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Full Length Research Paper

The fırm-level determınants underlyıng the profıtabılıty ın brokerage ınstıtutıons: Some evıdence from Turkey

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Sampling the period of 2005- 2007 on a quarter basis, this paper made a comprehensive empirical investigation on identifying the firm-level determinants underlying the profitability in brokerage institutions operating in Turkey. We performed multiple regression and panel data analyses for a large array of brokerage institutions and observations. Two sets of dependent variables were built to control for profitability. The first regressed variable was the operating profitability of total assets and the second one was the pre-tax profitability of total assets. We found that, the balance sheet-based factors such as current trade receivables to total assets, financial assets to total assets and short-term liabilities to total assets significantly, robustly and commonly account for the brokerage houses' profitability. We also found that, the firm-level factors do better explain the changes in the profitability should the former ratio be proxied as a profitability indicator. Paper concludes with some concrete policy recommendations.

Key words: Brokerage institutions (investment houses), profitability, firm-level factors, ACMIIT (the association of capital market ıntermediary Institutions of Turkey).

INTRODUCTION

Brokerage institutions are such important organizations ranking after banks in money and capital markets. These businesses, whose basic function is to intermediate the conduct of the securities transactions and hence to provide financial services, help clearing out the market through meeting supply and demand and achieving market dealership along the line of the rights and obligations attributed to them capital markets legislations surround. In particular, from legal standpoint, brokerage institutions that are acting as a mediator in a sense like banks, maintain their businesses in the form of capital companies in Turkey. Therefore, they are subject to corporate tax law numbered as 5520.

In our territory, the Capital Markets Board (CMB) of Turkey that is entitled to organize, oversee and supervise all the transactions taking place in the capital markets has defined the intermediation forms as best effort underwriting, stand-by underwriting, full underwriting, partial stand-by underwriting and partial underwriting.[1]

Brokerage institutions, in accordance with their definition of duties provisioned in their articles of incorporation, earn such revenues as sales revenues, service revenues, commission fees, corporate financing incomes, asset management incomes or interest incomes while incurring some material expenses like allowances from service revenues, general administrative expenses on top of cost of sales.

In this paper, the firm-level or the micro factors determining

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[1] See http://www.spk.gov.tr

the profitabilities of the brokerage institutions are investigated.[2] Unlike a number of studies on banks, to our knowledge, the literature is silent on the profitability issue as for brokerage institutions.[3] In covering this gap, we make a comprehensive empirical examination for a large set of brokerage institutions that have been active in the years of 2005-2007 in Turkey. Multiple and panel regression analyses are performed. Hence the resting paper is organized as follows. The second section presents the dataset and the methodology, the third section discusses the empirical findings and the fourth section concludes the paper with some policy recommendations.

DATASET AND METHODOLOGY

All the data in this study has been obtained from the URL of The Association of Capital Market Intermediary Institutions of Turkey (ACMIIT).[4] For the time span of 2005-2007, 99 brokerage institutions having run their operations under the auspices of the Capital Markets Board of Turkey and having been publicly released by ACMIIT are sampled on a quarter basis totaling 12 periods.

ACMIIT has disclosed the comparative financial statements of the brokerage institutions starting from the year 1999 up until the second quarter of the year 2009 in its website. It cascaded the time periods in a way to be compatible with then mandatory accounting policies. Accordingly; the financial statements that were reported on the cost basis include the period from 1999 to 2003, the ones reported on the inflationary accounting basis include the period from 2003 (last quarter) to 2004, the ones reported in concordance with the communiqué Serial XI No: 25 by CMB include the period from 2005 to 2007 and eventually those reported on the basis of international financial reporting standards (IFRS) to entail the period from 2008 to the first 6 months of 2009. Namely, there appears to exist data on four different financial reporting types or groups.

There are some severe obstacles on not sampling all the time horizon in this research. As to be realized, possessing different accounting structures and thus enforcements, the abovementioned financial periods (groups) exhibit unique differences. It can not be possible to harmonize them in first place. Carve-outs are not restricted to this. For instance, while comparative financial statements are decomposed into quarterly periods in some groups (e.g. the periods from 2005 to 2007), they are given as the entire (annual) financial period in some others (e.g. the periods from 2000 through 2002). Further, although comprehensive financial data is available including all the accounting items in some groups (e.g. the period from 2005 to 2007), quite limited financial information is presented in some others (e.g. the periods 2000 - 2003, 2003 - 2004). For these and similar reasons, it has not been possible to match all the financial groups and hence to cover the sample period starting from 1999 to 2009. Therefore, we pick up the period of 2005 - 2007 as our sample period since it entails quite updated data as well as unveiling the financial statements in a comparative and comprehensive fashion. Besides, as we incorporate not the annual but the quarterly periods into our examinations, we feel that observation number is more than sufficient along our objective. More importantly, we sample all the brokerage institutions that ACMIIT published in its website and there might not be another way of obtaining this data from elsewhere, as these brokerage institutions are not publicly listed but closed corporations.

Our essential goal is to identify, in first place, the basic firm-level or micro factors that determine the profitability in the brokerage institutions that have been active in the period from 2005 to 2007. In so doing, multiple regression and panel regression analyses are performed. First, a multiple regression is employed through SPSS. As known well, multiple regression analysis can be conducted in several ways. One of the pervasively used approaches out there is to run stepwise regression. Stepwise regression which is perhaps the most user-friendly technique unveiling the effects of each and every tested variable in our hands generates the best fit models on a simultaneous basis as well. Furthermore, along our very research purpose, willingness to keep the vector comprising of the independent or explanatory variables as large as possible makes stepwise attactive in comparison to its alternatives. Therefore, stepwise regression is followed in this paper rather than the ones such as

[2] The analysis and findings in this research are based on the data obtained from the items originating from the brokerage institutions' own performances/positions and taking place in their financial statements (e.g. income statement and balance sheet). In other words, we are working with firm-level or micro data. Macro-economic indicators such as interest rate, foreign exchange rate, inflation rate, budget deficit or surplus, growth rate, GNP, GNP per capita; or the industrial structural factors like industry (brokerage institutions market) concentration, degree of competition, capitalization rate and their probable effects on brokerage institutions' profitability fall entirely outside our scope. Moreover, as is the case in the financial literature, the words "firm-level", "micro", "endogenous", "intrinsic" are all used interchangeably.

[3] There is a number of studies in the literature investigating the profitability of the commercial banks. In all these studies, a large variety of examinations on the factors determining banking profitability, at either micro or macro bases, is available. Ho and Saunders (1981) being at the forefront, Afanasieff et al. (2001), Brock and Suarez (2000), Kunt and Huizinga (1999), Saunders and Schumacher (2000), Barajas et al. (2001), Valverde and Fernandez (2007), Kaya (2002), Angbazo (1997), Abreu and Mendes (2001) are just some well-known among these. For this and for the studies that investigate the firm-level factors indicating banking profitability and that make a sampling on a quarter basis, see for instance Kaymaz (2009). Similarly, studies such as Ö. Kaymaz, M. Pehlivan and Ö. Kaymaz (Asset size does matter to deposit banks: Evidence from Turkish banking sector, 2009, unpublished manuscript) or in particular Ö. Kaymaz, Ö. Kaymaz and S. Kılıç (It is the operating profit drivers that explain credit margins in deposit banks: Evidence from Turkish banking sector, 2009, unpublished manuscript) are recommendable to review.

[4] See http://www.tspakb.org.tr

enter, backward, forward or remove-based regression techniques.[5] Second, using the identical dataset we perform a panel data analysis through E-views. To facilitate comparisons across cross-sections (brokerage houses) and time period, we both specify fixed effects and random effects models.

Table 1 shows the dependent and the explanatory variables employed in our models. Two regressed variables have been determined to capture the profitability of or the return on assets. The first one is the ratio averaging total assets (asset size) by gross real operating profits (AOP) whereas the second one is given as a ratio of earnings before taxes to total assets (ATP). 16 independent or explanatory firm-level variables have been selected to predict the changes in the level of the corporate profitability; meaning the profitability of the sampled brokerage institutions. As the names indicate; AOP builds on gross real operating profits or net incomes while ATP draws on pre-tax profits or net incomes.[6] Table 2 which is based on the income statements encompassing the period of 2005-07 found in the URL of ACMIIT presents the profit breakdown used to calculate the profitability ratios.[7]

The regressors (independent variables), like the regressed variables, are all intrinsic or endogenous firm covenants that are composed of the items captured from the brokerage institutions' own financial statements. Specifically, the variables ranging from X_1 to X_7 can be named as asset ratios, the ones from X_8 to X_{13} as liability ratio, X_{15} as equity ratio and X_{15} with X_{16} as volume ratios. This is because asset, liability and equity ratios are the proportional values generated from their corresponding accounting items covered in the balance sheets. For the same reason, these ratios can be called balance sheet ratios. Likewise, the transaction volumes appearing at the bottom lines of the comparative financial statements of the sampled brokerage institutions are essential to the calculation of the volume-based ratios or regressors expected to explain the profitability.

The balance sheet ratios are comprised of such financial items that reveal either balance sheet major sub-totals (e.g. current assets, fixed assets, short-term liabilities, equity etc.) or minor sub-totals (e.g. liquid assets, marketable securities, financial assets, short and long term trade liabilities etc.). Therefore, they are important variables that are key to balance sheet sizes. On the other hand, by experience, it is a well known fact that (a) the asset sizes of the brokerage institutions pertain to their tradings in the securities market and that (b) these transaction volumes play quite an important role in the establishment of the corporate earnings. Generally speaking, it would not be incorrect to argue that as the asset size rises (reduces) transaction volumes will rise (reduce) as well. Therefore, among the ratios that are highly expected to account for the profitability, in addition to the balance sheet covenants, we have volume-based ratios that serve for achieving our goal as well. For transaction volumes arise from such sources as stocks and fixed income securities (e.g. government bonds, treasury bills), volume ratios are built on these grounds. As the hypothesis below depicts,

H_1: There is a relationship between X_1 and Y (Y_1 / Y_2).
H_2: There is a relationship between X_2 and Y (Y_1 / Y_2).
H_3: There is a relationship between X_3 and Y (Y_1 / Y_2).
H_4: There is a relationship between X_4 and Y (Y_1 / Y_2).
H_5: There is a relationship between X_5 and Y (Y_1 / Y_2).
H_6: There is a relationship between X_6 and Y (Y_1 / Y_2).
H_7: There is a relationship between X_7 and Y (Y_1 / Y_2).
H_8: There is a relationship between X_8 and Y (Y_1 / Y_2).
H_9: There is a relationship between X_9 and Y (Y_1 / Y_2).
H_{10}: There is a relationship between X_{10} and Y (Y_1 / Y_2).
H_{11}: There is a relationship between X_{11} and Y (Y_1 / Y_2).
H_{12}: There is a relationship between X_{12} and Y (Y_1 / Y_2).
H_{13}: There is a relationship between X_{13} and Y (Y_1 / Y_2).
H_{14}: There is a relationship between X_{14} and Y (Y_1 / Y_2).
H_{15}: There is a relationship between X_{15} and Y (Y_1 / Y_2).
H_{16}: There is a relationship between X_{16} and Y (Y_1 / Y_2).

Since we have 16 different variables to predict the profitability, 16 hypotheses are set. In order to test these hypotheses, regression models are built, one for multiple regression analysis and two for panel data analysis. For the multiple regression analysis, the model for both the regressed variables may be given as the following:

$$Y \;\; (Y_1 / Y_2) = \alpha_0 + \sum_{i=1}^{16} \alpha_i X_i + \varepsilon$$

Where; Y refers to the dependent variable meaning the profitability ratio, α_0 to constant value, α_i to the coefficient values of the independent variables, X_i to the independent variables and ε to the sampling error. The

[5] It should not been forgotten, that the main research objective in this paper is not to set the best fit model predicting the profitability. As stressed several times, we want to identify firm-level or micro factors that significantly underlie the profitability in the brokerage institutions in first place. That is the main idea. Nonetheless, as multiple regression examination is built on the stepwise technique, we also have the chance to see the best fit models characterized by such a wide variety of firm-level indicators signifying the profitability as well. Therefore, we will also credit it in here.

[6] In the calculation of the second profitability ratio, not the post-tax earnings (net profit or income after taxes) but the pre-tax earnings (earnings before taxes or taxable income) is used. This is because pre-tax profit reveals companies' profit in the concerning period. In other words, taxes companies are liable and hence pay out to are not directly connected to their financial performances.

[7] See http://www.tspakb.org.tr

Table 1. Definitions of the variables.

Variables	Definition
Dependent variable	
Y= Y1 (AOP)	Operating Profitability of Total Assets (Gross Real Operating Profit/Total Assets) (%)
Y= Y2 (ATP)	Pre-Tax Profitability of Total Assets (Earnings Before Taxes/Total Assets) (%)
Independent variables	
X1	Current assets/Total assets (%)
X2	Liquid assets/Total assets (%)
X3	Marketable securities/ Total assets (%)
X4	Short-term trade receivables/ Total assets(%)
X5	Fixed assets/ Total assets (%)
X6	Long-term trade receivables/ Total assets (%)
X7	Financial assets/ Total assets (%)
X8	Short-term liabilities/ Total assets (liabilities + equity) (%)
X9	Short-term financial liabilities/ Total assets (liabilities + equity) (%)
X10	Short-term trade liabilities/ Total assets (liabilities + equity) (%)
X11	Long-term liabilities/ Total assets (liabilities + equity) (%)
X12	Long-term financial liabilities/ Total assets (liabilities + equity) (%)
X13	Long-term trade liabilities/ Total assets (liabilities + equity) (%)
X14	Equityt/ Total assets (liabilities + equity) (%)
X15	Stock trading volume/ Total assets (%)
X16	Fixed income securities trading volume/ Total assets (%)

Table 2. Profit breakdown.

(Ia) Gross Real Operating Profit/Loss [Ia = II-III+IV+V]
Sales Revenues (II)
Cost of Sales (III)
Service Revenues (IV)
Other Real Operating Revenues (V)
Operating Expenses (VI)
Revenues and Profits From Other Operations (VII)
Expenses and Losses From Other Operations (VIII)
Financial Expenses (IX)
Net Monetary Gains or Losses (X)
Profits or Losses From Consolidated Participations (XI)
(Ib) Earnings Before Taxes [Ib = Ia-VI+VII-VIII-IX+X+XI]

above model is a vectorial form of representation of our multiple regression allowing to capture two forms of the profitability indicators, that is, Y_1 and Y_2.

For the panel data analysis, the fixed effects model is given as the following: For the panel data analysis, the fixed effects model is given as the following:

$$Y_{it}\ \left(Y_{1it} / Y_{2_{it}}\right) = \alpha_0 + \sum_{i=1}^{16} \alpha_i X_{it} + \varepsilon_{it}$$

Where; the variables have obvious meaning. The subscript *i* stands for the cross-section or the group (brokerage institution) and *t* for time. The random effects model is obtained as the following:

$$Y_{it}\ \left(Y_{1_{it}} / Y_{2_{it}}\right) = \alpha_{0i} + \sum_{i=1}^{16} \alpha_i X_{it} + \varepsilon_{it}$$

Where; the variables and the symbols are of obvious meaning. This model allows us to see how our fixed effects panel estimation is to be prompted to change across time and cross-section.[8]

EMPIRICAL FINDINGS

As we have conducted two empirical analyses, we classify our findings into two sub-sections: empirical findings on multiple regression analysis and empirical findings on panel data analysis. Since we have defined two indicators to proxy for the brokerage institutions' profitability, we further cascade our outcomes on two bases: 'Y_1 (AOP) set as the dependent variable' and 'Y_2

[8] See for instance Kök and Şimşek (unknown w.date) and Yaffee (posted on Nov. 5, 2003 and lastly revised on Nov. 30, 2005).

Table 3. Descriptive statistics.

	Mean	Std. Deviation	N
Y1	.23763674586910	.207941680447395	1197
X1	.80070559184553	.186742599322661	1197
X2	.17609762879751	.226071270768783	1197
X3	.22940299137070	.222208387453564	1197
X4	.27062542751942	.235143152393016	1197
X5	.19929440815447	.186742599322661	1197
X6	.00	.008	1197
X7	.11289962387754	.171332804242480	1197
X8	.36133884824921	.224517578278755	1197
X9	.05299180404479	.112105036244861	1197
X10	.17	.192	1197
X11	.02067661496098	.045281121270572	1197
X12	.00	.022	1197
X13	.00	.001	1197
X14	.61216359863957	.225124241985985	1197
X15	2.89140736213173E2	6.371579301834049E2	1197
X16	1.63570909679341E2	6.311446505487407E2	1197

(ATP) set as the dependent variable'.

Empirical findings: Multiple regression analysis

Y_1 (AOP) set as the dependent variable

We can discuss our empirical findings as the following. Table 3 presents the descriptives. Y_1 refers to the regressed variable and the variables that range from X_1 through X_{16} are all independent variables forming a vector. Observation number is 1197. This table tells that the profitability ratio being Y_1 dependent variable as a mean value of ca. % 24 and standard deviation of ca. 21%. The variable X_{15} has the highest mean and standard deviation of ca. 289% and ca. 637% respectively. The ones with the lowest mean values (ca. 0%) are X_6, X_{12} and X_{13}. Among these variables, the ratio X_{13} has the lowest standard deviation with ca. 0.1%.

Table 4a presents the correlations and Table 4b shows the entered/removed variables. Order of these tables matters as multiple regression analysis has been performed using stepwise method. We first need the correlations table in order to identify the variables to enter in or remove from the model. It shows the correlations between the dependent and the independent variables as well as the ones among the independent variables. According to this, the independent variables correlated to the dependent variable is ordered from the highest to the lowest at the significance level which is set at 5% being the default. From Table 4b, we see that SPSS builds up 7 different models wherein the simplest model consists of one variable (X_{15}) and the most comprehensive one is model 7. As the subsequent models illustrate, Model 7 is also the best fit model as it reveals statistically most robust and significant outcomes. Therefore, Table 5b orders the models from the weakest (worst fit) to the strongest (best fit) as well.

Table 5 presents the model summary. As implied from above, seven models have been set up in total. The weakest model is Model 1 and the strongest one is Model 7. The degree of (Pearson) correlation or coefficient being R indicates the level and the direction of the relationship between the dependent and the independent variable. In the case of Model 1, the relationship between Y_1 and X_{15} is 29.8%, with a positive direction and the adjusted R^2 is even less than 9%. However, in the case of Model 7, R value being positive is 49.5 % and the adjusted R^2 is 24.1%. In other words, the change in the level of the independent variables (X_{15}, X_7, X_{10}, X_4, X_2, X_{16}, X_8) accounts for the change in the level of the dependent variable ca. 24%. Model 7 is the one that explains the dependent variable among all the other models at best. Table 5 further shows that (i) all the changes in the coefficients of determinations (adjusted R^2) are significant ($p < 0.05$) and (ii) there is no any autocorrelation problem among the error terms.

Table 6 presents ANOVA stats. It tells that all the models are statistically significant ($p < 0.05$) and robust ($p \to 0$). Model 7 does not only predict the dependent variable as statistically significant ($p < 0.05$) but robustly as well ($p \to 0$). Table 7 is the table revealing the coefficients of the variables. In this, it will be appropriate to examine Model 7 across the unstandardized coefficients. Accordingly, the independent variables X_7, X_8, X_{10} and X_{16} adversely and the ones X_2, X_4 and X_{15}

Table 4a. Correlations.

		Y1	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16
Pearson correlation	Y1	1.000	.156	.160	-.089	.137	-.156	-.007	-.212	-.085	.016	-.134	.016	-.021	-.026	.083	.298	.082
	X1	.156	1.000	.224	.259	.219	-1.000	-.063	-.871	.350	.043	.257	-.163	.020	.006	-.335	-.007	.027
	X2	.160	.224	1.000	-.280	-.350	-.224	.011	-.237	-.094	-.151	-.004	-.007	.028	-.069	.099	.061	.025
	X3	-.089	.259	-.280	1.000	-.325	-.259	-.075	-.155	-.288	-.063	-.209	-.043	-.031	.054	.274	-.075	.046
	X4	.137	.219	-.350	-.325	1.000	-.219	-.047	-.227	.426	.284	.389	-.069	-.017	.052	-.417	-.005	.019
	X5	-.156	-1.000	-.224	-.259	-.219	1.000	.063	.871	-.350	-.043	-.257	.163	-.020	-.006	.335	.007	-.027
	X6	-.007	-.063	.011	-.075	-.047	.063	1.000	-.010	-.009	-.031	.001	.177	-.010	.163	-.021	-.014	-.030
	X7	-.212	-.871	-.237	-.155	-.227	.871	-.010	1.000	-.287	-.064	-.221	.056	-.014	-.001	.286	-.037	-.009
	X8	-.085	.350	-.094	-.288	.426	-.350	-.009	-.287	1.000	.383	.619	-.135	-.035	.101	-.972	.009	-.058
	X9	.016	.043	-.151	-.063	.284	-.043	-.031	-.064	.383	1.000	-.063	-.009	-.012	.023	-.374	.079	.032
	X10	-.134	.257	-.004	-.209	.389	-.257	.001	-.221	.619	-.063	1.000	-.102	-.011	.091	-.601	-.055	-.047
	X11	.016	-.163	-.007	-.043	-.069	.163	.177	.056	-.135	-.009	-.102	1.000	.463	-.006	-.059	.033	-.021
	X12	-.021	.020	.028	-.031	-.017	-.020	-.010	-.014	-.035	-.012	-.011	.463	1.000	-.005	-.058	-.009	-.009
	X13	-.026	.006	-.069	.054	.052	-.006	.163	-.001	.101	.023	.091	-.006	-.005	1.000	-.097	-.013	-.015
	X14	.083	-.335	.099	.274	-.417	.335	-.021	.286	-.972	-.374	-.601	-.059	-.058	-.097	1.000	-.007	.062
	X15	.298	-.007	.061	-.075	-.005	.007	-.014	-.037	.009	.079	-.055	.033	-.009	-.013	-.007	1.000	.613
	X16	.082	.027	.025	.046	.019	-.027	-.030	-.009	-.058	.032	-.047	-.021	-.009	-.015	.062	.613	1.000
Sig. (1-tailed)	Y1	.	.000	.000	.001	.000	.000	.399	.000	.002	.295	.000	.293	.233	.187	.002	.000	.002
	X1	.000	.	.000	.000	.000	.000	.015	.000	.000	.070	.000	.000	.249	.421	.000	.406	.171
	X2	.000	.000	.	.000	.000	.000	.356	.000	.001	.000	.452	.407	.164	.008	.000	.018	.190
	X3	.001	.000	.000	.	.000	.000	.005	.000	.000	.015	.000	.070	.140	.032	.000	.005	.057
	X4	.000	.000	.000	.000	.	.000	.053	.000	.000	.000	.000	.009	.273	.037	.000	.428	.257
	X5	.000	.000	.000	.000	.000	.	.015	.000	.000	.070	.000	.000	.249	.421	.000	.406	.171
	X6	.399	.015	.356	.005	.053	.015	.	.370	.376	.139	.484	.000	.366	.000	.230	.315	.151
	X7	.000	.000	.000	.000	.000	.000	.370	.	.000	.014	.000	.026	.312	.485	.000	.102	.384
	X8	.002	.000	.001	.000	.000	.000	.376	.000	.	.000	.000	.000	.114	.000	.000	.383	.022
	X9	.295	.070	.000	.015	.000	.070	.139	.014	.000	.	.014	.384	.339	.210	.000	.003	.136

Table 4a. Contd.

	X10	.000	.000	.452	.000	.000	.000	.484	.000	.000	.014	.	.000	.357	.001	.000	.030	.051
	X11	.293	.000	.407	.070	.009	.000	.000	.026	.000	.384	.000	.	.000	.420	.020	.127	.230
	X12	.233	.249	.164	.140	.273	.249	.366	.312	.114	.339	.357	.000	.	.432	.022	.378	.378
	X13	.187	.421	.008	.032	.037	.421	.000	.485	.000	.210	.001	.420	.432	.	.000	.326	.302
	X14	.002	.000	.000	.000	.000	.000	.230	.000	.000	.000	.000	.020	.022	.000	.	.403	.016
	X15	.000	.406	.018	.005	.428	.406	.315	.102	.383	.003	.030	.127	.378	.326	.403	.	.000
	X16	.002	.171	.190	.057	.257	.171	.151	.384	.022	.136	.051	.230	.378	.302	.016	.000	.
N	Y1	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X1	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X2	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X3	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X4	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X5	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X6	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X7	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X8	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X9	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X10	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X11	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X12	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X13	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X14	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X15	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X16	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197

or AOP. All these relationships are both statistically significant as $p < 0,05$ and robust as $p \to 0$. The model constant value is 0.212 or 21.2%. Standardized coefficients column reports that the variable being of the highest signi-ficance degree is X_{15} with 0.384 while the one with the lowest significance degree (0.141) appears as X_8. Thus; H_2, H_4, H_7, H_8, H_{10}, H_{15}, H_{16} are accepted leaving the resting eight hypotheses rejected.

Y_2 (ATP) set as the dependent variable

We will discuss here important tables along our objective. As to be realized from Tables 8, 8a and b, when Y_2 becomes the dependent variable, we face five different models. Once Model 5 is picked up among all the others, R value appears as 0.357. Accordingly, the degree of the relationship among the given variables in the model is 35.7% with an overall positive direction. The best fit

Table 4b. Variables entered/removed[b].

Model	Variables entered	Variables removed	Method
1	X15	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	X7	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	X10	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	X4	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
5	X2	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
6	X16	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
7	X8	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent variable: Y1.

Table 5. Model summary[h].

					Change statistics					
Model	R	R square	Adjusted R square	Std. error of the estimate	R square change	F change	df1	df2	Sig. F change	Durbin-Watson
1	.298a	.089	.088	.198605002801139	.089	116.094	1	1195	.000	
2	.359b	.129	.128	.194223338753927	.041	55.526	1	1194	.000	
3	.396c	.157	.155	.191170862762199	.028	39.434	1	1193	.000	
4	.430d	.185	.182	.188093025911670	.028	40.362	1	1192	.000	
5	.465e	.216	.213	.184456355181586	.032	48.465	1	1191	.000	
6	.484f	.234	.230	.182431012684561	.018	27.592	1	1190	.000	
7	.495g	.245	.241	.181194092091209	.011	17.303	1	1189	.000	1.562

a. Predictors: (Constant), X15, b. Predictors: (Constant), X15, X7, c. Predictors: (Constant), X15, X7, X10, d. Predictors: (Constant), X15, X7, X10, X4, e. Predictors: (Constant), X15, X7, X10, X4, X2, f. Predictors: (Constant), X15, X7, X10, X4, X2, X16, g. Predictors: (Constant), X15, X7, X10, X4, X2, X16, X8, h. Dependent variable: Y1.

model is Model 5 entailing the independent variables X_4, X_7, X_8 and X_{11} as it is the one ranking with the highest adjusted R^2 value (12.4%) among all the resting models. In other words, the change in the level of the independent variables accounts for the change in the level of the dependent variable ca. 12.4% with Model 5. Further, we see that the changes in all the models are statistically significant at the significance level of 5% ($p < 0.05$) and that there is no any autocorrelation problem positively relate to the dependent variable being Y_1 among the error terms.

Examining Table 9, we see that at the significance level of 5%, all the models including Model 5 are both statistically significant ($p < 0.05$) and robust ($p \to 0$). Table 10 shows the coefficients of the variables given that Y_2 or ATP is the dependent variable. Looking at Model 5 which is the most significant and robust one, we see that the variables X_8 and X_{11} negatively and the variables X_1, X_4 and X_7 positively relate to Y_2. The model coefficient takes a value of -0.256. The standardized coefficients column of the same table tells that X_1 has the highest significance value with 48.9% while X_4 takes the lowest significance value of 13%. Hence, we accept H_1, H_4, H_7, H_8, H_{11} and reject the resting 11 hypotheses. Next section presents the panel data analysis findings for each of the preset profitability
ratios.

Empirical findings: Panel data analysis

This section discusses the findings on the panel data analysis performed for both the profitability indicators, that is, AOP being Y_1 and ATP being Y_2. Panel regressions have been set through fixed and random effects models and run with E-views. For one thing, to perform panel analysis with fixed and random effects, dataset needs not exhibit any matrix singularity character or something close to it.[9] This was a problem we confronted with. In tackling this issue, ob-serving the results obtained from thestepwise regression analysis, we have removed some noisy variables from our vector

[9] Singular matrices are the matrices whose determinations are zero.

Table 6. ANOVA[h].

Model		Sum of squares	df	Mean square	F	Sig.
1	Regression	4.579	1	4.579	116.094	.000[a]
	Residual	47.136	1195	.039		
	Total	51.715	1196			
2	Regression	6.674	2	3.337	88.459	.000[b]
	Residual	45.041	1194	.038		
	Total	51.715	1196			
3	Regression	8.115	3	2.705	74.016	.000[c]
	Residual	43.600	1193	.037		
	Total	51.715	1196			
4	Regression	9.543	4	2.386	67.434	.000[d]
	Residual	42.172	1192	.035		
	Total	51.715	1196			
5	Regression	11.192	5	2.238	65.788	.000[e]
	Residual	40.523	1191	.034		
	Total	51.715	1196			
6	Regression	12.110	6	2.018	60.646	.000[f]
	Residual	39.604	1190	.033		
	Total	51.715	1196			
7	Regression	12.678	7	1.811	55.167	.000[g]
	Residual	39.036	1189	.033		
	Total	51.715	1196			

a. Predictors: (Constant), X15, b. Predictors: (Constant), X15, X7, c. Predictors: (Constant), X15, X7, X10, d. Predictors: (Constant), X15, X7, X10, X4, e. Predictors: (Constant), X15, X7, X10, X4, X2, f. Predictors: (Constant), X15, X7, X10, X4, X2, X16, g. Predictors: (Constant), X15, X7, X10, X4, X2, X16, X8, h. Dependent Variable: Y1.

Table 7. Coefficients[a].

	Model	Unstandardized coefficients		Standardized coefficients	t	Sig.	95% Confidence ınterval for B	
		B	Std. error	Beta			Lower bound	Upper bound
1	(Constant)	.210	.006		33.240	.000	.197	.222
	X15	9.711E-5	.000	.298	10.775	.000	.000	.000
2	(Constant)	.238	.007		32.850	.000	.224	.252
	X15	9.470E-5	.000	.290	10.737	.000	.000	.000
	X7	-.244	.033	-.201	-7.452	.000	-.309	-.180
3	(Constant)	.276	.009		29.399	.000	.258	.295
	X15	9.119E-5	.000	.279	10.482	.000	.000	.000
	X7	-.291	.033	-.240	-8.783	.000	-.356	-.226
	X10	-.186	.030	-.172	-6.280	.000	-.244	-.128
4	(Constant)	.241	.011		22.412	.000	.220	.262
	X15	9.067E-5	.000	.278	10.592	.000	.000	.000
	X7	-.258	.033	-.213	-7.820	.000	-.323	-.193
	X10	-.256	.031	-.237	-8.229	.000	-.317	-.195
	X4	.162	.025	.183	6.353	.000	.112	.211

Table 7. Contd.

5	(Constant)	.182	.014		13.370	.000	.155	.208
	X15	8.715E-5	.000	.267	10.363	.000	.000	.000
	X7	-.179	.034	-.148	-5.232	.000	-.247	-.112
	X10	-.281	.031	-.259	-9.131	.000	-.341	-.220
	X4	.246	.028	.278	8.866	.000	.191	.300
	X2	.188	.027	.205	6.962	.000	.135	.242
6	(Constant)	.180	.013		13.365	.000	.153	.206
	X15	.000	.000	.370	11.504	.000	.000	.000
	X7	-.176	.034	-.145	-5.177	.000	-.242	-.109
	X10	-.285	.030	-.263	-9.375	.000	-.345	-.225
	X4	.251	.027	.284	9.163	.000	.198	.305
	X2	.189	.027	.206	7.072	.000	.137	.242
	X16	-5.562E-5	.000	-.169	-5.253	.000	.000	.000
7	(Constant)	.212	.015		13.744	.000	.181	.242
	X15	.000	.000	.384	11.940	.000	.000	.000
	X7	-.201	.034	-.166	-5.872	.000	-.268	-.134
	X10	-.205	.036	-.190	-5.738	.000	-.275	-.135
	X4	.272	.028	.308	9.822	.000	.218	.326
	X2	.180	.027	.196	6.740	.000	.128	.232
	X16	-6.000E-5	.000	-.182	-5.676	.000	.000	.000
	X8	-.131	.031	-.141	-4.160	.000	-.192	-.069

a. Dependent Variable: Y1

of independent variables.[10] X_3, X_5, X_6, X_9, X_{12}, X_{13} and X_{14} have hence been precluded from this set of identifiers. This helped to root out the singularity problem. For another thing, we need to have a balanced panel to carry out the panel regression with two-way random effects. This is purported to gauge if cross-sections and/or temporal dimensions are influential on the degree of the regressed variable.[11] The initial observation number was 1197. Removing the redundant nine observations from the sample set along 99 cross-sections (brokerage institutions) and 12 quarter periods, observation number reduced to 1188 (99*12). Hence unbalanced panel became balanced panel, which allowed us to gather tractable results from random effects model as well. In other words, it has been possible to make the panel analysis along both dynamic cross-section and time dimensions.

Y_1 (AOP) set as the dependent variable

We first needed to check if the series are stationary and thereby conducted unit root tests. Table 11 reports that there is neither common nor unit roots among the series, which implies that the series are stationary and that there is no need to reorganize or adjust them. Therefore, panel data analysis has been doable.

Looking at the fixed and random effects model, we see that X_2, X_4, X_7, X_8, X_{10}, X_{15} and X_{16} are the variables that do significantly account for the dependent variable being Y_1 or AOP. The explanatory variables X_7, X_8, X_{10} and X_{16} negatively and the ones X_2, X_4 and X_{15} positively relate to the dependent variable. All these relationships are both statistically significant as $p < 0.05$ and robust as $p \to 0$. Adjusted R^2 value in fixed effects model (Table 12) appears as ca. 42%, which means that the changes in the

[10] Stepwise regression provides us with a due diligence opportunity to make a cross-check with panel data analysis among the others. Particularly, as we can recognize that which variables are statistically significant, we can use them to disentangle the redundant variables from the entire set of the panel data, so that we can have a smooth (ie. non-singular matrix) structure with a determination value of non-zero. Recall that, should we not predefine any cross-section or temporal effects in running the panel analysis, the results we get will be pooled (ordinary least regression) model results by default.

[11] Panel regression with fixed effects model does not need to tune the panel data. Nonetheless, if a matrix singularity is detected, one needs to rearrange the panel set anyway.

Table 8. Descriptive statistics.

	Mean	Std. Deviation	N
Y2	.03346339813567	.146036034148202	1197
X1	.80070559184553	.186742599322661	1197
X2	.17609762879751	.226071270768783	1197
X3	.22940299137070	.222208387453564	1197
X4	.27062542751942	.235143152393016	1197
X5	.19929440815447	.186742599322661	1197
X6	.00	.008	1197
X7	.11289962387754	.171332804242480	1197
X8	.36133884824921	.224517578278755	1197
X9	.05299180404479	.112105036244861	1197
X10	.17	.192	1197
X11	.02067661496098	.045281121270572	1197
X12	.00	.022	1197
X13	.00	.001	1197
X14	.61216359863957	.225124241985985	1197
X15	2.89140736213173E2	6.371579301834049E2	1197
X16	1.63570909679341E2	6.311446505487407E2	1197

Table 8a. Correlations.

		Y2	X1	X2	X3	X4	X5	X6	X7	X8	X9	X10	X11	X12	X13	X14	X15	X16
Pearson correlation	Y2	1.000	.144	.044	.099	.056	-.144	-.118	-.036	-.115	-.086	-.031	-.197	-.018	-.022	.148	-.050	.043
	X1	.144	1.000	.224	.259	.219	-1.000	-.063	-.871	.350	.043	.257	-.163	.020	.006	-.335	-.007	.027
	X2	.044	.224	1.000	-.280	-.350	-.224	.011	-.237	-.094	-.151	-.004	-.007	.028	-.069	.099	.061	.025
	X3	.099	.259	-.280	1.000	-.325	-.259	-.075	-.155	-.288	-.063	-.209	-.043	-.031	.054	.274	-.075	.046
	X4	.056	.219	-.350	-.325	1.000	-.219	-.047	-.227	.426	.284	.389	-.069	-.017	.052	-.417	-.005	.019
	X5	-.144	-1.000	-.224	-.259	-.219	1.000	.063	.871	-.350	-.043	-.257	.163	-.020	-.006	.335	.007	-.027
	X6	-.118	-.063	.011	-.075	-.047	.063	1.000	-.010	-.009	-.031	.001	.177	-.010	.163	-.021	-.014	-.030
	X7	-.036	-.871	-.237	-.155	-.227	.871	-.010	1.000	-.287	-.064	-.221	.056	-.014	-.001	.286	-.037	-.009
	X8	-.115	.350	-.094	-.288	.426	-.350	-.009	-.287	1.000	.383	.619	-.135	-.035	.101	-.972	.009	-.058
	X9	-.086	.043	-.151	-.063	.284	-.043	-.031	-.064	.383	1.000	-.063	-.009	-.012	.023	-.374	.079	.032
	X10	-.031	.257	-.004	-.209	.389	-.257	.001	-.221	.619	-.063	1.000	-.102	-.011	.091	-.601	-.055	-.047
	X11	-.197	-.163	-.007	-.043	-.069	.163	.177	.056	-.135	-.009	-.102	1.000	.463	-.006	-.059	.033	-.021
	X12	-.018	.020	.028	-.031	-.017	-.020	-.010	-.014	-.035	-.012	-.011	.463	1.000	-.005	-.058	-.009	-.009
	X13	-.022	.006	-.069	.054	.052	-.006	.163	-.001	.101	.023	.091	-.006	-.005	1.000	-.097	-.013	-.015
	X14	.148	-.335	.099	.274	-.417	.335	-.021	.286	-.972	-.374	-.601	-.059	-.058	-.097	1.000	-.007	.062
	X15	-.050	-.007	.061	-.075	-.005	.007	-.014	-.037	.009	.079	-.055	.033	-.009	-.013	-.007	1.000	.613
	X16	.043	.027	.025	.046	.019	-.027	-.030	-.009	-.058	.032	-.047	-.021	-.009	-.015	.062	.613	1.000
Sig. (1-tailed)	Y2	.	.000	.065	.000	.026	.000	.000	.108	.000	.001	.142	.000	.268	.221	.000	.043	.068
	X1	.000	.	.000	.000	.000	.000	.015	.000	.000	.070	.000	.000	.249	.421	.000	.406	.171
	X2	.065	.000	.	.000	.000	.000	.356	.000	.001	.000	.452	.407	.164	.008	.000	.018	.190
	X3	.000	.000	.000	.	.000	.000	.005	.000	.000	.015	.000	.070	.140	.032	.000	.005	.057
	X4	.026	.000	.000	.000	.	.000	.053	.000	.000	.000	.000	.009	.273	.037	.000	.428	.257
	X5	.000	.000	.000	.000	.000	.	.015	.000	.000	.070	.000	.000	.249	.421	.000	.406	.171

Table 8a. Contd.

	X6	.000	.015	.356	.005	.053	.015	.	.370	.376	.139	.484	.000	.366	.000	.230	.315	.151
	X7	.108	.000	.000	.000	.000	.000	.370	.	.000	.014	.000	.026	.312	.485	.000	.102	.384
	X8	.000	.000	.001	.000	.000	.000	.376	.000	.	.000	.000	.000	.114	.000	.000	.383	.022
	X9	.001	.070	.000	.015	.000	.070	.139	.014	.000	.	.014	.384	.339	.210	.000	.003	.136
	X10	.142	.000	.452	.000	.000	.000	.484	.000	.000	.014	.	.000	.357	.001	.000	.030	.051
	X11	.000	.000	.407	.070	.009	.000	.000	.026	.000	.384	.000	.	.000	.420	.020	.127	.230
	X12	.268	.249	.164	.140	.273	.249	.366	.312	.114	.339	.357	.000	.	.432	.022	.378	.378
	X13	.221	.421	.008	.032	.037	.421	.000	.485	.000	.210	.001	.420	.432	.	.000	.326	.302
	X14	.000	.000	.000	.000	.000	.000	.230	.000	.000	.000	.000	.020	.022	.000	.	.403	.016
	X15	.043	.406	.018	.005	.428	.406	.315	.102	.383	.003	.030	.127	.378	.326	.403	.	.000
	X16	.068	.171	.190	.057	.257	.171	.151	.384	.022	.136	.051	.230	.378	.302	.016	.000	.
N	Y2	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X1	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X2	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X3	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X4	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X5	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X6	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X7	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X8	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X9	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X10	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X11	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X12	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X13	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X14	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X15	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197
	X16	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197	1197

independent variables account for the changes in the level of the profitability (AOP) as much as ca. 42%. On the other hand, adjusted R^2 value in random effects model (Table 13) is ca. 25%, meaning that the independent variables explain the profitability (AOP) as much as ca. 25%.

We are interested in seeing which panel model should be followed to better predict the brokerage houses' profitability. Therefore, we have conducted a Hausman test. The test results show that random effects model should be used to predict the profitability as the p-value in Table 14 is much greater than 5%, telling that cross-section and temporal effects are randomly given (e.g. Kök and Şimşek, ibid.). This can also be understood looking at the F-stat of the fixed effects model (ca. 8) versus that of random effects model (ca. 45). This suggests that both the cross-sections or groups (brokerage institutions) and time are influential in determining the profitability and thus we need to consider not fixed but random effects panel regression in interpreting the outcomes.

Y_2 (ATP) set as the dependent variable

As Table 15 reports that the series across and within the roots are stationary ($p < 0.05$), there is not either common nor any unit root problem over here as well. On the fixed effects model, the results suggest that X_1, X_2, X_4, X_7, X_8 and X_{11} are the variables that do significantly account for the dependent variable being Y_2 or ATP. The explanatory

Table 8b. Variables entered/removed[a].

Model	Variables entered	Variables removed	Method
1	X11	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
2	X8	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
3	X1	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
4	X7	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).
5	X4	.	Stepwise (Criteria: Probability-of-F-to-enter <= .050, Probability-of-F-to-remove >= .100).

a. Dependent Variable: Y2.

Table 9a. Model summary[f].

Model	R	R square	Adjusted R square	Std. error of the estimate	Change statistics					Durbin-Watson
					R square change	F change	df1	df2	Sig. F change	
1	.197[a]	.039	.038	.143239581082055	.039	48.155	1	1195	.000	
2	.243[b]	.059	.058	.141766534329941	.020	25.963	1	1194	.000	
3	.298[c]	.089	.086	.139591424153291	.029	38.500	1	1193	.000	
4	.338[d]	.114	.111	.137696808642069	.025	34.056	1	1192	.000	
5	.357[e]	.127	.124	.136695782056969	.014	18.522	1	1191	.000	1.993

a. Predictors: (Constant), X11, b. Predictors: (Constant), X11, X8, c. Predictors: (Constant), X11, X8, X1, d. Predictors: (Constant), X11, X8, X1, X7, e. Predictors: (Constant), X11, X8, X1, X7, X4, f. Dependent Variable: Y2.

Table 9b. ANOVA[f]

	Model	Sum of squares	df	Mean square	F	Sig.
1	Regression	.988	1	.988	48.155	.000[a]
	Residual	24.519	1195	.021		
	Total	25.507	1196			
2	Regression	1.510	2	.755	37.562	.000[b]
	Residual	23.997	1194	.020		
	Total	25.507	1196			
3	Regression	2.260	3	.753	38.661	.000[c]
	Residual	23.247	1193	.019		
	Total	25.507	1196			
4	Regression	2.906	4	.726	38.313	.000[d]
	Residual	22.601	1192	.019		
	Total	25.507	1196			
5	Regression	3.252	5	.650	34.805	.000[e]
	Residual	22.255	1191	.019		
	Total	25.507	1196			

a. Predictors: (Constant), X11, b. Predictors: (Constant), X11, X8, c. Predictors: (Constant), ,X11, X8, X1, d. Predictors: (Constant), X11, X8, X1, X7, e. Predictors: (Constant), X11, X8, X1, X7, X4, f. Dependent Variable: Y2.

variables X_8, X_{11} and X_{15} adversely and the ones X_1, X_2, X_4 and X_7 positively relate to the dependent variable. All these relationships are both statistically significant as $p < 0.05$ and robust as $p \to 0$. For the random effects model, it is almost the same, with the exception that X_2 isstatistically insignificant out there ($p > 0.05$). Adjusted R^2 value in fixed effects model (Table 16) appears as ca. 15%, which means that the changes in the independent variables account for the changes in the degree of the adjusted R^2 value in random effects model (Table 17) is almost 13%, meaning that the independent variables explain the profitability as much as ca. 13%.

Table 10. Coefficients[a].

Model		Unstandardized coefficients		Standardized Coefficients	t	Sig.	95% confidence ınterval for B	
		B	Std. error	Beta			Lower bound	Upper bound
1	(Constant)	.047	.005		10.235	.000	.038	.056
	X11	-.635	.091	-.197	-6.939	.000	-.814	-.455
2	(Constant)	.082	.008		9.915	.000	.066	.098
	X11	-.698	.091	-.216	-7.635	.000	-.877	-.518
	X8	-.094	.018	-.144	-5.095	.000	-.130	-.058
3	(Constant)	-.021	.018		-1.124	.261	-.057	.015
	X11	-.627	.091	-.194	-6.917	.000	-.805	-.449
	X8	-.134	.019	-.206	-6.957	.000	-.172	-.096
	X1	.144	.023	.185	6.205	.000	.099	.190
4	(Constant)	-.237	.041		-5.742	.000	-.318	-.156
	X11	-.534	.091	-.166	-5.880	.000	-.712	-.356
	X8	-.137	.019	-.210	-7.197	.000	-.174	-.099
	X1	.374	.046	.478	8.210	.000	.285	.463
	X7	.281	.048	.330	5.836	.000	.187	.375
5	(Constant)	-.256	.041		-6.217	.000	-.337	-.175
	X11	-.526	.090	-.163	-5.836	.000	-.703	-.349
	X8	-.171	.020	-.262	-8.346	.000	-.211	-.130
	X1	.383	.045	.489	8.458	.000	.294	.472
	X7	.302	.048	.354	6.282	.000	.208	.396
	X4	.081	.019	.130	4.304	.000	.044	.117

a. Dependent Variable: Y2.

Table 11. Unit root tests.

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin and Chu t*	-7.83833	0.0000	14	16690
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-90.5556	0.0000	14	16690
ADF - Fisher Chi-square	1383.71	0.0000	14	16690
PP - Fisher Chi-square	1280.70	0.0000	14	16743

** Probabilities for Fisher tests are computed using an asymptotic Chi. -square distribution. All other tests assume asymptotic normality.

Hausman test (Table 18) indicates that random effects panel regression should be preferred over fixed effects model as $p > 0.05$. This suggests that X_2 be removed from our set of profitability identifiers. Hence the determinants underlying the profitability appear as X_1, X_2, X_4, X_7, X_8 and X_{11} ratios.

To sum up, the empirical findings report that the factors (ratios) significantly and robustly accounting for the operating profitability of total assets are Liquid Assets/Total Assets, Current Trade Receivables/Total Assets, Stock Trading Volume/Total Assets, Financial Assets/Total Assets, Short-Term Liabilities/Total Assets, Short-Term Trade Payables/Total Assets and Fixed Income Securities Trading Volume/Total Assets. The first the profitability. Pre-tax profitability of total assets has been found to be accounted for by the ratios Short-Term Liabilities/Total Assets, Long-Term Liabilities/Total Assets, Current Assets/Total Assets, Current Trade Receivables/ Total Assets and Financial Assets/Total Assets. The first two is negatively and the last three is positively related to the profitability. In the case of multiple regression analysis; the adjusted coefficient of determination in the best fit model (24.1%) wherein the dependent variable is the operating profitability of total assets hugely varies from the one (12.4%) in the best fit model wherein the dependent variable is the pre-tax profitability of total assets. In the case of panel data analysis, random effects models have been shown to be considered in both the profitability

Table 12. Fixed effects

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.204167	0.050757	4.022422	0.0001
X1	0.022256	0.055265	0.402722	0.6872
X10	-0.203863	0.034119	-5.974987	0.0000
X11	-0.006479	0.109733	-0.059042	0.9529
X15	9.71E-05	9.87E-06	9.838760	0.0000
X16	-4.55E-05	1.01E-05	-4.506732	0.0000
X2	0.172186	0.024911	6.912124	0.0000
X4	0.257077	0.025452	10.10057	0.0000
X7	-0.193654	0.058881	-3.288902	0.0010
X8	-0.131622	0.030200	-4.358309	0.0000
Effects Specification				
Cross-section fixed (dummy variables)				
Period fixed (dummy variables)				
R-squared	0.473473	Mean dependent var		0.237687
Adjusted R-squared	0.415353	S.D. dependent var		0.208286
S.E. of regression	0.159260	Akaike info criterion		-0.741770
Sum squared resid	27.11380	Schwarz criterion		-0.232912
Log likelihood	559.6112	Hannan-Quinn criter.		-0.549992
F-statistic	8.146479	Durbin-Watson stat		2.275938
Prob(F-statistic)	0.000000			

Dependent Variable: Y1, Method: Panel Least Squares,Sample: 2005Q1 2007Q4. Periods included: 12 Cross-sections included: 99. Total panel (balanced) observations: 1188.

forms. For the operating profitability of total assets, the adjusted coefficient of determination has been reported to be ca. 25%, while for the pre-tax profitability of total assets, it was reported as ca. 13%. Namely; when the profitability ratio is set not relying on earnings before taxes but on gross real operating income, the effects of the firm-level factors on the profitability become profound and the model's predictive power rises significantly. However, no three is positively and the last four is adversely related to matter how profitability is given, the factors (ratios) current trade receivables to total assets, financial assets to total assets and short-term liabilities to total assets preserve their significances ($p<0,05$) and robustnesses ($p\rightarrow0$) in either the cases. As to be recalled from Table 1, these firm-level or micro factors are such proportional values that have been obtained from the balance sheet items of the brokerage institutions. For this reason, we can argue that the balance sheet-based factors such as current trade receivables to total assets, financial assets to total assets and short-term liabilities to total assets not only significantly and robustly but commonly explain the brokerage houses' profitability.

CONCLUSION AND SOME POLICY RECOMMENDATIONS

Following banks, brokerage institutions are remarkably important businesses running in the capital markets in general and financial services industry in particular. With this awareness, in parallel to the studies made for the similar sectors such as banking, the firm-level or micro factors that determine profitability in the brokerage institutions have been the main subject-matter of this paper. These firm-level factors are firm-intrinsic characters that stem from the brokerage institutions' self dynamics. In this respect, along the financial reporting techniques mandated by the respective statute, a large number of brokerage institutions overseen and supervised by CMB of Turkey has been sampled for all the quarter periods running from 2005 through 2007. This ensured not only the existence of the complete data but also the reliability, through assuring coherence and consistency within and across the entire set of the financial information exhausted in this study.

As the basic objective of ours is to identify the role of the underlying firm-level indicators and their effects on the brokerage institutions' profitability, two empirical examinations have been conducted. Two sets of dependent variables were set to control for the profitability given as return on assets. The first regressed variable was built on the net revenue or income sourcing from the conduct of the main (gross real) operations (that is, operating profitability of total assets). The second one was drawn on the earnings before taxes (that is, pre-tax profitability of total assets) unveiling the global revenue that comes

Table 13. Random effects.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	0.197148	0.051224	3.848767	0.0001
X1	0.027428	0.055174	0.497114	0.6192
X10	-0.207013	0.033514	-6.176919	0.0000
X11	-0.013361	0.108923	-0.122663	0.9024
X15	0.000106	9.81E-06	10.76075	0.0000
X16	-5.01E-05	9.97E-06	-5.024040	0.0000
X2	0.174513	0.024712	7.061850	0.0000
X4	0.260604	0.025190	10.34560	0.0000
X7	-0.189287	0.058719	-3.223599	0.0013
X8	-0.131612	0.029868	-4.406439	0.0000
Effects specification				
			S.D.	**Rho**
Cross-section random			0.078130	0.1940
Period random			0.000000	0.0000
Idiosyncratic random			0.159260	0.8060
Weighted statistics				
R-squared	0.255180	Mean dependent var		0.120542
Adjusted R-squared	0.249490	S.D. dependent var		0.185428
S.E. of regression	0.160640	Sum squared resid		30.39864
F-statistic	44.84344	Durbin-Watson stat		2.049321
Prob(F-statistic)	0.000000			
Unweighted statistics				
R-squared	0.243018	Mean dependent var		0.237687
Sum squared resid	38.98120	Durbin-Watson stat		1.598119

Dependent variable: Y1. Method: Panel EGLS (Two-way random effects). Sample: 2005Q1 2007Q4. Periods included: 12. Cross-sections included: 99. Total panel (balanced) observations: 1188. Swamy and Arora estimator of component variances.

Table 14. Husman test.

Test summary	Chi-Sq. statistic	Chi-Sq. d.f.	Prob.
Cross-section random	0.000000	9	1.0000
Period random	0.000000	9	1.0000
Cross-section and period random	0.000000	9	1.0000

Correlated Random Effects - Hausman Test. Equation: Untitled. Test cross-section and period random effects.

Table 15. Unit root tests.

Method	Statistic	Prob.**	Cross-sections	Obs
Null: Unit root (assumes common unit root process)				
Levin, Lin and Chu t*	-7.83833	0.0000	14	16690
Null: Unit root (assumes individual unit root process)				
Im, Pesaran and Shin W-stat	-90.5556	0.0000	14	16690
ADF - Fisher Chi-square	1383.71	0.0000	14	16690
PP - Fisher Chi-square	1280.70	0.0000	14	16743

** Probabilities for Fisher tests are computed using an asymptotic Chi-square distribution. All other tests assume asymptotic normality.

Table 16. Fixed effects.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.244953	0.042933	-5.705491	0.0000
X1	0.357114	0.046745	7.639555	0.0000
X10	0.016261	0.028860	0.563454	0.5732
X11	-0.523463	0.092817	-5.639716	0.0000
X15	-1.73E-05	8.35E-06	-2.070803	0.0386
X16	1.45E-05	8.53E-06	1.703274	0.0888
X2	0.045006	0.021071	2.135947	0.0329
X4	0.090605	0.021528	4.208670	0.0000
X7	0.289677	0.049804	5.816295	0.0000
X8	-0.171194	0.025545	-6.701729	0.0000

Effects specification			
Cross-section fixed (dummy variables)			
Period fixed (dummy variables)			
R-squared	0.230017	Mean dependent var	0.033473
Adjusted R-squared	0.145024	S.D. dependent var	0.145687
S.E. of regression	0.134709	Akaike info criterion	-1.076605
Sum squared resid	19.39873	Schwarz criterion	-0.567747
Log likelihood	758.5034	Hannan-Quinn criter.	-0.884827
F-statistic	2.706291	Durbin-Watson stat	2.268244
Prob(F-statistic)	0.000000		

Dependent Variable: Y2. Method: Panel Least Squares. Sample: 2005Q1 2007Q4. Periods included: 12. Cross-sections included: 99. Total panel (balanced) observations: 1188.

Table 17. Random Effects.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.244800	0.041865	-5.847385	0.0000
X1	0.359264	0.045593	7.879883	0.0000
X10	0.011396	0.027080	0.420807	0.6740
X11	-0.525226	0.089634	-5.859709	0.0000
X15	-1.39E-05	8.02E-06	-1.733426	0.0833
X16	1.12E-05	8.12E-06	1.372921	0.1700
X2	0.037641	0.020174	1.865852	0.0623
X4	0.090683	0.020746	4.371061	0.0000
X7	0.291293	0.048571	5.997279	0.0000
X8	-0.172130	0.024261	-7.094772	0.0000

Effects specification		
	S.D.	**Rho**
Cross-section random	0.023370	0.0292
Period random	0.000000	0.0000
Idiosyncratic random	0.134709	0.9708

Weighted statistics			
R-squared	0.133930	Mean dependent var	0.028690
Adjusted R-squared	0.127314	S.D. dependent var	0.143820

Table 17. contd.

S.E. of regression	0.134354	Sum squared resid	21.26400
F-statistic	20.24087	Durbin-Watson stat	2.090718
Prob(F-statistic)	0.000000		
Unweighted statistics			
R-squared	0.131273	Mean dependent var	0.033473
Sum squared resid	21.88647	Durbin-Watson stat	2.031257

Dependent variable: Y2. Method: Panel EGLS (Two-way random effects). Sample: 2005Q1 2007Q4. Periods included: 12. Cross-sections included: 99. Total panel (balanced) observations: 1188. Swamy and Arora estimator of component variances.

Table 18. Hausman test.

Test Summary	Chi-Sq. statistic	Chi-Sq. d.f.	Prob.
Cross-section random	5.508388	9	0.7879
Period random	4.693322	9	0.8602
Cross-section and period random	5.914701	9	0.7484

Correlated random effects - Hausman Test. Equation: Untitled. Test cross-section and period random effects.

from the maintance of not only the main but the entire array of financial activities.

The empirical findings suggest that the factors (ratios) significantly and robustly accounting for the operating profitability of total assets are Liquid Assets/Total Assets, Current Trade Receivables/Total Assets, Stock Trading Volume/Total Assets, Financial Assets/Total Assets, Short-Term Liabilities/Total Assets, Short-Term Trade Payables/Total Assets and Fixed Income Securities Trading Volume/Total Assets. The first three is positively and the last four is adversely related to the profitability. Pre-tax profitability of total assets has been found to be accounted for by the ratios Short-Term Liabilities/Total Assets, Long-Term Liabilities/Total Assets, Current Assets/Total Assets, Current Trade Receivables/Total Assets and Financial Assets/Total Assets. The first two is negatively and the last three is positively related to the profitability. Findings further point that the firm-level factors explain (identify) the operating profitability of the assets as much as ca. 25% on average and the pre-tax profitability of the assets as much as ca. 13% on average.

The findings also suggest that the balance sheet-based factors such as current trade receivables to total assets, financial assets to total assets and short-term liabilities to total assets not only significantly and robustly but commonly explain the brokerage houses' profitability. This implies that analyzing the balance sheets of the brokerage institutions will help understand their earnings and hence profitability formations or patterns.

The abovementioned points recommend that the public authorities, in particular those organizing, overseeing and/or supervising the brokerage institutions, assume or shoulder some responsibilities. The analyses in this study suggest that the degree of the financial items leading balance sheet major and minor sub-totals play a direct role on the establishment of the brokerage institutions' earnings. These items revealing the asset size and financing structure should be systematically monitored and audited. In addition, in the process of advancing the legislation towards the brokerage institutions, together with the other financial components, some specific provisions need to be particularly articulated across a due diligence basis. Last but not least, it is clear that, the examination of the brokerage institutions' balance sheets and even transaction volumes will yield some useful hints on observing the reliability of their earnings declaration (income) statements delivered to the taxing authorities or released for the purposes of public awareness.

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