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**Stock Market Development, Bank Concentration,  
Ownership Structure, and Bank Performance:  
Evidence from Turkey**

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**Abstract.** Using the the Two-Step Generalized Method of Moments (GMM) described by Arellano and Bond (1991) for dynamic panels, this paper analyzes the profitability of 25 commercial banks in Turkey over the period from 2003 to 2011. Our profitability determinants include bank-specific characteristics as well as industry-specific and macroeconomic factors, some of which have not been considered in previous studies. We conclude that the high bank profitability during these years is associated with a large percentage of loans in total assets, a low proportion of liquid asset, good efficiency and a low doubtful assets ratio. In addition, higher capital ratios also increase the bank's return, but only when return on assets and return on equities is used as the profitability measure. We find evidence of economies of scale in the Turkish banking sector. Empirical results show that there is a negative relationship between financial development and profitability. We find also there is a positive relationship between bank concentration and bank performance in Turkish banking industry, consisting with the structure-conduct-performance (SCP) hypothesis. The results also suggest that there is a negative relation between the foreign ownership and profitability, indicating that foreign banks do not in general make relatively higher profit, at least during the period under the consideration.

**Keywords:** Banking profitability, Stock markets, Concentration, Ownership, Turkey, GMM

**JEL classification:** G21, C32, E44.

## 1. Introduction

Profit is the foremost motive for everyone to put an immense effort and make the business successful, since profit is a central source of (re) investment funds. When it comes to banking sector, the importance of banks' profitability can be appraised at the micro and macro levels of the economy (see for instance: Bourke, 1989; Chaudhry *et al.*, 1995; Kosmidou *et al.*, 2007; Kosmidou, 2008). In modern finance, banks play a crucial role in the process of financial intermediation (Fungacova and Poghosyan, 2011). During the last two decades the banking sector has experienced worldwide major transformations in its operating environment. Both external and domestic factors have affected its structure and performance. Recently banking institutions are facing the environment that is changing rapidly and competition is increasing at local as well

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as international level (Athanasoglou et al., 2008). Banks are the primary source of funds for general public, government administration together with business industrial sectors. Countries whose banking system is going into profit can successfully manage the financial distress and make a better contribution in the consistency of financial system. Therefore it is useful to investigate what are the major factors which can affect the profitability of banks.

The fast economic developments lived in the world are affecting all sectors. One of the sectors which is directly affected of those developments is finance sector. Because, the circulation of commercial life proximately depends on the healthy operating of the financial sector. Due to the fact that the financial markets undertake the function of the supply of funds for dissemination of new technologies and the realization of capital accumulation, it fronts us during the economic growth as an important element (Aslan and Kucukaksoy, 2006). Ensuring the effectiveness in source allocation and capital accumulation through the financial markets contributes to economic growth by creating a suitable environment for the implementation of large and long-term projects with increasing technological innovation and specialization (Altıntaş and Ayricay, 2010). The functioning of financial markets in a country has a major impact on the development of the country. The increasing of the integration of financial markets to each other in recent years made this effect more important.

The facts as globalization, financial liberalization, the release of the interest rates, opening the sector to international markets and getting sources from the international area and releasing the operation with foreign currency increased the uncertainty and variability in the market. The facts as uncertainties in the financial markets, asymmetric information and increase the risk in the market of the problems of adverse selection are increasing the impact of financial deregulation on banking sector and risks. Thus, the importance of the risks on banking sector is increasing.

The adverse effects of the global financial crisis on the economies of the countries and financial markets revived the discussions about the inadequacy of the financial regulations in banking sector. In this context, Basel III consensus has been prepared in order to repair the deficiencies observed in the Basel II for increasing the durability of banking sector against financial and economic shocks (Yuksel, 2011). Following the recent global crisis Basel III consensus has been prepared by Basel Committee in order to repair the unsatisfactory aspects of Basel II consensus, come up with new approaches and measures and trying to prevent the possible crises by doing those actions or minimize the loses. Basel III regulations prepared following the last global crisis are not only increasing the total amount of the capital of the banks they should hold, they (Basel III reg.) also bring the new regulations (Gurel *et al.*, 2012).

The ultimate aim of the banks in terms of financial management is to maximize shareholder profits as it is in all commercial enterprises. One of the most important tools to reach that ultimate goal are getting profit and raising profit (Iskenderoglu *et al.*, 2012). The success of the banks about protecting the profitability ratios or reaching the profitability targets highly depends on the accurate pricing and effectively management of those risks which have been undertaken due to the brokerage activities (Eken, 2005).

This paper investigates the effect of bank-specific, industry specific and macroeconomic determinants on bank profitability. The group of the bank-specific determinants of profitability involves operating efficiency, risk, asset quality, liquidity, capitalization and size. The second group of determinants describes industry-structure factors that affect bank profits, which are not the direct result of managerial decisions. These are industry concentration and the ownership status of

banks. The third group of determinants relates profitability to the macroeconomic environment within which the banking system operates.

The present paper builds on the work by Athanasoglou et al. (2008), Trujillo-Ponce (2013); Naceur and Omran (2011); Fungacova and Poghosyan (2011); Dietrich and Wanzenried (2011); Kanas et al. (2012); Lee and Hsieh (2013). We empirically assess the main factors that determine the profitability of banks in Turkey. To that end, we use data from 25 commercial banks and for the longest relevant period from 2003 to 2011. To account for profit persistence and potential endogeneity problems, we apply a GMM technique to our panel of Turkish banks. Studies on Turkish banking are only very loosely related to our paper and have instead focused on the relationship between bank specific and macro-economic variables and profitability (e.g. Kaya, 2002; Atasoy, 2007; Ata, 2009; Gündoğdu and Aksu, 2011; Çerçi et al., 2012). To conclude, the existing literature provides a comprehensive examination of the effects of banks specific, industry-specific, and macroeconomic determinants on bank profitability. However, the impact of the financial development indicators on the determinants of bank profitability has not yet been widely analyzed. To fill the gap, we also examine the impact of the level of financial development on the performance of the banking sector. We use two proxies for the level of financial development; one represents market-based indicators and the other refers to bank-based indicators. As for the first proxy, we use stock market capitalization divided by GDP as a measure of the size of the equity market. As for the bank-based indicators, we use the size of the ratio of the credit to private sector as a percentage of the GDP to measure the importance of bank financing in the economy. The novelty should make an important addition to the extensive literature on the determinants of bank profitability.

The paper is structured as follows. Section 2 surveys the relevant literature on banking profitability and theoretical background. Section 3 describes the data sample and methodology used. Section 4 presents the results of our empirical analysis, and Section 5 concludes.

## 2. Theory and Literature

This section reviews the relevant literature on the determinants of banking profitability. According to previous studies, the factors determining the profitability of banks fall into three main groups. First, there is a group of determinants of profitability that are specific to each bank and that, in many cases, are the direct result of managerial decisions. They include asset structure, asset quality, capitalization, financial structure, efficiency, and size. The second group of determinants includes factors relating profitability to the industry structure. The third group of determinants relates profitability to the macroeconomic environment within which the banking system operates economic growth, inflation and interest rates.

### 2.1. Literature on Bank-Specific Determinants of Bank Profitability

In most studies, variables such as bank size, risk, capital ratio, asset quality, liquidity and operational efficiency are used as bank-specific determinants of banking profitability.

Size is included to assess the existence of economies or diseconomies of scale in the banking sector. The empirical results provide conflicting evidence. Berger et al. (1987), provide evidence that costs are reduced only slightly by increasing the size of a bank and that very large bank often encounter scale inefficiencies. Smirlock (1985), Short (1979), Bikker and Hu (2002), Pasiouras and Kosmidou (2007), Naceur and Goaid (2008), Fadzlan and Kahazanah (2009) find a positive and significant relationship between size and bank performance. On the other hand,

Kosmidou et al. (2005) find that small UK banks display higher profitability to larger ones over the period in 1998. Athanasoglou et al. (2008), Kasman (2010) and Trujillo-Ponce (2013) find that a size has a negative and statistically significant impact on the net interest margin on a panel of 431 banks in 39 countries.

Another determinant of bank profitability is risk. In the literature, the bank loans over total assets ratio is mainly used as a measure of bank liquidity or as a proxy for credit risk (Maudos and De Guevara, 2004). Miller and Noulas (1997) suggest a negative relationship between credit risk and profitability because a higher loan to asset ratio increases the exposure of banks to bad loans and hence lowers profit margins. On the other hand, standard asset pricing arguments imply a positive relationship between risk and earnings. Empirical studies find that a higher loan ratio is associated with higher interest margins, which suggest that risk averse shareholders seek larger earnings to compensate higher credit risk (Demirguc-Kunt and Huizingua, 1999, Chirwa, 2003, Maudos and Guevara, 2004, Naceur and Goaid, 2008, Flamini et al., 2009; Fadzlan and Kahazanah, 2009; Trujillo-Ponce, 2013; Kanas et al., 2012). Abreu and Mendes (2002) find that the loans-to-assets ratio, as a proxy for risk, has a positive impact on the profitability of a bank. Bourke (1989) and Molyneux and Thornton (1992), Miller and Noulas (1997), Goddard et al. (2004) and Iannotta et al. (2007) among others, find a negative and significant relationship between the level of risk and profitability.

The relationship between equity and profitability is also controversial. The first to examine closely the capital–earning relationship is Berger (1995). Berger (1995) finds that a strong positive relationship between capital and earnings, meaning well capitalized firms face lower expected bankruptcy costs, which in turn reduce their cost of funding and increase their profitability. The traditional view suggests a higher capital-asset ratio (CAR) is linked with a lower Return on Equity (ROE) because a higher CAR decreases the risk on equity and the tax subsidy provided by interest deductibility. In more recent studies, Angbazo (1996), Demirguc-Kunt and Huizingua (1999), Saunders and Schumacher (2000), Drakos (2003), Pasiouras and Kosmidou (2007), Naceur and Goaid (2008), Garcia-Herrero et al. (2009), Naceur nad Omran (2011) and Trujillo-Ponce (2013) find a positive relationship between bank performance and capitalization. Liquid assets to customer and short-term deposits proxying the liquidity risk faced by banks (Fungacova and Poghosyan, 2011). Banks with more liquid assets generally have smaller target capital buffers and may also be willing to increase their levels of risk (Jokipii and Milne, 2011). Alternatively, a bank that holds a relatively high proportion of capital is unlikely to earn high profits; yet is less exposed to risk (Goddard *et al.*, 2004). Molyneux and Thornton (1992), Fadzlan and Kahazanah (2009), Fungacova and Poghosyan (2011) find a negative relationship between the ratio of liquid assets to total assets and bank interest margins in Russia. Banks that are more liquid may be more efficient in the sense that, all other things being equal, an efficient bank can produce more output part of which includes liquid and other assets (Altunbas *et al.*, 2007).

### 2.2. Literature on Industrial Determinants of Bank Profitability

Another factor driving bank performance is market structure or industry concentration or competition; due to the relatively inelastic demand for loans and supply of deposits, banks choose to exercise their market power and set higher margins (Fungacova and Poghosyan, 2011). Market structure, which refers to the degree of market concentration within an industry, represents the degree of competition within a specific industry (Lee and Hsieh, 2013). Turning to market concentration and its impact on bank profitability, it should be noted that two opposing hypotheses have been proposed: the structure-conduct-performance (SCP) hypothesis and the efficient-structure (ES) hypothesis. Two theories are

proposed to explain how the degree of sector concentration affects bank profitability. The structure-conduct-performance hypothesis (also referred to as the market-power hypothesis) states that a more concentrated sector favours bank profitability motivated by the benefits of greater market power (Naceur and Omran, 2011). On the other hand, the efficient-structure theory explains the negative relationship between concentration and profitability as an indirect consequence of efficiency (Athanasoglou et al. 2008). A number of studies confirm the SCP hypothesis (Rose and Fraser, 1976, Heggstad and Mingo, 1974, Samad, 2005, and Chirwa, 2003; Berger and Bouwman, 2013). Other researches provide support to the ES hypothesis in the banking sector (Gillini et al., 1984, Smirlock, 1985, and Evanoff and Fortier, 1988; Garcia-Herrero et al., 2009; Kanas et al., 2012).

Another sectorial variable is the ownership of a bank. Demircuc-Kunt and Huizinga (1999) suggest that the international ownership of banks has a significant impact on bank profitability. Foreign banks are shown to be less profitable in developed countries. Demircuc-Kunt and Huizinga (2000) find that foreign banks realize higher margins than domestic banks in developing countries. Claessens et al. (2001) find that foreign bank entry improves domestic bank profitability, which they attribute to improved banking efficiency following the entry of foreign players. Grigorian and Manole (2002), Yildirim and Philippatos (2002) and Bonin et al. (2005a, b) all find that foreign-owned banks are significantly more cost efficient than domestic banks. Martinez Peria and Mody (2004) show that foreign banks in Latin American countries exhibit lower interest margins than domestic banks. While Belkhir (2004) finds a statistically significant negative relation between ownership and performance, McConnell and Servaes (1990), Belkhir (2009) and Westman (2011) finds a statistically significant positive relation between ownership and performance. Qi *et al.* (2000) find a negative the effect of foreign ownership on performance.

### 2.3. Literature on Macro-Economic Determinants of Bank Profitability

The impact of macroeconomic factors on bank performance has also been discussed in the literature. Previous studies also include external determinants of bank profitability such as central bank interest rate, inflation, the GDP development. Most studies have shown a positive relationship between inflation, central bank interest rates, GDP growth, and bank profitability (e.g. Bourke, 1989; Molyneux and Thornton, 1992; Demircuc-Kunt and Huizinga, 1999; Athanasoglou et al., 2008; Albertazzi and Gambacorta, 2009).

Poor economic conditions can worsen the quality of the loan portfolio, generating credit losses and increasing the provisions that banks need to hold, thereby reducing bank profitability (Trujillo and Ponce, 2013). The knowledge of the link between business cycle fluctuations and banking sector profitability is important in order to evaluate the stability of the financial and banking sector (Albertazzi and Gambacorta, 2009). GDP growth is considered as a macro determinant of bank performance and allows for controlling business cycle fluctuations (Bernanke and Gertler, 1989). According to Bernanke and Gertler (1989), Athanasoglou et al. (2008), Fadzlan and Kahazanah (2009) Albertazzi and Gambacorta (2009) and Trujillo-Ponce (2013) during recessions the quality of loans declines and therefore companies borrow at higher margins, therefore a negative relationship between spread and economic growth is to be expected. Among the studies that report a positive relationship between interest rates and bank profitability are Bourke (1989), Claeyns and Vander Vennet (2008), Demircuc-Kunt and Huizinga (1999), Garcia-Herrero et al. (2009), Trujillo-Ponce (2013) and Molyneux and Thornton (1992). Another variable which has received attention is inflation expectations. More recent studies (Bourke, 1989; Molyneux and Thornton, 1992; Athanasoglou et al., 2008; Albertazzi and Gambacorta, 2009;

Fadzman and Kahazanah, 2009; Trujillo-Ponce, 2013) have found a positive relationship between inflation and profitability; Unlike Kanas et al. (2012). Perry (1992) argued that attention should be given to the effect arising from inflation expectations, with this effect being dependent upon whether expectations are fully anticipated.

Demirguc-Kunt and Huizingua (1999) find a negative relationship between the size of the banking sector and profitability measures that reflects the higher level of competition in developed banking sector. Demirguc-Kunt and Huizingua (2001) find also financial development has a significant impact on bank profitability. A developed banking system reduces profitability through higher competitiveness whereas stock market development improves bank performance especially in a lower level of financial development. The complementarity between stock market development and bank performance is also found in Naceur and Goaid (2008), Albertazzi and Gambacorta (2009) and Naceur and Omran (2011).

### 3. Data and Methodology

#### 3.1. Data

This paper applies the Generalized Method of Moments (GMM) technique for dynamic panels using bank-level data for Turkish banking sector over the period 2003 to 2011 to investigate the impacts of bank capital on profitability and risk. We aim to shed some crucial light on the determinants of bank risk-taking and analyze its relationship with capital and profitability. We have a balanced panel of 225 samples of 25 banks from Turkish banking sector. We have selected over the period of 2003-2011 due to the completion of the process of the restructuring of the Turkish Banking Sector and the exit from the crisis of Turkish economy, after the economic crisis in Turkey in 2001. The data base related to bank and sectorial variables comes from The Banks Association of Turkey (TBB), inflation and GDP growth data obtains from Turkey Statistical Institute (TUIK) and Stock market capitalization, Interest rate and Domestic credit data come from World Development Indicators (WDI).

**TABLE 1: Variables Description**

| Variables             |                         | Descriptions                     |  |
|-----------------------|-------------------------|----------------------------------|--|
| Dependent Variables   | Profitability           | Net interest margin (NIM)        | Net interest revenue against average assets                    |
|                       |                         | Return on assets (ROA)           | Net income / total assets                                      |
|                       |                         | Return on equities (ROE)         | Net income / equity  |
| Independent Variables | Bank Specific variables | Capital rate (CAR)               | Equity to total assets   |
|                       |                         | Loan loss reserve rate (LLGL)    | Loan loss reserve to gross loans                               |
|                       |                         | Loans rate (NLTA)                | Net loans to total assets                                      |
|                       |                         | Liquidity rate (LAD)             | Liquid assets to customer and short-term deposits              |
|                       |                         | Income-cost rate (ICR)           | Total incomes over total expences                              |
|                       | Sectorial variables     | Foreign ownership (FO)           | Total the percentage of foreign ownership                      |
|                       |                         | Herfindahl-Hirschman Index (HHI) | Herfindahl-Hirschman Index for assets of competition structure |
|                       | Macro control variables | Inflation rate (INF)             | The change of Consumer Price Index (CPI)                       |
|                       |                         | Real GDP growth rate (RGDP)      | GDP growth rate at 2003 costant price                          |

|                                      |  |
|--------------------------------------|--|
| Stock market capitalization (MARKET) | Stock market capitalization/GDP  |
| Interest rate (IR)                   | Deposit interest rate is the rate paid by commercial or similar banks for demand, time, or savings deposits. |
| Domestic credit (CREDIT)             | Domestic credit provided by the banking sector includes all credit to various sectors /GDP                   |

The dependent and independent variables are shown in Table 1. Following the previous studies (Athanasoglou et al. 2008; Trujillo-Ponce, 2013; Naceur and Omran, 2011; Fungacova and Poghosyan, 2011; Dietrich and Wanzenried, 2011; Kanas et al. 2012; Lee and Hsieh, 2013), for the explanatory variables we use a range of bank-specific, sectorial and macro control variables that are believed to be important in explaining the performance of banks. There are three the dependent variables to measure profitability. Profitability is measured in terms of net interest margin, return on asset and return on equities. We therefore try to observe that the effects of bank capital, asset quality, liquidity, size, risk, foreign ownership, competition structure and macro-economic variables such as inflation, GDP growth, interest rate, stock market capitalization and domestic credit on profitability in Turkish banking sector.

### 3.2. Methodology

We examine the effect of bank capital on profitability by using the panel data methodology, because of the benefits it provides. Baltagi (2001) and Hsiao (1986) indicate panel data methodology controls for individual heterogeneity, reduces problems associated with multicollinearity and estimation bias, and specifies the time-varying relation between dependent and independent variables.

It is the generalized method of moments that is most commonly used among the two-stage estimation methods. The most accepted ones of the generalized methods of moments are, Arellano and Bond (1991) two-step generalized method of moments and Arellano and Bover (1995)/Blundell and Bond (1998) two-step generalized method of moments. In Arellano and Bond (1991) the estimator of two-step generalized method of moments, first, the first difference model is being converted by using instrumental variable matrix and then this converted model is estimated by the method of generalized least squares (GLS). Also in Arellano and Bover (1995)/Blundell and Bond (1998) the estimator of two-step generalized method of moments, the effective instrumental variable is estimated by orthogonal deviations method instead of the transformation of the first difference in Arellano and Bond (1991). Thus, the data loss is minimized by using the average of the possible future values instead of first-difference method in the data set where unbalanced panel or units are bigger than the time. Additionally, if the units are bigger than the time, the variable variance and autocorrelation are present in the data set but the correlation does not exist between the units, Arellano and Bond (1991) two-step generalized method of moments is more suitable for estimating.

The validity of the results of dynamic panel data model developed by Arellano and Bond (1991) could be realized by two tests after estimate. One of those tests is the Sargan test that shows whether the tool variables are used accurately and completely for the estimate of GMM and the other is first and second-order autocorrelation test. Sargan test is the test suggested by Arellano and Bond (1991) in order to test whether the tool variables used for estimating the results are adequate or not (Tatoglu, 2012). We conducted a serial correlation test for panel GMM estimators developed by Arellano and Bond (1991). The significant serial

correlation means our estimated coefficients were biased. Thus, in order to produce robust results we tested the serial correlation and the test results were insignificant. Also, it is necessary to test the results of dynamic panel data estimation model that are realized under the conditions of GMM with first and second-order autocorrelation tests suggested by Arellano and Bond (1991). According to the results, it is expected that second-order autocorrelation would be significant statistically. The models that do not have the second-order autocorrelation are the suitable models (Tatoglu, 2012). The fact could be tested by the Wald test that whether the model estimate is done correctly or not (Roodman, 2006).

Our study adopts the dynamic panel data approach and GMM to estimate the parameters. the independent variable with lagged periods is included in Eqs. (1) and (2), as shown below. Beyond the dynamic panel data, the model that establishes the relationship between bank capital and profitability (risk) is based on the earlier literature. According to the earlier literature discussion and this study' purpose of research, we modify the works of Athanasoglou et al. (2008), Trujillo-Ponce (2013); Naceur and Omran (2011); Fungacova and Poghosyan (2011); Dietrich and Wanzenried (2011); Kanas et al. (2012); Lee and Hsieh (2013) to establish the relationship between bank capital and profitability.

This paper mainly investigates the relationships among stock market capitalization, competition, foreign ownership and profitability for Turkish banks with the latest and a wider range of panel data that cover 25 banks from 2003 to 2011. The relationship between bank-specific, industrial and macro-economic variables and profitability can be specified as follows:

$$\pi_{it} = \alpha_0 + \alpha_1\pi_{it-1} + \alpha_2Bank_{it} + \alpha_3Industry_{it} + \alpha_4Macro_{it} + \lambda_i + n_{it}, \forall i, t \quad (1)$$

Here,  $t$  and  $i$  denote time period and banks, respectively,  $\lambda_i$  is an unobserved bank-specific effect, and  $n_{it}$  is the idiosyncratic error term.. Term  $Bank_{it}$  includes the set of bank specific variables (Agusman *et al.*, 2008; Naceur and Omran, 2011; Fungacova and Poghosyan, 2011; Lee and Hsieh, 2013);  $\pi_{it}$  refers to the  $i$  the bank's profitability in year  $t$ , proxied by four profitability variables: return on assets (ROA), return on equities (ROE) and net interest revenue against average assets (NIM). Term  $Industry_{it}$  includes the set of sectorial explanatory variables (Athanasoglou, 2008; Dietrich and Wanzenried, 2011; Trujillo-Ponce, 2013; Kanas et al., 2012), while  $\alpha_1$  is the estimated persistence coefficient for profitability. Lee and Hsieh (2013) suggests that banks are always accompanied by the feature of profitability persistence, difficulty in entry-and-exit, a monopoly on resources, and a special ability for management resource allocation. Thus, it is crucial to consider the persistence of profitability through the dynamic panel model. As for the related internal control variables, according to Short (1979), Smirlock (1985), Naceur and Omran (2011), Lee and Hsieh (2013) they include loan loss reserves to gross loans (LLGL), net loans to total assets (NLTA), liquid assets to customer and short-term deposits (LAD). Term  $Macro_{it}$  includes the set of macro-economic control variables. Five macro control variables are set as the related external control variables: inflation (INF), GDP growth rate (RGDP), Stock market capitalization (MARKET), deposit interest rate (IR) and domestic credit (CREDIT) following the studies such as Athanasoglou (2008), Albertazzi and Gambacorta (2009), Naceur and Omran (2011), Dietrich and Wanzenried (2011), Trujillo-Ponce (2013) and Kanas et al. (2012).

We control for local market power by including the bank-level Herfindahl-Hirschman Index (HHI) of asset concentration for the local markets in which the bank is present, is a proxy for bank asset concentration (diversification). Additionally, we add the models total the percentage of foreign ownership (FO) to

measure effect of foreign ownership structure on profitability and risk. We also examine the impact of the level of financial development on the performance of the banking sector as a measure of macro control variables. We use two proxies for the level of financial development; one represents market-based indicators and the other refers to bank-based indicators. As for the first proxy, we use stock market capitalization divided by GDP (MARKET) as a measure of the size of the equity market. As for the bank-based indicators, we use the size of the ratio of the credit to private sector as a percentage of the GDP (CREDIT) to measure the importance of bank financing in the economy. MARKET and CREDIT may also indicate the complementarities or substitutability between bank and equity market financing. Domestic credit provided by banking sector/GDP (CREDIT) is domestic credit provided by the banking sector includes all credit to various sectors on a gross basis, with the exception of credit to the central government. The banking sector includes monetary authorities and deposit money banks, as well as other banking institutions where data are available (World Development Indicators, <http://data.worldbank.org/products/wdi>, 10.11.2013). Market capitalization of listed companies/GDP (MARKET): market capitalization (also known as market value) is the share price times the number of shares outstanding. Listed domestic companies are the domestically incorporated companies listed on the country's stock exchanges at the end of the year. Listed companies do not include investment companies, mutual funds, or other collective investment vehicles (World Development Indicators, <http://data.worldbank.org/products/wdi>, 10.11.2013).

#### 4. Empirical Results and Discussion

In this section, general sample characteristic, the findings of panel unit root test and the findings of the generalized method of moments of Arellano and Bond (1991) dynamic panel data analysis models are presented.

##### 4.1. Descriptive Statistics

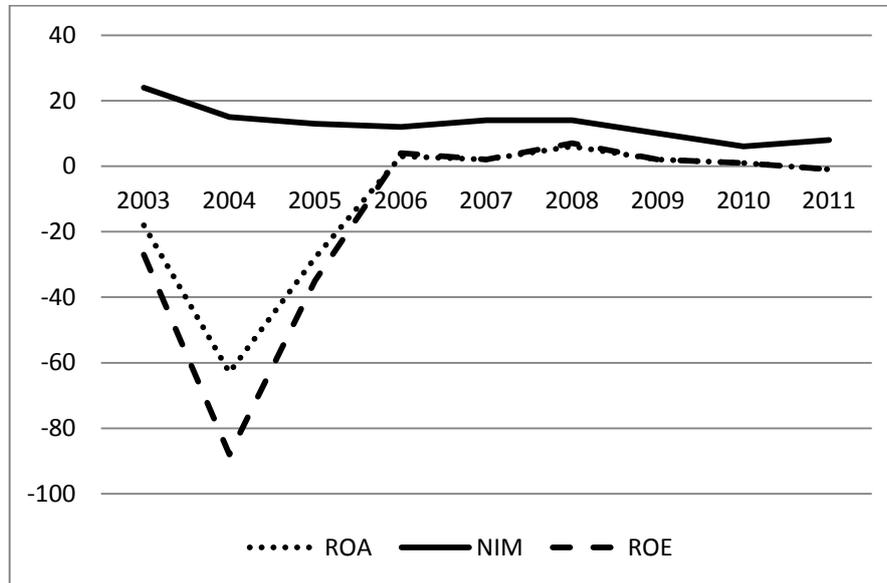
Table 2 provides descriptive statistics of all variables.

**TABLE 2: Descriptive Statistics**

| Variables | Observation | Mean  | Std. Dev. | Min    | Max    |
|-----------|-------------|-------|-----------|--------|--------|
| NIM       | 225         | 0,045 | 0,039     | -0,216 | 0,239  |
| ROE       | 225         | 0,112 | 0,189     | -1,782 | 0,464  |
| ROA       | 225         | 0,011 | 0,057     | -0,632 | 0,215  |
| CAP       | 225         | 0,167 | 0,152     | 0,066  | 0,849  |
| LLGL      | 225         | 0,063 | 0,123     | 0      | 0,590  |
| NLTA      | 225         | 0,425 | 0,195     | 0,013  | 0,767  |
| LAD       | 225         | 0,866 | 1,215     | 0,077  | 7,320  |
| SIZE      | 225         | 6,634 | 0,938     | 2,395  | 8,162  |
| ICR       | 225         | 132,3 | 23,79     | 34,60  | 218,3  |
| HHI       | 225         | 974,6 | 209,0     | 0,100  | 1055,1 |
| FO        | 225         | 35,73 | 41,48     | 0      | 100    |
| INF       | 225         | 0,087 | 0,014     | 0,064  | 0,104  |
| RGDP      | 225         | 0,049 | 0,042     | -0,048 | 0,093  |
| CREDIT    | 225         | 53,25 | 10,57     | 41,35  | 69,62  |
| MARKET    | 225         | 30,75 | 8,753     | 16,14  | 44,28  |
| IR        | 225         | 21,84 | 6,508     | 14,21  | 37,67  |

During the entire period 2003–2011, used as indicators of bank profitability, the mean value of return on asset (ROA), return on equities (ROE) and net interest margin (NIM) are 0,011 and 0,112 and 0,045 respectively. In addition, the average bank capital to asset (CAP) is 16,7%. As can be seen from Table 1; net loans to

total asset (NLTA), Liquid assets to customer and short-term deposits (LAD) are average 0,425 and 0,866, respectively. Furthermore, the minimum and maximum value of foreign ownership is range from '0' to '100'. This means that banks included in the study are completely foreign and domestic banks.



GRAPH 1: The Profitability Ratios

In Graph. 1, the development over the years of banks' profitability ratios is shown. In the period under review, the return on assets (ROA) and return on equities (ROE) profitability ratios are acting together unlike net interest margin (NIM). The regarding profit abilities are negative in the years of 2003-2005 and are positive in following years. The limited level profitability has been lived in ongoing periods and the profit abilities again become negative in the year of 2011. The net interest margin (NIM) was on the highest value in 2003 but decreased over the years. It is seen that, NIM was more variable till the year of 2006 and it is more stable with the year of 2006.

4.2. Correlation Matrix

Table 3 reports the correlation coefficients between the variables. The correlations between the dependent and independent variables are seen in Table 3. The correlation coefficients show both the direction and greatness of the relations between dependent variables and independent variables. There is a negative relation between net interest margin, return on equity and return on assets and there is a positive relation between return on assets and return on equity. In addition, there is a negative relationship between CAP, LLGL, LAD and ROA and ROE, whereas a positive relationship between NLTA, SIZE, ICR, CREDIT and MARKET and ROA and ROE.

TABLE 3: Correlation Matrix

|      | NIM    | ROE    | ROA    | CAP    | LLGL   | NLTA | LAD | SIZE |
|------|--------|--------|--------|--------|--------|------|-----|------|
| NIM  | 1      |        |        |        |        |      |     |      |
| ROE  | -0,153 | 1      |        |        |        |      |     |      |
| ROA  | -0,359 | 0,672  | 1      |        |        |      |     |      |
| CAP  | 0,283  | -0,279 | -0,335 | 1      |        |      |     |      |
| LLGL | 0,483  | -0,250 | -0,385 | 0,803  | 1      |      |     |      |
| NLTA | 0,073  | 0,140  | 0,188  | -0,509 | -0,500 | 1    |     |      |

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|        |        |        |        |        |        |        |        |
|--------|--------|--------|--------|--------|--------|--------|--------|
| LAD    | 0,208  | -0,173 | -0,148 | 0,885  | 0,748  | -0,584 | 1      |
| SIZE   | -0,114 | 0,347  | 0,261  | -0,617 | -0,397 | 0,312  | -0,569 |
| ICR    | 0,019  | 0,599  | 0,514  | -0,017 | -0,086 | 0,068  | -0,019 |
| HHI    | -0,468 | 0,292  | 0,449  | -0,056 | -0,882 | 0,458  | -0,838 |
| FO     | -0,121 | -0,109 | 0,059  | -0,025 | -0,219 | 0,117  | -0,035 |
| INF    | -0,027 | 0,001  | -0,040 | -0,023 | 0,002  | -0,281 | -0,006 |
| RGDP   | -0,113 | -0,080 | -0,097 | -0,019 | 0,001  | -0,138 | -0,024 |
| CREDIT | -0,031 | 0,027  | 0,086  | -0,013 | -0,055 | 0,092  | 0,048  |
| MARKET | -0,024 | 0,046  | 0,069  | 0,012  | -0,035 | 0,228  | 0,021  |
| DIR    | 0,077  | -0,010 | -0,072 | 0,021  | 0,109  | -0,166 | -0,065 |

**TABLE 3:** *Correlation Matrix (continued)*

|        | ICR    | HHI    | FO     | INF    | RGDP   | CREDIT | MARKET |
|--------|--------|--------|--------|--------|--------|--------|--------|
| ICR    | 1      |        |        |        |        |        |        |
| HHI    | 0,167  | 1      |        |        |        |        |        |
| FO     | -0,081 | 0,188  | 1      |        |        |        |        |
| INF    | -0,191 | -0,068 | -0,070 | 1      |        |        |        |
| RGDP   | -0,165 | -0,032 | -0,125 | 0,154  | 1      |        |        |
| CREDIT | 0,180  | 0,033  | 0,205  | -0,364 | -0,289 | 1      |        |
| MARKET | 0,132  | 0,037  | 0,083  | -0,769 | 0,074  | 0,306  | 1      |
| DIR    | -0,169 | -0,037 | -0,184 | 0,369  | 0,071  | -0,741 | -0,419 |

The correlation among the independent variables is in Table 3. The correlation coefficients will put forth both the relations among the variables and also the presence of high multicollinearity problems among the independent variables will be used in the model. In this regard, in case of the high correlation ( $\pm 0,90$  and higher) among those independent variables, they will not be estimated in the same equation. Instead of this, they will take a part in different equations. While look at the Table 2, it is seen that this multi collinearity problem (multi collinearity) is not valid for any kind of independent variable. This finding expresses that it could take a part in estimating of all independent variables.

### 4.3. Panel Unit Root Results

Before passing to the panel data analysis, it should be examined that whether the process creates the variables is stable over time, in other words it is necessary to examine whether the variables stable or not. Otherwise, if the econometric model set among the non-stable variables is estimated by the method of least-squares (LS), after a shock, there could be obtained the relations which do not exist in reality between the variables. This situation is a problem named spurious regression. In order not to meet this problem, panel unit root test is done to determine whether each variable is stable or not. The non-stable variables are kept out of the analysis and the analysis is realized only with the variables that are identified as stable.

**TABLE 4:** *Harris and Tzavalis Unit Root Test and Im, Pesaran and Shin Unit Root Test Findings of Dependent Variables*

| Dependent Variables | Harris and Tzavalis       |             | Im, Pesaran and Shin |            |            |
|---------------------|---------------------------|-------------|----------------------|------------|------------|
|                     | Z Statistics              | Decision    | Statistics           | Decision   |            |
| Profitability       | Return on assets (ROA)    | -4,1465***  | Stationary           | -7,7228*** | Stationary |
|                     | Return on equities (ROE)  | -10,0632*** | Stationary           | -5,3939*** | Stationary |
|                     | Net interest margin (NIM) | -1,6990**   | Stationary           | -6,0583*** | Stationary |

\*, \*\* and \*\*\* show respectively the level of statistical significance on the levels of 0.10, 0.05, and 0.01.

In the stability analysis of the variables in study; Harris and Tzavalis (1999) unit root test and Im, Pesaran and Shin Unit Root Test (2003) have been used due to the facts that there is no correlation among the units, all units have common autoregressive variable and the number of the period under review is smaller than number of units. In Harris and Tzavalis (1999) unit root test and Im, Pesaran and Shin Unit Root Test (2003) it is identified that the units include unit root in  $H_0$  hypothesis. If the coefficient is different than zero significantly, it will be considered that regarding units do not include the root and they are stable on their level. The unit root tests are presented below in Table 4 and 5.

The findings in Table 4 and 5 shows that both all the dependents and variables do not include unit root on original level according to Harris and Tzavalis unit root test and Im, Pesaran and Shin Unit Root Test in other words they are stable. Thus, the models will be established with dependent variables that all are on original level and independent variables and they will be used in panel data estimate.

**TABLE 5:** *Harris and Tzavalis Unit Root Test and Im, Pesaran and Shin Unit Root Test Findings of Independent Variables*

| Independent Variables   | Harris and Tzavalis                  |            | Im, Pesaran and Shin |             |            |
|-------------------------|--------------------------------------|------------|----------------------|-------------|------------|
|                         | Z Statistics                         | Decision   | Statistics           | Decision    |            |
| Bank-specific variables | Capital rate (CAR)                   | -6.1835*** | Stationary           | -13,2664*** | Stationary |
|                         | Loan loss reserve rate (LLGL)        | -6.1471*** | Stationary           | -11,6512*** | Stationary |
|                         | Loans rate (NLTA)                    | -5,7784*** | Stationary           | -8,1267***  | Stationary |
|                         | Liquidity rate (LAD)                 | -1,7858**  | Stationary           | -3,8606***  | Stationary |
|                         | Bank size (SIZE)                     | -6,5707*** | Stationary           | -10,6771*** | Stationary |
|                         | Income-Cost rate(ICR)                | -6,2038*** | Stationary           | -4,6820***  | Stationary |
| Sectorial variables     | Foreign ownership (FO)               | -1,5645**  | Stationary           | -5,4554***  | Stationary |
|                         | Herfindahl-Hirschman Indeks (HHI)    | -9.7432*** | Stationary           | -11,5388*** | Stationary |
| Macro control variables | Inflation rate (INF)                 | -15,007*** | Stationary           | -6,7290***  | Stationary |
|                         | Real GDP growth (RGDP)               | -8,4210*** | Stationary           | -2,5919***  | Stationary |
|                         | Stock market capitalization (MARKET) | -17,062*** | Stationary           | -10,6485*** | Stationary |
|                         | Interest rate (IR)                   | -4,8479*** | Stationary           | -10,5518*** | Stationary |
|                         | Domestic credit (CREDIT)             | -6,5437**  | Stationary           | -8,2434***  | Stationary |

\*, \*\* and \*\*\* show respectively the level of statistical significance on the levels of 0.10, 0.05 and 0.01.

#### 4.4. Panel Estimation Results

The findings gained from the dynamic panel data analysis models Arellano and Bond two-stage generalized method of moments are presented. In the below Table 5, the findings of profitability models are existing. As seen at the results of the Wald test that is done for examining the significance of all models of profitability in Table, it is seen that all models have general meaning. Also, for testing the presence of second order autocorrelation, the autocorrelation test of Arellano and Bond is not significant statistically. Thus, it is understood that the second order

autocorrelation that is necessary for the suitability of models does not exist. Next, the Sargan test which is done for the validity of instrument variables that are obtained from the non-robust models is not significant statistically. At the end of the test, it is found that the instrument variables used in instrument variable regression are valid. The Sargan and the serial-correlation tests do not reject the null hypothesis of correct specification, which means that we have valid instruments and no serial correlation.

**TABLE 6:** Estimation Results (Robust Standard Errors)

| Models  | ROA            | ROE             | NIM           |
|---|----------------|-----------------|---------------|
| ROA(-1)   | 0,176***       |                 |               |
| ROE(-1)   |                | 0,065***        |               |
| NIM(-1)   |                |                 | 0,691***      |
| CAR   | 0,107***       | 0,687***        | -0,076***     |
| LLGL  | -0,099*        | -0,532***       | -0,060*       |
| NLTA  | 0,037***       | 0,161**         | -0,0017       |
| LAD   | -0,038***      | -0,023**        | -0,038        |
| SIZE  | 0,124***       | 0,244***        | -0,036***     |
| ICR   | 0,0011***      | 0,004***        | 0,0020***     |
| HHI   | 0,007***       | 0,003**         | 0,001         |
| FO  | -0,0016**      | -0,002          | -0,0011*      |
| INF   | 0,623***       | 0,091           | 0,017         |
| RGDP  | -0,113***      | -0,222***       | -0,148***     |
| IR  | -0,0067***     | -0,0061**       | 0,0008        |
| MARKET  | -0,0018**      | -0,0004*        | -0,0015       |
| CREDIT  | -0,0018***     | -0,0003**       | -0,0004       |
| Wald Test                                       | 43357,57***    | 2237,93***      | 26885,23***   |
| Arellano-Bond second order<br>-AR(2) (p-values) | -0,7022 (0,48) | 0,2227 (0,0,82) | 1,0839 (0,27) |
| Sargan Test (p-value) <sup>1</sup>              | 15,954(0,95)   | 12,592(0,99)    | 8,525 (0,99)  |
| Number of observations                          | 175            | 175             | 175           |
| Number of groups                                | 25             | 25              | 25            |

\*, \*\* and \*\*\* show respectively the level of statistical significance on the levels of 0.10, 0.05, and 0.01.

<sup>1</sup> Sargan tests are obtained from two-step generalized method of moments the non-robust models.

As seen at the results of the models in Table 6, the lagged values of the dependent variables are positive and significant. This result shows that the previous period profitability is important for the bank profitability. Table 6 reports the empirical results of the full sample when Eq. (1) is considered, which focuses on when the two-step GMM and dynamic panel data approach are adopted, as well as the estimation results of profitability. The effects of the independent variables on profitability are significant generally.

Capitalization (CAR) is found to be positively related to bank performance (ROA and ROE), which underlines that poor performance of banks in Turkey is associated with low capitalization. This is consistent with Berger (1995) finds that a strong positive relationship between capital and earnings, meaning well capitalized firms face lower expected bankruptcy costs, which in turn reduce their cost of funding and increase their profitability. This finding is in line with more recent studies such as Drakos (2003), Maudos and De Guevara (2004), Pasiouras and Kosmidou (2007), Naceur and Goaid (2008), Garcia-Herrero et al. (2009), Naceur nad Omran (2011) and Trujillo-Ponce (2013).

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Log of total assets (SIZE), is found to be positively and significantly related to bank performance. The estimated effects of SIZE provide evidence of economies of scale in Turkish banking. This is because larger banks are likely to have a higher degree of product and loan diversification than smaller banks, and because they should benefit from economies of scale. This positive relation is in line with Smirlock (1985), Short (1979), Bikker and Hu (2002), Pasiouras and Kosmidou (2007), Naceur and Goaied (2008), Fadzlan and Kahazanah (2009) find a positive and significant relationship between size and bank performance.

The sign of bank loans over total assets ratio (NLTA), as a proxy for credit risk, is positive and significant. This finding is consistent with standard asset pricing arguments imply a positive relationship between risk and earnings. This finding also is line with empirical studies find that a higher loan ratio is associated with higher interest margins, which suggest that risk averse shareholders seek larger earnings to compensate higher credit risk (i.e. Demirguc-Kunt and Huizinga, 1999, Chirwa, 2003, Flamini et al., 2009; Fadzlan and Kahazanah, 2009; Trujillo-Ponce, 2013; Kanas et al., 2012). The level of operational efficiency (ICR), measured by income-cost ratio, is found to be positively related to bank performance, which underlines that banks have lower expenses for a given level of output. This would imply that operational efficiency is a prerequisite for improving the profitability of the banking system, with the most profitable banks having the lowest efficiency ratios. This finding is line with studies such as Athanasoglou et al. (2008), Goddard et al. (2009) and Garcia-Herrero et al. (2009).

We find that there is a negative relationship between poor credit quality (LLGL) has a negative effect on bank profitability, indicating that an increase in the doubtful assets, which do not accrue income, requires a bank to allocate a significant portion of its gross margin to provisions to cover expected credit losses. This finding consistent with among the studies that show a direct relationship between profitability and asset quality are Athanasoglou et al. (2008), Chiorazzo et al. (2008) and DeYoung and Rice (2004) and Trujillo-Ponce (2013). The sign of liquid assets to customer and short-term deposits (LAD), liquidity rate, is negative and significant, indicating that a bank that holds a relatively high proportion of capital is unlikely to earn high profits; yet is less exposed to risk. This finding is consistent with studies such as Molyneux and Thornton (1992), Fadzlan and Kahazanah (2009), Fungacova and Poghosyan (2011) find a negative relationship between the ratio of liquid assets to total assets and bank interest margins.

Further, we find that there is a positive relationship between bank concentration (HHI) and bank performance in Turkish banking industry. The structure-conduct-performance (SCP) hypothesis assumes that, in the highly concentrated market which has lower competition, the large firms tend to collude with each other to get high profits. Our result is in line with Rose and Fraser, 1976, Heggstad and Mingo, 1974, Rhoades, 1977, Samad, 2005, and Chirwa, 2003; Berger and Bouwman, 2013). The sign of foreign ownership (FO) is negative and significant. The foreign ownership status of the banks is significant in explaining profitability, denoting that foreign banks do not in general make relatively higher profit, at least during the period under the consideration. This finding is consistent with Demirguc-Kunt and Huizinga (1999), Martinez Peria and Mody (2004), Belkhir (2004) and Qi *et al.* (2000) find a negative the effect of foreign ownership on performance.

In terms of the macroeconomic variables, we find that there is a negative relationship between bank performance and deposit rate (IR). Among the studies that report a positive relationship between interest rates and bank profitability are Bourke (1989), Claey's and Vander Vennet (2008), Demirguc-Kunt and Huizinga (1999), Garcia- Herrero et al. (2009), Trujillo-Ponce (2013) and Molyneux and

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Thornton (1992). Furthermore, inflation is found to be significantly and positively related to bank performance in Turkey, possibly due to the ability of Turkish banks' to forecast future inflation, which in turn implies that interest rate has been appropriately adjusted to achieve better performance. This result is consistent with the findings reported by Bourke (1989), Molyneux and Thornton (1992), Athanasoglou et al. (2008), Albertazzi and Gambacorta (2009), Fadzlan and Kahazanah (2009) and Trujillo-Ponce (2013). Further, The GDP growth is found to be significantly and negatively related to bank performance in China. This result is consistent with Tan and Floros (2012) for Chinese banks and Liu and Wilson (2009) for the Japanese banking industry. This result partially supports the view that high economic growth improves business environment and lowers bank entry barriers. The consequently increased competition dampens bank's performance. However, this finding is not consistent with studies Athanasoglou et al. (2008), Fadzlan and Kahazanah (2009) Albertazzi and Gambacorta (2009) and Trujillo-Ponce (2013) states that during recessions the quality of loans declines and therefore companies borrow at higher margins, therefore a negative relationship between spread and economic growth is to be expected.

The sign of stock market development (CAPITAL), as a measure of the size of the equity market, is negative and significant, indicating that there is a negative relationship between stock market development and bank performance in Turkish banking sector. This finding is in line with Liu and Wilson (2009) for the Japanese banks and Tan and Floros (2012) Chinese banks. A high market capitalization ratio means economic expansion, while the easy access for firms to finance through stock markets reduces bank's business opportunities which results in a deterioration of performance. Domestic credit provided by the banking sector (CREDIT), as a measure the importance of bank financing in the economy, is negative and significant. This finding consistent with Demirguc-Kunt and Huizinga (1999) and Demirguc-Kunt and Huizinga (2001) find a negative relationship between the size of the banking sector and profitability measures that reflects the higher level of competition in developed banking sector.

### 5. Conclusion

The purpose of this paper is to evaluate the determinants of bank performance in Turkey. In particular, the paper examines the effects of stock market, competition and ownership on bank performance in Turkey. The sample comprises a total of 25 banks and the period under consideration extends from 2003-2011. Our profitability determinants include bank-specific characteristics as well as industry-specific and macroeconomic factors, some of which have not been considered in previous studies.

Using the the Two-Step Generalized Method of Moments (GMM) described by Arellano and Bond (1991) for dynamic panels, we conclude that the high bank profitability during these years is associated with a large percentage of loans in total assets, a low proportion of liquid asset, good efficiency and a low doubtful assets ratio. In addition, higher capital ratios also increase the bank's return, but only when return on assets and return on equities is used as the profitability measure. We find evidence of economies of scale in the Turkish banking sector. Empirical results show that there is a negative relationship between financial development and profitability. We find also there is a positive relationship between bank concentration and bank performance in Turkish banking industry, consisting with the structure-conduct-performance (SCP) hypothesis. The results also suggest that there is a negative relation between the foreign ownership and profitability, indicating that foreign banks do not in general make relatively higher profit, at least

during the period under the consideration. Further research should examine other methods to calculate the bank competition in Turkey, and other determinants of bank performance and classify banks (i.e. commercial banks, saving banks, foreign banks, state banks, private banks) compare them with each other results. The current study has relevant policy implications. First, in order to increase the profit earned from the traditional loan-deposit services, the Turkish banks should make loans to the high risk projects or companies, and control the expenses including both the operating and personnel expenses. Particular emphasis is given on the investigation into the effects of stock market development, competition and ownership on bank performance in Turkey while controlling for the most comprehensive bank-specific, industry specific and macroeconomic variables.

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