9. MICRO AND MACROECONOMIC DETERMINANTS OF STOCK PRICES: THE CASE OF TURKISH BANKING SECTOR

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Abstract

This paper investigates the relationship between Turkish banks stock prices and a set of micro and macro variables. The study carried out via applying a fixed panel data analysis and Dumitrescu and Hurlin panel Granger causality test for the period spans from 1995 3rd quarter to 2015 4th quarter. In general, both macro and micro variables can reliably price the bank stocks. Specifically, the findings show that asset quality, management quality, earning, size, money supply and interest rate are significantly related to stock price. Also, bidirectional causality found between bank size, asset quality, money supply and bank stock price. In other words, investors should pay attention to bank specific information in their decision. Moreover, the result indicates that bank stock prices react negatively to economic crisis.

Keywords: Turkish banking sector, stock prices, micro and macro factors

JEL Classification: C23, G12, G21

1. Introduction

An efficient capital market is a market where security prices adjust rapidly to the arrival of new information. In the last decades many economic research has analyzed whether the capital market is efficient or not. The research in this area is important because results have significant real-world implications for investors and portfolio managers. There is a large theoretical and empirical literature on the relationship between stock market and macroeconomic fundamentals.

In contrast to macroeconomic-based explanations of the connection between risk and expected return, it is possible to specify risk in microeconomic term using certain

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characteristics of the underlying sample of securities. Empirical literature shows that average return on common stock is related to firm characteristics such as size, earning/price, cash flow/price, book to market equity and other financial indicators.

Banz (1981), Kohen and Santomero (1980), Blum (1999), Cooper *et al*. (2003), Shams *et al*. (2011) reported a significant relationship between micro variables and stock return. Most of those researches focused on developed countries. This study will shed some lights on an emerging market stock return, specifically on Turkey. The motivation behind this study is that the Turkish stock market, one of the leading emerging markets, has its unique features, which may trigger a different pattern of stock price movement either from developed or other emerging markets. The Turkish banking sector has traditionally occupied an important position in the financial system which is based on a universal bank framework that legally authorizes commercial banks to service various kinds of activities in financial market. Moreover, the Turkish banking sector is among the strongest and most expansive in Eastern Europe, the Middle East and Central Asia. The study analyzes seven banks[4] listed in ISE for the period span from 1995:Q3 to 2015:Q4.

The purpose of this study is to build a characteristic-based factor approach to estimate multifactor model that explains the bank stock prices. The study attempts to determine to what extent the banks stock prices are driven by their performance.

The study will contribute to the literature that investigates the Turkish stock market being the first study that analyzes the effects of the selected macro and micro variables on the banking stock prices.

2. Literature Review

The literature on the determinants of stock market falls into two categories, one investigates the effect of macroeconomic factors on the stock market, and the other investigates the effect of microeconomic factors on the stock market.

Since this study investigates both categories, the following brief reviews of the literature focus on the dynamic interaction between, first, microeconomic factors and second, macroeconomic variables and stock prices.

Banz (1981) analyzed the relationship between the total market value of NYSE common for the period span from 1926 to 1975 on a monthly basis. The findings reported that the relationship between size and return exists. Also, investors would not desire to hold common stock of very small firms. Kohen and Santomero (1980) advocate that higher capital requirements could result in increasing the bank riskiness. Amihud and Menderson (1991) advocate that the more liquid the financial institution, the higher the price at which it can be sold.

Blum (1999) examined the effect of capital adequacy requirements on bank risks. The study analyzed one bank; the reported result indicated that capital adequacy requirements may actually increase risk and a reduction in bank's profit. Moreover, if the future profits are lower, a bank has a smaller incentive to avoid default. Aksu and Onder (2000) studied the relationship between firm size and book to market equity with

[4] *The study anaylzes seven banks namely; Ak Bank, Alternatif Bank, Finans Bank, Garanti Bank, Iş Bank, Tekstil Bank and Yapi ve Kredi Bank (Appendix 4).*

stock return in Turkey. They explore this relationship via applying CAPM and F&F for the period span from 1993 to 1997. The findings revealed that both size and book to market significantly affect stock return, while size has higher explanatory power.

Cooper *et al*. (2003) examined the relationship of the 213 banks stock return by taking the advantage of a unique set of micro variables, namely income for derivative usage, provision loan commitments, loan loss reserve, size, earnings, changes in total liquidity to total assets and leverage, for the period spans from June 1986 to December 1999. They find that the variables related to noninterest income, loan loss reserve, earnings, leverage and standby letters of credit are all important in forecasting the cross section of bank stock return. On the other hand, none of the book value to market value and firm size is important in the analyzed sample.

Chen *et al*. (1986) tested a set of macroeconomic variables, namely industrial production, risk premium, inflation, market return, consumption and oil prices on US stock return for the period spans from January 1953 to November 1983. The findings revealed a strong relationship between the tested macro variables and the expected return. Specifically, industrial production, changes in risk premium, twist in the yield curve, measure of unanticipated inflation and change in expected inflation are significant in explaining expected return.

Choi *et al*. (1992) tested the data of 48 US banks' stock return against macroeconomic variables, namely market return, interest rate and exchange rate, using a sample span from January 1975 to December 1987. The findings indicated that exchange rate innovation was significant related to bank stock returns prior to October 1979.

Paul and Malik (2003) examined the effect of inflation, interest rate and GDP on banking and financial institution stock prices in Australia for the 1980-1999 period by using cointegration and ECM. The findings advocate the presence of cointegration between stock prices and the tested variables. Specifically, interest rate was found to have a significant and negative impact, the GDP was positively related to stock price, while inflation was found to be not statistically significant.

Maysami *et al*. (2004) examined the long-run and short-run relationship between a set of macroeconomic variables in Singapore's stock market indices (finance index, property index and hotel index) for the period span from February 1995 to December 2001. The findings indicate a positive relationship between inflation, industrial production and all stock indices. Exchange rate was found to be positive in hotel index and negative in both finance and property indexes, while money supply was positively related to finance index and property index and negatively related to hotel index.

Rjoub *et al*. (2008) analyzed a set of macroeconomic variables and stock return in Turkey for the period span from January 2001 to September 2005 via applying multiple regression. They advocate a positive relationship between interest rate, inflation and stock return. Also, exchange rate and money supply was found to be positive and statistically significant.

Humpe and Macmillan (2009) investigated whether a set of macroeconomic variables, namely industrial production index, consumer price index, money supply and treasury bill interest rate, can explain the movement in stock return for Japan and the US via applying a cointegration for the period span from January 1963 to June 2005. The findings revealed a positive relationship between industrial productions and negative

relationship between both consumer price index and long-term interest rate, while money supply was not significant and positive in explaining stock price for the US. For Japan, industrial production was found to be positively related and statistically significant and the money supply negatively related to stock price.

Kasman *et al*. (2011) analyzed the impact of both interest rate and exchange rate on bank stock return in Turkey for the period span from 27 July 1999 to 9 April 2009 via applying OLS technique and GARCH. The findings indicate that both interest rate and exchange rate have a significant impact on bank stock return. Rjoub (2012) analyzed the dynamic relationship between exchange rate and stock price index in Turkey for the period span from August 2001 to April 2009 via applying VAR model. The result indicated the presence of cointegration between exchange rate and stock prices. Specifically, the exchange rate was found to be negatively related to stock prices.

Narayan *et al*. (2014) investigated the impact of three economic variables, namely industrial production, interest rate and exchange rate on Indian banking stock price. They carried a panel cointegration analysis and panel granger causality test for the period spans from June 1998 to April 2008. The findings indicate the presence of cointegration between the tested variables and bank stock prices.

3. Model, Data Set and Estimation Results

In this section, we first introduce the model for determinants of the Turkish banking sector stock price and description of the variables and then estimation results are given.

3.1 Model and Data Set

In this study, the relationship between bank stock prices and a set of both micro and macro variables is modeled as

$$LP_{it} = \beta_1 C_{it} + \beta_2 A_{it} + \beta_3 M_{it} + \beta_4 E_{it} + \beta_5 L_{it} + \beta_6 S_{it} + \beta_7 INF_t + \beta_8 LIPI_t + \beta_9 INT_t + \beta_{10} LM1_t + \alpha_i + u_{it} \quad (1)$$

where: LP is the seven biggest banks stock prices; C is the capital adequacy (total loans as a percentage of total capital); A is the asset quality (total loans as a percentage of total assets); M is the management quality (deposit interest expenses as a percentage of total assets); E is the earning (interest income as a percentage of total assets); L is the liquidity (cash and cash equivalents as a percentage of total assets); S is the size (logarithm of total assets); INF is the inflation (quarterly change in the logarithm of consumer price index); LEXC is the exchange rate (logarithm of US Dollar/TL exchange rates); LIPI is industrial production (logarithm of industrial production index); INT is the interest rates (three month deposit interest rates); LM1 is the money supply (logarithm of M1 money supply).

Micro variables were calculated from the balance sheets and income statements of the banks, which were provided by Borsa Istanbul (Istanbul Stock Exchange). Selected macroeconomic variables were retrieved from the International Monetary Fund, International Financial Statistics, for the period span from 1995 Quarter 3 to 2015 Quarter 4. Additionally, two dummy variables are added to the model to capture the effect of the 2001 crisis in Turkey and the 2008 global crisis. The 2008 global crisis is well documented in the literature, but the 2001 crisis in Turkey is relatively less known;

therefore, we give a brief account of what happened in that crisis. In the beginning of 2000, the Central Bank implemented an exchange rate-based stabilization program by adopting a crawling peg exchange rate regime to curb inflation. In addition, the ceiling values for net domestic assets and floor values for net international reserves items of the Central Bank balance sheet were targeted. The net domestic assets growth of Central Bank balance sheet was determined by the increase in net foreign assets. This policy yielded relatively high volatility in the interbank money market interest rate as compared to previous periods. However, a considerable progress was made in terms of reducing inflation. Interest rates fell sharply at the beginning of the program, but with the deterioration in the external account and deteriorating expectations about devaluation they started to rise in the second half of the year. Rise in interest rates deteriorated the financial position of some banks which hold a large amount of Treasure Bills and funded these bills via short-term resources. Despite turmoil in financial markets in November, the Central Bank did not halt the program. Although a relative recovery was observed in the beginning of 2001, the damage caused by the November crisis on the banking sector increased the fragility of the system. Because of unfavorable political developments prior to the Treasure auction and unsolved structural problems, the Turkish Lira faced a serious speculative attack on February 22, 2001, and the Central Bank let Turkish Lira float on February 22, 2001. Given the seriousness of the crisis, we introduced this dummy variable into the model.

Table 1 presents the variables employed in the study along with their expected sign in the empirical literature.

Table 1

Expected Signs of the Micro (Bank-specific) and Macro Variables

Variable	Acronym	Expected sign	Reference
1. Capital Adequacy Loan/ Capital	C	-	Kohen&Santomenro (1980) and Blum (1999)
2. Asset Quality Loan/ Asset	A	-	Cooper *et al*. (2003) and Gunsel (2010).
3. Management Quality Interest Exp/ Asset	M	-	Chemmanur *et al*. (2007), Baele *et al*. (2007).
4. Earning Interest Income/ Asset	E	+	Cooper *et al*. (2003).
5. Liquidity Liquid Asset/ Asset	L	+	Shams *et al*. (2011) and Amihud (2002).
6. Size	S	+	Cooper *et al*. (2003) and Banz (1981).
7. Inflation Rate	INF	+	Fama (1981), Erbaykal *et al*. (2008) and Saunders and Tress (1981).
8. Exchange Rate	LEXC	-	Soenen&Hennigar (1988), Ajayi&Mougoue (1996), and Rjoub (2012).
9. Industrial Production	LIPI	+	Chen *et al*. (1986), Choi *et al*. (1992) and Tursoy *et al*. (2008).
10. Interest Rate	INT	-	Paul & Malik (2003), Choi & Jon (1991) and Kasman *et al*. (2011).
11. Money Supply	LM1	+	Cheng (1995), Al Sharkas (2004) and Muradoglu&Metin (1996).

The descriptive statistics show that the tested variables are within the same mean interval, which ensures that they have the same characteristics. The Jarque-Bera normality test results indicate that the null hypothesis of normality can be rejected for all variables. Skewness is negative, which indicates that all banks have the same asymmetry of the probability distribution (Appendix 1).

3.2 Unit Root Tests

Before estimating our model, we checked for stationarity of the micro variables by using the tests of Levin, Lin and Chu (2002) (LLC), Im, Pesaran and Shin (2003) (IPS) and Fisher type test of Choi (2001). Stationarity of the macro variables was tested by using Augmented Dickey-Fuller (ADF), Phillip-Perron (PP), and Ng-Perron tests.

Unit root test results for both micro and macro variables are stationary at first difference I(1). Since all variables are not stationary at level, the variables entered the model in the form of first differences (Appendix 2).

3.3 Selection of Panel Data Estimation Method

A panel time series model can be represented as:

$$Y_{it} = \alpha_i + x'_{it}\beta_i + \varepsilon_{it}, \quad i = 1, \dots, N,$$

where: $\varepsilon_{it} \sim IID\left(0, \sigma^2_{\varepsilon,i}\right)$.

As it is well known, the models with panel data can be estimated by different methods. In this study, we used the Chow F-test to determine whether the fixed effect model outperforms the pooled OLS, and the BP-LM test is used to determine whether random effect model outperforms pooled OLS. The Hausman test is used to compare fixed effect versus random effect panel (the test results are given in Appendix 3).

We have chosen the fixed panel model by using the F-test, BP-LM test and Hausman test; the F-test indicates that fixed effect model outperform the pool, while the BP-LM test demonstrates that the pool outperform the random effect model. When F-test supports the fixed effect against the pool and BP-LM supports the pool against the random effect, the appropriate model is the fixed panel model (Park 2010). In addition, the Hausman test asserts the rejection of random effect in favor of the fixed effect panel model. Further, Baltagi (2005) emphasized that when T is greater than N, the fixed panel model is the most appropriate one.

3.4 Fixed Effect Panel Estimation Results

The fixed effect panel estimation results are given in Table 2. The diagnostic tests presented in Table 2 for serial correlation and heteroscedasticity indicate that the residuals do not display any serial correlation and they are homoscedastic; therefore, we can interpret the estimation results.

Model one includes CAMELS ratios and the early mentioned macroeconomic variables, while model two includes only the significant variables and the results found to be robust.

Asset quality and management quality were found to be statistically significant and negatively related to bank stock prices. In other word, poor bank management leads to wrong lending decisions, which in turn decrease the quality of their assets (outstanding

loans). Because of the poor management and wrong lending decisions, Turkey experienced severe banking crises in the early 2000s. The findings here are in line with Cooper *et al*. (2003) and Gunsel (2010), who documented a negative relationship between asset quality and bank performance. Regarding management quality, the finding is in line with Chemmanur *et al*. (2007) and Baele *et al*. (2007), who reported a negative relationship between management quality and stock price.

Table 2

Fixed Effect Panel Estimation Results

VARIABLES	Model One	Model Two
∆C: Capital Adequacy	-1.0085 (0.0053)	-------
∆A : Asset Quality	-1.3443 (0.2796)***	-1.2988 (0.3545)***
∆M : Management Quality	-2.5480 (0.8429)***	-2.5519 (1.621)**
∆E : Earning	2,2208 (0.9025)**	2.3968 (0.9319)***
∆L : Liquidity	-0.0291 (0.1746)	-------
∆S : Size	0.3978 (0.0916)***	0.3987 (0.0965)***
∆INF : Inflation	0.0246 (0.0706)	-------
∆LEXC : Exchange Rate	-0.7014 (0.6156)	-------
∆IPI : Industiral Production	1.2987 (1.1785)	-------
∆INT : Interest Rates	-0.6154 (0.3704)*	-0.55819 (0.2241)**
∆M1 : M1 Money Supply	0.6743 (0.0951)***	0.67008 (0.1336)***
DUMMY2001	-0.1250 (0.0636)**	-0.2909 (0.0911)***
DUMMY2008	-0.1862 (0.2535)*	-0.2958 (0.0743)***
CONSTANT	-0.0072 (0.0624)	-0.1689 (0.0140)***
R^2	0.3438	0.2403
N	567	567
Heterosedaskitcty test: Erlat LM-test	7.3214 (0.1195)	0,01547 (0.901)
Serial Autocorrelation: Baltagi LM-test	1.2726 (0.5292)	-1.170 (0.242)

, ** and * denotes significant level at 10%, 5% and 1% respectively.*
The standard error values are reported in parentheses.
Note: The null hypotheses of residuals tests are that the residuals do not display any serial correlation or heteroscedasticity.

Capital adequacy and liquidity were found to be insignificant in determining the stock prices. Earnings are positive and statistically significant. This means that an increase in the ratio of interest income to total assets will increase bank's profitability, and subsequently increase the bank stock returns and prices. The finding here are in line with Cooper *et al*. (2003), who documented a significant positive relationship between earnings and stock return. Size was found to be positively and statistically significant in explaining stock prices. This result suggests that the largest the bank is the more profitable the bank will be, which attracts more investors and leads to price increase. The finding is consistent with Banz (1981), who suggested a positive relationship between size and stock return.

Regarding to macro variables, money supply is positive and statistically significant. Mukherjee and Naka (1995) argues that an increase in money supply leads to economic expansion via increased cash flow in the market; in turn, the stock price would benefit from the economic growth caused by such expansionary monetary policy. Alsharkas (2004) and Muradoglu and Metin (1996) reported a positive relationship between money supply and stock price.

Interest rate was found to be negative and statistically significant. The changes in interest rate have an impact on the value of banks' common stocks by influencing their net interest income and the level of other interest-sensitive income. For example, when the average duration period of assets in banks is longer than that of liabilities, an unexpected increase in interest rate will negatively influence a bank's balance sheet, consequently affecting its stock return and prices. Paul and Malik (2003) and Kasman *et al*. (2011) advocated a significant negative relationship between interest rate and stock return.

Industrial production was found to be positive, but not statistically significant. Chen *et al*. (1986), Choi *et al*. (1992) and Humpe and Macmillan (2009) stated a strong positive relationship between industrial production and stock return. Exchange rate and inflation were found not to be statistically significant. The findings related to the crises dummy variables indicate negative relationship with the stock prices. In other words, during the crises the bank stock prices decline due to low confidence in the banking sector and, consequently, lead to price drop. Ali and Afzal (2012) and Schewart (1989) reported a negative impact on stock prices during crises.

3.5 Panel Causality Test Results

In this part of the paper, we present the panel causality test developed by Dumitrescu and Hurlin (2012). Here, we determine the causal relations between bank stock prices and the micro and macroeconomic variables. This test is an extended version of the Granger non-causality test for heterogenous panel data models with fixed coefficients.

The method of the causality test is based on data characteristics. Before testing the causality relationships between the variables, one needs to test for the cross-sectional independence in the panel data. For this, we used Pesaran (2004) CD and LM tests. The CD test is calculated by the following formula:

$$CD = \sqrt{\frac{2}{N(N-1)}} \left\{ \sum_{i=1}^{N-1} \sum_{j=i+1}^{N} \sqrt{T_{ij}}\, \hat{\rho}_{ij} \right\}$$

where: N denotes number of bank stock prices for the cross-banks (7), T_{ij} denotes the number of observations for which the correlation coefficients for the cross-banks are calculated, ρ_{ij} denotes the par-wise correlation coefficient involving the stock price *i* and *j*. Null hypothesis is cross-sectional independence. We also applied the LM test to verify cross-sectional independence assumption for a small cross-sectional unit (N, 7 banks) and a large number of time period (T) from 1995:Q3 to 2015:Q4. The formula is expressed as follows:

$$LM_{BP} = T \sum_{i=1}^{n-1} \sum_{j=i+1}^{n} \rho_{ij}^2$$

where: T denotes total observations for the cross-section (banks), ρ_{ij} denotes the correlation coefficient amid the stock price *i* and *j*. Cross-sectional independence reflected by the null hypothesis is, H_0: $\rho_{ij} = 0 \; for \; i \neq j$. Rejection of null hypothesis may occur because of heteroscedasticity or cross-sectional dependence or both.

The CD results reported in Table 3 reveals the rejection of null hypothesis of cross-sectional independence across the banks at 1% level of significance. Also, the results of the LM test confirms the dependence across cross-section units of the heterogenous panel.

Table 3

Pesaran (2004) CD and LM Tests, Cross-section Dependence

Variable	CD Test Statistic	Prob	LM Test Statistic	Prob
LDPRICE	1.9687	0.000	10.2599	0.0490

**Null hypothesis: Cross-sectional independence.*

Thus, we used Dumitrescu and Hurlin (2012) panel causality test with asymptotic distribution where T>N (T=81, and N= 7). The formula is expressed as follows:

$$y_{it} = \alpha_i + \sum_{k=1}^{k} \omega_i^k \, y_{i,t-k} + \sum_{k=1}^{k} \beta_i^k \, x_{i,t-k} + \varepsilon_{i,t}$$

where: *k* represents the lag length, ω_i^k denotes the autoregressive parameter, and β_i^k represents the regression coefficient which can change among the groups, due to the absence of the independency among each cross-sectional unit. Therefore, the homogenous non-causality (HNC) hypothesis was used for the analysis of the causality relationship and heterogeneous models. For T>N, the asymptotic distribution was used in the HNC hypothesis. When cross-sectional dependence is found, the null and alternative hypotheses of HNC are as follows:

H_0: $\beta_i = 0$ $\quad \forall_i = 1, \dots N$ $\quad$ with $\beta_i = (\beta_i^{(1)}, \dots, \beta_i^{(k)})$

H_1: $\beta_i = 0$ $\quad \forall_i = 1, \dots N$

$\beta_i \neq 0$ $\quad \forall_i = N_1, +1, N_1, +2, \dots, N$

The alternative hypothesis of HNC allows for some of the individual vectors (β_i) to be equal to zero. For the Dumitrescu-Hurlin test, the average statistic $W_{N,T}^{HNC}$, hypothesis can be written as follows:

$$W_{N,T}^{HNC} = {}^{1}/_{N} \sum_{i=1}^{N} W_{i,T}$$

where: $W_{i.t} = (T - 2K - 1)(\tilde{\varepsilon_i} \emptyset_i \tilde{\varepsilon_i} | \tilde{\varepsilon_i} M_i \tilde{\varepsilon_i}), i = 1, .., N$ due to the existence of cross-sectional dependence represents the individual Wald statistic for i^{th} cross-section unit corresponding to the individual test H_0: $\beta_i = 0$. The average statistic , $W_{N,T}^{HNC}$, which has asymptotic distribution, associated with the null HNC hypothesis, is defined as:

$$Z_{N,T}^{HNC} = \sqrt{{}^{N}/_{2K}} \; (\; W_{N,T}^{HNC} - K) \;\; T, N \to \infty \;\; N(0,1)$$

After the rejection of the null hypothesis of independence assumption as proved by Pesaran (2004) CD and LM test and further the unit root test statistics indicate that the variables are nonstationary at level, the first difference of the variables is used for the causality tests. Dumitrescu-Hurlin's panel Granger causality test results are given in Table 4.

Table 4

Pairwise Dumitrescu-Hurlin Panel Causality Test Results

Direction of Causality	W-Stat	Zbar-Stat	Probability
A → LP	5.31391	4.07897	0.0001***
LP → A	20.9492	23.6521	0.0000***
M → LP	8.04304	7.49545	0.0000***
LP → M	2.77555	0.90133	0.3674
E → LP	1.44759	-0.76108	0.4466
LP → E	0.71417	-1.67922	0.0931
S → LP	9.7761	9.66498	0.0000***
LP → S	19.226	21.4948	0.0000***
INT → LP	0.97693	-1.35028	0.1769
LP → INT	9.03539	8.73772	0.0000***
LM1 → LP	31.9936	37.478	0.0000***
LP → LM1	0.69422	-1.70419	0.0883

Lag length = 4 selected based on SIC and ACI long-run covariance white noise residuals.

, ** and * denotes significant level at 10%, 5% and 1%, respectively.*

Our results in Table 4 show that there is unidirectional causality between stock price and the banks' earnings in the short run. In other words, an increase in the stock prices indicates that the banks are performing well and might continue to perform well at least in the short run. This proved interaction support the results in Table 2, which reveal there is positive and significant relationship between banks earning and their stock price. Furthermore, the results show that there is bidirectional causality between banks size and the banks' stock prices in the short run. The stocks of large banks are actively traded and they provide more liquidity and marketability to the investors. In turn, it will lead to an increase in the stock price. Also, the findings reveal that there is homogeneously unidirectional causality running from the stock price to interest rate, and management quality to stock prices in the economic cycle. This inferences explained by the lack of financial stability in the banking sector during the tested period that has been witnessed during global crisis. Our findings also show that there is bidirectional causality

between asset quality and money supply and the stock prices. Hence, banks with quality outstanding loan lead to an increase in banks profitability; in turn, it will increase the demand for its stock and, consequently, a price increase.

Conclusion

This paper investigates the relationship between macro and micro variables and stock prices of seven banks listed in Istanbul Stock Exchange for the period span from 1995:Q3 to 2015:Q4. Fixed effect panel estimation results indicate that asset quality, management quality, earnings, size, money supply, interest rate and global and domestic crisis dummy variables are statistically significant in explaining stock prices. The result indicates that both micro and macro variables are important factors in determining bank stock price during the tested period. Moreover, bidirectional causality was found between asset quality, bank size, money supply and bank stock prices.

The study has policy implication for both investors and decision makers in Turkey. The investors in banking stock should take into account the micro variables as they found to be pricing factors. Investors should assess the bank performance, through the mentioned pricing factors, to make the right decision about their investment.

Policy makers should be careful in their implementation of interest rate policies, given that policies have ramifications on the stock market. Interest rate is an essential anchor available to policy makers to intervene in the country's financial system. Therefore, policy makers should maintain an appropriate rate of interest in the country that helps and motivates investors.

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Appendices

Appendix 1: Descriptive Statistics of the Variables

Panel A: Micro variables	LP	C	A	M	E	L	S
Mean	-0.076887	-0.023679	-0.000109	-0.002236	-0.001858	-0.001470	-0.078406
Median	0.006257	0.013242	0.001063	0.000143	8.00E-05	0.003282	0.003650
Maximum	1.028000	2.296545	0.860792	0.692929	0.211489	4.560172	3.032896
Minimum	-1.088500	-2.301573	-4.859058	-0.776897	-0.599906	-4.792258	-5.822710
Std. Dev.	1.380897	13.82426	0.222020	0.076991	0.071334	0.425735	0.650685
Skewness	-1.300767	-0.045229	-18.29753	-1.969784	-2.149958	-2.088881	-6.061291
Jarque-Bera	16375.79***	1694303***	3890019***	45969.31***	3601.135***	121183.1***	51766.72***
Panel B: Macro Variables	**INF**	**LEXC**	**LIPI**		**INT**		**LM1**
Mean	-0.00198	0.035315	0.008200		0.007302		-0.007821
Median	-0.02818	0.026059	0.010865		-0.003357		0.069593
Maximum	0.625564	0.386427	0.073077		0.730705		7.025800
Minimum	-0.37369	-0.166121	-0.104085		-0.394385		0.283240
Std. Dev.	0.164749	0.097246	0.034973		0.157460		0.788692
Skewness	1.058122	0.904832	-0.874404		1.659610		-8.716800
Jarque-Bera	4368.795***	152.5366***	104.7180***		1620.325***		138916.9***

Note: JB is the Jarque-Bera test for normality based on excess Skewness and Kurtosis. ***, and ** indicate significance at the 1%, and 5% level, respectively. Kurtosis has been normalized to zero.

Appendix 2: Unit-Root Test Results

Panel A : Level I (0)							
VARIABLES	**K**	**FISHER ADF**		**LLC**		**IPS**	
MICRO		**A**	**B**	**A**	**B**	**A**	**B**
LP	2	36.5110***	33.4214**	-1.44382	-1.23830	-3.4789**	-3.35064
C	9	23.0074	15.6847	-0.25405	1.75765	-1.99026**	-1.09390
A	5	3.45336	11.4244	2.03653	-0.07391	2.47809	-0.20788
M	3	27.9015**	35.2924**	-0.67921	-0.74625	-2.02278**	-2.96776***
E	4	15.0307	20.3639	-0.90130	0.80595	-0.85592	-1.16488
L	9	12.0489	11.3589	1.39029	1.90962	0.55354	-0.50252
S	1	3.59413	15.0588	0.43153	0.10637	1.83146	-0.94205
MACRO		**ADF**		**P.P**		**NG.PERON**	
		A	**B**	**A**	**B**	**A**	**B**
INF	1	-1.311534	-2.812607	-1.030853	-2.381478	-1.17337	-2.55758
LEXC	2	-0.100443	-1.535740	0.139914	-1.274945	1.61556	1.86558
LIPI	1	-0.582610	-2.483633	-0.511219	-2.33087	0.75113	-2.58636
INT	2	-1.652300	-3.107047	-2.182558	-3.53932**	-1.51295	-2.89180
LM1	1	-1.665438	-1.571564	-1.758056	-1.668392	-1.53164	-1.57679
Panel B : First Difference I (1)							
	K	**FISHER ADF**		**LLC**		**IPS**	
MICRO		**A**	**B**	**A**	**B**	**A**	**B**
P	2	184.314***	163.234***	-11.8562***	-11.7056***	-14.5950***	-13.7935***
C	9	53.7021***	34.7295***	22.3019**	28.0780***	-5.02561***	-3.50174***
A	5	92.2707***	71.9551***	-1.73384**	-0.49048	-7.84179***	-6.81900***
M	3	188.929***	168.356***	3.14631**	6.32183***	-14.6001***	-13.7970***
E	4	112.967***	86.0035***	19.0723***	24.8287***	-9.23418***	-8.02800***
L	9	47.7104***	31.2607***	10.2753***	12.2683***	-4.44612***	-2.97982***
S	1	19.7332***	17.2287***	-17.7555***	-18.8334***	14.9764***	-14.1581***
MACRO		**ADF**		**P.P**		**NG.PERON**	
		A	**B**	**A**	**B**	**A**	**B**
INF	1	-5.65743***	-5.65681***	-6.68112***	-6.66639***	-4.61265***	-4.66818***
LEXC	2	-4.66419***	-4.67178***	-6.99726***	-6.99753***	-4.6495***	-4.82855***
LIPI	1	-5.95289***	-5.91986***	-7.64747***	-7.60134***	-4.5929***	-4.35513***
INT	2	-6.72094***	-6.69050***	-11.4943***	-11.4523***	-2.8396***	-4.26693***
LM1	1	-6.30851***	-6.32846***	-9.58180***	-9.57934***	-4.41417***	-4.43242***

*** And ***, denotes the stationary of the variables at 5% and 1% respectively based on test critical values. K: is the lag length, it is been determined via applying general to specific method. A: Intercept, B: Intercept and Trend.*

Appendix 3: Panel Data Model Selection Tests

	Model One	Model Two
F-test (Pooled OLS vs. FEM) Chi-Square	2.1196 (0.000) ***	2.1369 (0.000)***
BP-test (Pooled OLS vs. REM) Chi-Square	0.3562 (0.5505)	0.6926 (0.2442)
Hausman test	42.4773 (0.000)***	11.8042 (0.0376)**

Appendix 4: List of tested Bank Names and Market Capitalization

Name	Traded Date	Total Asset (Million USD)	Percentage in Banking Sector
Ak Bank	June 1990	80466	10.86%
Alternatif Bank	June 1995	4506	0.61%
Finans Bank	January 1990	29378	3.96%
Garanti Bank	May 1990	87160	11.76%
Is Bank	October 1987	94485	12.75%
Tekstil Bank	April 1990	2280	0.31%
Yapive Kredi Bank	May 1987	75518	10.19%
Total		741,250	50.43%

Source: Banking Regulation and Supervision Agency.