

# New evidence on the persistence of profit in Turkey with first and second generation panel unit root tests

Alper Aslan<sup>1</sup>

*University of Niğde, Faculty of Economics and Administrative Sciences, Department of Economics, Niğde, Turkey*  
*e-mail: alperaslan@nigde.edu.tr*

Ferit Kula

*University of Erziyes, Faculty of Economics and Administrative Sciences, Department of Economics, Kayseri, Turkey*  
*e-mail: kulaf@erciyes.edu.tr*

Muhittin Kaplan

*University of Melikşah, Faculty of Economics and Administrative Sciences, Department of Economics, Kayseri, Turkey*  
*e-mail: mkaplan@meliksah.edu.tr*

## Abstract

As argued that Developing country (DC) markets are lacking in competition because there are entry and exit barriers, high levels of protection, small and segmented markets in these countries. However, empirical literature on the intensity of competition in DCs, although limited in number, shows that the persistency coefficients are smaller for DCs than for advanced countries (ACs) suggesting that the intensity of competition is higher in DCs than that for the latter. This paper will provide new empirical evidence on the subject for 114 of the largest manufacturing firms in Turkey over the period 1985-2005. Empirical methodology chosen involves the first and second generation panel data unit root analysis of corporate profitability since the first generation panel unit root tests (LLC and IPS tests) are inadequate in the presence of cross-sectional dependence and may lead to misleading conclusions. To check the robustness of our results, we also repeated the unit root tests utilized for smaller sub-samples: *the pre-customs union* and *post-customs union* years of 1985–1995 and 1996-2005, in addition to full span analysis. The empirical findings of this paper illustrate that our results are not sensitive to the sampling periods selected and *Customs Union does not* generate substantial welfare at least for a sample of 114 listed companies drawn among 500 largest firms in Turkey.

*Keywords:* Competition, persistency of profits, unit roots.

*JEL classification:* L0; L11; L25; L16.

## 1. Introduction

The market structure performance paradigm holds that structure affects conduct, which in turn determines ultimate market performance. The

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empirical literature on the structure conduct- performance (SCP) relation has developed considerably since it was first introduced by Joe S. Bain's study in (1941), "The Profit Rate as Measure of Monopoly Power". The seminal contributions of Mueller (1977, 1986 and 1990) has triggered a productive and progressively growing literature on SCP aiming to investigate empirically the persistence of company profits. The idea is that, competitive environment will erode abnormal profits and therefore, profitability of competing firms will not be persistent and hence profit differentials across firms, will disappear in the long run. However, the empirical evidence tends to give little support to this theory. Several studies investigate the question of competition within the framework of persistence of profits, across different economies, industries, and time periods (Cuaresma and Gschwandtner, 2008).

Mueller (1990) has examined the dynamics of company profits for seven developed economies during the 1960s–1980s. The main finding of this study was that a high degree of profit persistence was observed in all these developed economies. On the other hand, Kambahampati (1995) and Glen, Lee and Singh (2001) have carried out studies on the intensity of competition for developing countries such as India and seven emerging markets. While Kambahampati (1995) showed that competition is less intense only in fast-growing industries in India, Glen et al (2001) concluded that both short and long-term persistency of corporate profit rates for seven developing countries are lower than those for mature economies.

Glen et al. (2001)'s findings, imply that there is a higher level of competition in emerging markets, come as a surprise considering the fact that the presence of entry and exit barriers, high levels of protection, small and segmented markets that may discourage competition are the main characteristics of emerging countries (Lee 1992 and Singh 2003).

This interesting finding has also attracted a lot of interest in examining the persistence of profits in developing countries in general, as well as in Turkey. Yurtoğlu (2004) analyzed the persistence of firm-level profitability for the largest 172 manufacturing firms in Turkey during the period 1985–1998 and concluded that the intensity of competition in Turkey is no less than in developed countries. In a similar study, Kaplan and Aslan (2008) look into the underlying sources of the persistency, namely persistency of monopoly power and of economic efficiency using the data from 114 largest firms in Turkey over the period 1984–2004. They found that the observed persistency of profits in the markets is due to persistency of productivity rather than the persistency of profit margins suggesting that pro-competitive characteristics of markets overweigh the inimical competition characteristics in Turkey.

While these papers aimed at measuring the level of competition focus on time series analysis, Resende (2006) analyzed the persistence of firm-level profitability in Brazil by using panel data unit root tests. The results of his study mostly show the presence of a unit root for both measures of

excess profitability employed in the paper implying that one can still observe extremely persistent profits.

However the conventional panel unit root tests, Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003)'s tests, as the ones employed in Resende (2006) are criticized by Sarno & Taylor (1998), O'Connell (1998), Kristian (2005) and Pesaran (2005) for assuming cross-sectional independence. The reason is that cross-section dependence can arise due to unobservable common factors or spatial effects or spillover effects, which are common characteristic of data sets employed in persistence studies. Furthermore, neglect of cross-section dependence in panel unit root tests could lead to significant size distortions and have adverse effects on the properties of tests leading to invalid, misleading conclusions (Baltagi and Pesaran, 2007; Pesaran, 2007).

The aim of our study is to present further evidence on the persistence of profit in Turkey by mitigating the low power problem of conventional panel unit root tests by employing second generation panel data unit root methodology over the period 1985-2005, and for smaller sub-samples, *pre-customs union* and *post-customs union* years of 1985–1995 and 1996-2005. To the best of our knowledge, this paper attempts CADF tests for the first time to test persistence of profit and to analyze the effect of Customs Union on the market structure and profitability using the firms-level data.

## 2. Data description and empirical methodology

Before undertaking the econometric analysis of the persistency of profits and its components, this section introduces the data employed in the applied work and provides main features and preliminary statistical analysis of it. The data is obtained from the annual surveys of the 500 largest firms conducted by the Istanbul Chamber of Industry (ICI), which includes accounting data on sales, gross value added, total assets, profits before taxes, exports and number of employees. Firms with broken runs of data are excluded and the data set subject to empirical analysis involves a sample of 114 listed companies continuously over the period 1985-2005.

To test the presence of persistence of profitability, persistence in the profitability variable and persistence in the determinants of profitability variable, namely market power and productivity variables will be tested using the first and second generation panel unit root tests. The reason for the use of more than one profitability variable can be explained as follows: According to persistence of profit (PP) methodology, if competition is intense, the above average profits in one period will be eroded in the subsequent periods and therefore profitability of competing firms will not be persistent. In econometrics term, this means that the profitability variable follows stationary process. If competition is less intense, then firms earning above average profits will be able to maintain the same level of profits in the

subsequent periods implying the presence of persistence of profits (i.e. profitability variable is non-stationary).

However, as shown by Demsetz (1974, 1989), the observed high profitability of large firms may be due to their greater efficiency or to greater market power since the return on assets is equal to  $(R/K) = (R/S) \cdot (S/K)$ , in where R represents profits, K is capital, S represents sales. The latter two terms, profit margins (R/S) and output-capital ratio (S/K) can be interpreted as market power (profits(R)/sales(S)) and productivity (the output(S)/capital(K)), which are the examination of the two components of persistency of profits (Glen, Lee and Singh, 2003).

The variables that will be used in the empirical analysis of the profitability and its two components, namely profit margins and output capital ratios are defined as follows. *Profitability* is defined as earnings after tax divided by total assets. But data after tax profits are not provided by ICI and therefore earnings before taxes is used in definition of profitability. *Profit margins* and *output capital ratios* are defined as earnings before taxes divided by total sales and total sales over total assets respectively. Table 1 illustrates the descriptive statistics related to the data set. As seen from the Table, all three proxies for profitability are positively skewed. Kurtosis values indicate that the variables have a leptokurtic distribution, which has a more acute peak around the mean and flatter tails than the normal distribution.

**Table 1**  
Simple statistical descriptions of company profit rates

	<b>Capital-output ratio</b>	<b>Profit margins</b>	<b>Profitability</b>
<b>Mean</b>	1.704425	.178499	.3731118
<b>Std. Dev.</b>	1.266071	.3783507	.9363972
<b>Skewness</b>	1.990752	4.039581	3.007107
<b>Kurtosis</b>	11.94686	35.6043	22.75215
<b>Variance</b>	1.602936	.1431492	.8768397

*Source:* The data is obtained from the annual surveys of the 500 largest firms conducted by the Istanbul Chamber of Industry (ICI) which involves a sample of 114 listed continuously over the period 1985-2005.

It is well known that traditional unit root tests possess low power against near unit root alternatives (Diebold & Nerlove, 1990). A popular test for verifying unit roots is the Augmented Dickey-Fuller (ADF) test in which the null hypothesis is non-stationarity. However, these statistics are applied to time series data sets. The most effectual choice is therefore the application of panel unit root tests. The pioneer of the panel unit root is Abuaf & Jorion (1990). In an influential paper Abuaf & Jorion (1990) develop a multivariate unit root test based on systems estimation of autoregressive processes for a set of real exchange rate series, and use this to reject the joint null hypothesis of non-stationarity of a number of real exchange rates.

### 2.1. First generation unit root tests (Cross-sectional independence)

The Im, Pesaran and Shin (2003, IPS hereafter) is based on the traditional augmented Dickey Fuller specification

$$\Delta y_{it} = \mu_i + \delta_i t + \rho_i y_{it-1} + \sum_{k=1}^{p_i} \gamma_{ik} \Delta y_{it-k} + v_{it} \quad (1)$$

IPS allows for a heterogeneous coefficient of  $y_{it-1}$  and proposes a testing procedure based on averaging individual unit root test statistics and the null hypothesis is given by the existence of a unit root in all the units of the panel against the alternative of at least one stationary cross-section. To test the hypothesis, Im *et al.* (2003) propose a standardized t-bar statistic given by:

$$Z_{tbar} = \frac{\sqrt{N} \left\{ tbar_{NT} - \frac{1}{N} \sum_{i=1}^N E[t_{iT}(p_i, 0) | \beta_i = 0] \right\}}{\sqrt{\frac{1}{N} \sum_{i=1}^N Var[t_{iT}(p_i, 0) | \beta_i = 0]}} \xrightarrow{T, N} N(0, 1) \quad (2)$$

The Levin, Lin and Chu t-test (2002, hereafter LLC) test is carried out by estimating the following equation:

$$\Delta y_{i,t} = \alpha_{i,k} + \beta_i y_{i,t-1} + \sum_{l=1}^{L_i} \partial_l \Delta y_{i,t-l} + \varepsilon_{i,t} \quad (3)$$

The panel OLS of the normalized residuals is run to obtain the  $\beta$  estimates. And LLC show that under the null hypothesis  $H_0 : \beta = 0$ , the regression t-statistic ( $t_\beta$ ) has a standard normal limiting distribution.

When one considers both IPS and LLC test results with trend and without trend analysis, the results reject in all cases the existence of a unit root for the three different profitability measures which mean that there is convergence in profit rates. Results from IPS and LLC illustrate that persistence of capital-output, profit margins and profitability tend to return to their trend path overtime.

The first generation of panel unit root tests include Levin, Lin and Chu (2002), Im, Pesaran and Shin (2003)'s tests which are all constructed under the assumption that the individual time series in the panel are cross-sectionally independently distributed. However, a large amount of evidence accumulated in the literature suggests that co-movements of economic variables are very common and the first generation unit root tests which neglects this cross-sectional dependence and co-movements will provide invalid and misleading results. To overcome this difficulty, a second generation of tests allowing for the cross-sectional dependence has been introduced.

**Table 2**  
First Generation Unit Root Tests (1985-2005)

Method	Augmented Lag	Capital-output ratio		Profit margins		Profitability	
		Constant	Constant and Trend	Constant	Constant and Trend	Constant	Constant and Trend
LLC	0	-31.449 (0.000)	-33.134 (0.000)	-36.875 (0.000)	-34.796 (0.000)	-41.733 (0.000)	-39.049 (0.000)
	1	-14.456 (0.000)	-16.826 (0.000)	-17.942 (0.000)	-17.446 (0.000)	-22.031 (0.000)	-21.523 (0.000)
	2	-6.498 (0.000)	-10.154 (0.000)	-9.640 (0.000)	-10.667 (0.000)	-12.970 (0.000)	-15.098 (0.000)
	<b>Optimal Lag</b>	-31.191 (0.000)	-27.531 (0.000)	-36.806 (0.000)	-25.541 (0.000)	-42.098 (0.000)	-28.344 (0.000)
	0	-24.800 (0.000)	-23.481 (0.000)	-29.652 (0.000)	-24.793 (0.000)	-32.308 (0.000)	-27.220 (0.000)
IPS	1	-11.125 (0.000)	-9.827 (0.000)	-14.487 (0.000)	-10.160 (0.000)	-16.131 (0.000)	-11.857 (0.000)
	2	-6.538 (0.000)	-7.815 (0.000)	-9.949 (0.000)	-8.101 (0.000)	-10.881 (0.000)	-9.723 (0.000)
	<b>Optimal Lag</b>	-24.335 (0.000)	-21.399 (0.000)	-29.286 (0.000)	-17.939 (0.000)	-32.323 (0.000)	-20.525 (0.000)

Note: Prob. statistics in parenthesis and to decide the optimal lag, Modified Schwarz Information Criterion (MSIC) is used.

## 2.2. Second generation unit root tests (cross-sectional dependence)

A growing body of the panel data literature comes to the conclusion that panel data sets are likely to exhibit substantial cross-sectional dependence, which may arise due to the presence of common shocks and unobserved components that become part of the error term ultimately, spatial dependence, as well as due to idiosyncratic pair-wise dependence in the disturbances with no particular pattern of common components or spatial dependence<sup>2</sup>. Moreover, in microeconomic applications, the propensity of individuals to respond to common ‘shocks’, or common unobserved factors in a similar manner may be plausibly explained by social norms, neighborhood effects, herd behavior and genuinely interdependent preferences (De Hoyos and Sarafidis, 2006).

After the work of Abuaf & Jorion (1990), Levin & Lin (1993), and O’Connell (1998), and Sarno & Taylor (1998) improved the panel unit root tests by considering cross-sectional correlation. O’Connell (1998) was the first author to note that cross-sectional correlation in panel data will have

<sup>2</sup> See, for detailed literature Baltagi (2005, section 12.3).

negative effects on the Levin-Lin panel unit root test, making the test have substantial size distortion and low power. Kristian (2005) studied the performance of the Levin-Lin test under cross-sectional correlation. In his DGP (Data Generation Processes), he controlled the magnitude of the correlation, and he found results similar to the results of O’Connell (1998). Pesaran (2005) proposed the simple averages of the individual cross-sectional augmented ADF (CADF) statistics, based on a single common factor specification for the cross-correlation structure. The Pesaran tests augment the standard ADF regressions with the cross section averages of lagged levels and first differences of the individual series (CADF).

The CADF tests which assume serial correlated errors are based on the t-statistics of the OLS estimate of  $\beta_I$  in the following regression:

$$\Delta y_{it} = \mu_i + \delta_i t + \beta_i y_{it-1} + c_i \bar{y}_t + d_i \Delta \bar{y}_t + \sum_{k=1}^{P_i} \gamma_{ik} \Delta y_{it-k} + e_{it} \tag{4}$$

where  $t_i(N, T)$  the t-statistic of the coefficient of  $y_{i,t-1}$  in the CADF regression for the  $i^{th}$  companies.

**Table 3**  
Second Generation Unit Root Test (1985-2005)

		Capital-output ratio		Profit margins		Profitability	
Method	Augmented Lag	Constant	Constant and Trend	Constant	Constant and Trend	Constant	Constant and Trend
	0	-3.326 (0.000)	-3.652 (0.000)	-3.488 (0.000)	-3.458 (0.000)	-3.859 (0.000)	-3.818 (0.000)
CADF	1	-2.211 (0.000)	-2.413 (0.097)	-2.976 (0.000)	-2.967 (0.000)	-2.513 (0.000)	-2.467 (0.031)
	2	-1.775 (0.357)	-1.983 (0.999)	-1.922 (0.029)	-1.904 (1.000)	-1.899 (0.048)	-1.862 (1.000)

*Note:* Prob. statistics in parenthesis and the distribution of the CIPS test is non-standard and the critical values for 1%, 5% and 10% have been tabulated by Pesaran (2005) for different combinations of N and T.

In addition to the first generation unit root tests results with cross-sectional independence, when this survey considers the cross-sectional correlation by CIPS test, Table 3 displays different results. The results obtained in this research which is based on first generation panel unit root techniques indicate that all three proxies for profitability follow a stationary process implying that there is no persistence in profit rates. Although the first generation test results provide support for the presence of competition in industries of Turkey, the second generation tests, which assume cross-sectional dependence in profitability of firms, illustrate that there is persistence in profit rates overtime.

### 3. Persistence of profits and pro-competitive effect of customs union

In order to provide a robust analysis for our results, we repeat the unit root tests utilized above for smaller sub-samples: *the pre-customs union* and *post-customs union* years of 1985–1995 and 1996–2005<sup>3</sup>. The purpose is to show that our results are not sensitive to the sampling periods selected and to analyze the effect of that customs union on the market structure and profitability in the firms.

The Turkish economy achieved considerably high growth rates in the 1960s and 1970s under the import substitution industrialization (ISI) strategy. However, as observed in many other countries that had adopted similar strategies in the same era, the process of rapid economic growth proved to be unsustainable in the late 1970s under the severe pressure of balance of payments problems. On January 24, 1980, the Turkish government announced a stabilization program which was fully implemented under the military regime after September 1980 (Taymaz, 1998). The Stabilization and Structural Adjustment Program (SSAP) has represented a radical transformation of earlier economic policies and attracted a great deal of domestic and international attention, especially in IMF- World Bank circles where it has been hailed as a case of successful adjustment if not as a new model of market and export oriented policies (Şenses, 1991).

Import liberalization and export promotion were key features of the reform. Import liberalization encompassed a gradual shift from nontariff barriers to tariffs and a reduction in the rate and variability of import taxes. Export promotion was achieved directly through a generous package of incentives for exporters and indirectly through devaluation of the real Exchange rate. In the first of two series of import reforms, the import licensing system was liberalized in 1981. Quotas were abolished, and goods from the quota list were moved to the liberalized lists- one requiring import licenses, the other not (Foroutan, 1996).

These policies were implemented to discipline the behavior of firms which have market power. The empirical literature investigating the impact of import competition on the pricing behavior of domestic firms has concluded that trade liberalization forces firms to set prices closer to marginal costs. That is, there is a negative relationship between profits and the openness of the economy.

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<sup>3</sup> The relationship between Turkey and initially with the European Economic Cooperation (EEC) and later with the European Union (EU) was started by an agreement in Ankara on 12 September 1963. The agreement, which came into effect on 1 January 1964, provides for a developing customs union between Turkey and the European Union. In December 1995, the European Parliament took the decision to finalize the Customs Agreement with Turkey, while the final stage of Customs Union was arrived in January 1996.

The new theoretical literature claimed that the scope of gains from regional integration beyond that suggested by standard customs union theory based on perfect competition and constant returns to scale. As a result, one of the important issues that customs union theory now focuses on is the effect of economic integration on the market structure and the profitability of firms. The new theoretical literature on international trade suggests that under conditions of imperfect conditions, trade liberalization generates substantial welfare increases as a result of greater competitive pressure. The so-called *pro-competitive effect* of trade liberalization indicates that trade affects the degree of competition which decreases firms' price cost mark-ups and increases the production scale (Akkoyunlu-Wigley and Mihci, 2006).

However, there are few papers examined the relationship between profit rates and trade liberalization in Turkey. While Aydoğuş (1993) found no statistically meaningful relationship between total factor productivity and export expansion, Levinsohn (1993) reached the conclusion that industries that were imperfectly competitive prior to liberalization experienced a decline in markups with the onset of liberalization. Yalçın (2000) concludes that import penetration decreases profit rates in both public and private sectors by using panel data of Turkey manufacturing industry for the 1983-1994 period. By extending time periods as 1966-2001, Saatçi and Aslan (2008) concluded that import penetration played an important role in disciplining the market for the years 1966-2001 in Turkish manufacturing industries. However, all these aforementioned papers focused on sector data. In this paper, the Customs union effect on firms in Turkey is examined for the periods *the pre-customs union* and *post-customs union* years of 1985-1995 and 1996-2005.

Tables 4, 5, 6, and 7 display the results. Table 4 shows the first generation unit root tests for the period 1985-1995, similar to Table 2 for the full spans of data. The results of the Table shows that none of the persistence variables (capital-output, profit margins and profitability) involve unit-roots implying that they tend to return to their trend path over the period 1985-1995.

In order to see pro-competitive effect of trade liberalization, we repeat the unit root tests utilized above by taking custom union effect into account in Table 5.

**Table 4**  
First Generation Unit Root Tests (1985-1995)

Method	Augmented Lag	Capital-output ratio		Profit margins		Profitability	
		Constant	Constant and Trend	Constant	Constant and Trend	Constant	Constant and Trend
LLC	0	-31.083 (0.000)	-32.140 (0.000)	-32.961 (0.000)	-36.869 (0.000)	-34.613 (0.000)	-36.719 (0.000)
	1	-9.331 (0.000)	-9.263 (0.000)	-8.232 (0.000)	-10.727 (0.000)	-9.937 (0.000)	-11.449 (0.000)
	2	-5.322 (0.000)	-12.817 (0.000)	-5.478 (0.000)	-23.820 (0.000)	-3.390 (0.000)	-20.076 (0.000)
	<b>Optimal Lag</b>	-30.627 (0.000)	-30.724 (0.000)	-32.847 (0.000)	-34.230 (0.000)	-34.785 (0.000)	-33.918 (0.000)
IPS	0	18.836 (0.000)	-14.363 (0.000)	-19.712 (0.000)	-18.082 (0.000)	-20.726 (0.000)	-17.612 (0.000)
	1	-4.254 (0.000)	0.009 (0.503)	-3.920 (0.000)	-1.383 (0.083)	-4.736 (0.000)	-1.284 (0.000)
	2	-3.384 (0.000)	-2.170 (0.015)	-3.630 (0.000)	-5.903 (0.000)	-4.020 (0.000)	-5.421 (0.000)
	<b>Optimal Lag</b>	-18.079 (0.000)	-11.508 (0.000)	-18.617 (0.000)	-13.486 (0.000)	-20.554 (0.000)	-13.823 (0.000)

*Note:* Prob. statistics in parenthesis and to decide the optimal lag, Modified Schwarz Information Criterion (MSIC) is used.

However, the first generation results for *post-customs union* are essentially unchanged from *the pre-customs union*. ***This result can be interpreted that Customs Union does not*** generate substantial welfare gains through greater competitive pressure.

Considering the criticism of O'Connell (1998) related to the assumption of the first generation tests which involves that panel series are cross-sectionally independently distributed, we employed the second generation test proposed by Pesaran (2005).

We consider the non rejection of the unit root hypothesis as a strong evidence of lacking competition since the presence of unit root in profits variables would indicate that the profitability gap among the different firms would be infinitely persistent. Examination of Table 6 shows that we cannot reject the null hypothesis of unit root. Therefore, we conclude that the second generation panel data unit root test indicates the presence of persistence in profits in Turkey.

**Table 5**  
First Generation Unit Root Tests (1996-2005)

Method	Augmented Lag	Capital-output ratio		Profit margins		Profitability	
		Constant	Constant and Trend	Constant	Constant and Trend	Constant	Constant and Trend
LLC	0	-12.870 (0.000)	-16.967 (0.000)	-17.797 (0.000)	-18.524 (0.000)	-16.224 (0.000)	-17.882 (0.000)
	1	-13.355 (0.000)	-14.970 (0.000)	-15.530 (0.000)	-20.238 (0.000)	-15.010 (0.000)	-16.597 (0.000)
	2	-12.131 (0.000)	-12.512 (0.000)	-13.904 (0.000)	-10.899 (0.000)	-16.547 (0.000)	-15.230 (0.000)
	Optimal Lag	-15.950 (0.000)	-19.455 (0.000)	-19.667 (0.000)	-23.136 (0.000)	-19.465 (0.000)	-19.787 (0.000)
	0	-5.215 (0.000)	-1.561 (0.059)	-7.336 (0.000)	-1.454 (0.072)	-6.646 (0.000)	-1.116 (0.132)
	1	-4.498 (0.000)	-0.321 (0.374)	-6.121 (0.000)	-1.110 (0.133)	-5.611 (0.000)	-0.501 (0.307)
IPS	2	-4.122 (0.000)	0.115 (0.545)	-5.331 (0.000)	0.559 (0.711)	-6.600 (0.000)	-0.586 (0.278)
	Optimal Lag	-6.767 (0.000)	-2.432 (0.007)	-8.700 (0.000)	-2.666 (0.003)	-8.248 (0.000)	-1.931 (0.026)

Note: Prob. statistics in parenthesis and to decide the optimal lag, Modified Schwarz Information Criterion (MSIC) is used.

**Table 6**  
Second Generation Unit Root Test (1985-1995)

Augmented Lag	Capital-output ratio		Profit margins		Profitability	
	Constant	Constant and Trend	Constant	Constant and Trend	Constant	Constant and Trend
0	-2.671 (0.000)	-3.208 (0.000)	-2.458 (0.000)	-2.951 (0.000)	-2.780 (0.000)	-3.464 (0.000)
1	-1.049 (1.000)	-1.542 (1.000)	-3.602 (0.000)	-4.362 (0.000)	-0.520 (1.000)	-0.908 (1.000)
2	2.610 (1.000)	1.700 (1.000)	2.610 (1.000)	1.700 (1.000)	2.610 (1.000)	1.700 (1.000)

Note: Prob. statistics in parenthesis and the distribution of the CIPS test is non-standard and the critical values for 1%, 5% and 10% have been tabulated by Pesaran (2005) for different combinations of N and T.

Furthermore, when the cross-sectional dependence is taken into account, our results are essentially unchanged in terms of *the pre-customs union* and *post-customs union*. *However*, second generation test which assumes cross-sectional dependence in profit margins illustrates that there is persistence in profit rates for both Customs Union sub-samples.

**Table 7**  
Second Generation Unit Root Test (1996-2005)

Lag	Capital-output ratio		Profit margins		Profitability	
	Constant	Constant and Trend	Constant	Constant and Trend	Constant	Constant and Trend
0	-1.943 (0.022)	-2.373 (0.204)	-1.937 (0.025)	-2.136 (0.779)	-2.026 (0.004)	-2.668 (0.453)
1	-1.785 (0.224)	1.700 (1.000)	-2.844 (0.000)	1.700 (1.000)	-2.535 (0.000)	1.700 (1.000)
2	2.610 (1.000)	1.700 (1.000)	2.610 (1.000)	1.700 (1.000)	2.610 (1.000)	1.700 (1.000)

Overall result implies that while the first generation panel unit root tests results illustrate no persistence in profits, second generation test which has more power<sup>4</sup> illustrate that there is persistence in profit rates overtime implying that the Turkish manufacturing sector lacks competition. These findings may be due to entry and exit barriers, high levels of protection and the presence of small and segmented markets since anti-trust enforcement was weak in Turkey. Furthermore, these results might be related to the fact that major actors in the Turkish economy have been family-controlled, diversified big business group, or holding companies. Many of the largest companies in Turkey are owned and controlled by one of the largest holding companies, which in turn are controlled by a family. The holding company in Turkey is similar to the Japanese *keiretsu* and even more similar to the Korean *chaebol*, in that it is a collection of a large number of industrial and financial companies owned and managed by the founder family (Yurtoglu, 2004).

#### 4. Conclusion

In this study, we tested the intensity of competition in the Turkish manufacturing sector using the data from 114 largest firms in Turkey and employing the first and second generation panel data unit root analysis of corporate profitability. The empirical analysis is carried out for profitability variable and for two components of profitability, market power and productivity.

The results obtained from the first generation panel unit root techniques, which have less power have indicated that all three proxies for profitability follow a stationary process implying convergence in profit rates in the long-run. Although these results imply the presence of intensive

<sup>4</sup> According to O'Connell (1998) and Pesaran (2005) allowing for cross-sectional correlation in the error terms we are able to avoid severe size distortions in panel unit root tests. This may allow us to obtain significant improvements and more power over traditional panel unit root tests.

competition among manufacturing firms, the findings gathered from more powerful second generation tests, which assume cross-sectional dependence, illustrate that there is no convergence in profit rates overtime at least for these 114 firms in Turkey.

In addition to these interesting findings, in order to provide a robust analysis for our results and to analyze the effect of that customs union on market structure and profitability in firms, we repeated the unit root tests utilized above for smaller sub-samples such as *the pre-customs union* and *post-customs union* years of 1985–1995 and 1996–2005.

Because the new theoretical literature on international trade implies that under conditions of imperfect condition, trade liberalization creates substantial welfare increases via greater competitive pressure. Central to the so-called pro-competitive effect of Customs Union, is the idea that trade affects the degree of competition, thereby, depressing firms' profit margins.

In addition to first generation unit root tests' results for pro-competitive effect of Customs Union, when the cross-sectional dependence is taken into account, our results are essentially unchanged indicating *that there are no differences for both Customs Union sub-samples. However, while the first generation tests' results* indicate that all three proxies for profitability follow a stationary process implying that there is no persistence in profit rates, second generation tests, which assume cross-sectional dependence in profit margins, illustrate that there is persistence in profit rates for both Customs Union sub-samples.

Although it is expected that the entrance to the Customs Union should increase competitive pressure in Turkey, the evidence indicated that an extreme level of persistence associated with the presence of a unit root in excess profitability cannot be discarded.

However, it is worth mentioning that the results of this study cannot easily be generalized to the economy as a whole since the data employed in this study belongs to 114 listed firms drawn from the annual surveys of the 500 largest firms conducted by the Istanbul Chamber of Industry (ICI). For this reason, further studies are recommended to replicate the findings with small and large firms and for different periods.

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## Özet

### Türkiye’de kârlılığın kalıcılığı: Birinci ve ikinci nesil panel birim kök testleri ile yeni bulgular

Bu araştırmada 1985-2005 yılları arasında Türkiye’de firma seviyesinde kârlılığın kalıcı olup olmadığı birinci ve ikinci nesil panel birim kök testleri ile sınanmıştır. Türkiye’de ilk 500 büyük firma sıralamasına giren 114 firma örneğinde yapılan analizlerde şu bulgulara ulaşılmıştır: 1985-2005 dönemi için birinci nesil birim kök testleri ile elde edilen sonuçlar kârlılık göstergelerinin durağan olduğunu yani firmaların kârlılıklarının birbirine yakınsadığını göstermektedir. Ancak aynı dönem için yatay kesitler arasındaki bağımlılığı dikkate alan ikinci nesil birim kök testi sonuçları birinci nesil birim kök testlerinin tersine firmaların kârlılıklarının durağan olmadığını göstermektedir. Yapılan analizler gümrük birliği öncesi (1985-1995) ve gümrük birliği sonrası (1996-2005) alt dönemleri için tekrarlanmış ancak elde edilen bulgular 1985-2005 için ulaşılan sonucu değiştirmemiştir.

*Anahtar kelimeler:* Rekabet, kârlılığın sürekliliği, birim kökler.

*JEL sınıflandırma:* L0; L11; L25; L16.