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AN EMPIRICAL INVESTIGATION OF THE RELATIONSHIP AMONG P/E RATIO, STOCK RETURN AND DIVIDEND YIELS FOR ISTANBUL STOCK EXCHANGE

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Abstract

The price to earnings ratio (P/E) is widely used, particularly by practitioners, as a measure of relative stock valuation. Price to earnings is an indicator which indicates current mood of investors how much they are willing to pay per unit of company earnings. Traditionally, the P/E ratio has been assumed to be an indicator of the quality of an investment; a relatively low P/E ratio implies a good investment, whereas a relatively high P/E ratio indicates a "poor" investment prospect.

The aim of this study is to identify relationship among market stock return, dividend yields and price to earnings ratio affect in the period 2000.01-2009.12. Therefore, to determine long-run and short-run relationship, Johansen cointegration tests, error-correction models and Granger causality tests are used.

Key Words: *Price to Earnings Ratio, Stock Return, Dividend Yields, Time Series.*

JEL Classification: G20, G30

1. INTRODUCTION

Relative valuation aims at determining the value of a stock by looking at data from comparable companies with similar qualities. In relative valuation, the value of the company in question is determined by examination of variables, such as income, cash flow, book value and/or sales (Park and Lee, 2003: 32).

The most common method in relative valuation is based on price-to-earnings ratio (P/E) measured by dividing the market value of a stock by profit earned per stock. P/E ratio used frequently in developed and developing markets is important to market analysts and potential investors as it is an indicator of what a company's market value should be in relation to profit per stock following a 1 TL tax. In other words, the P/E ratio indicates how many times greater the price per share is over the profit per share.

The P/E ratio is commonly used by investors and market analysts at banks or intermediary institutions in comparing potential profitability of different companies or industries. The P/E ratio is the most common valuation methodology used by intermediary institutions and banks in Turkey.

The advantages of the P/E ratio are: Its calculation is simple, it uses actual data, and it can be applied to all profit-making companies. Despite these advantages, a valuation which uses the P/E ratio carries error probability. Taking net profit as one of the basic indicators in calculating P/E ratio may lead to several problems. When the net profit does not reflect the actual profit as a result of the effects of different accounting practices and inflation, the derived value can be misleading. Furthermore, that the P/E ratio can not be applied to loss-making companies, and that it is hard to find comparable companies with similar qualities for valuation are among the disadvantages of the P/E ratio(Damodaran, 2002: 453-454).

In many empirical studies, key variables such as, dividend yields, stock return, market volatility, inflation, rate of return for long-term bonds and rate of growth in earnings have been identified as factors which influence the P/E ratio. Thus, it has been put forward that the P/E ratio will have a high value in case of a high dividend yield and expected growth rate, but will drop in case of a stock return with a high value. In practical terms, most investors intuitively evaluate the stocks of companies with high P/E ratios according to high growth rate expectancy, and tend to invest more in such stocks. (Ramcharran, 2002: 168).

When making recommendations about stock investment decisions, many financial analysts go by the assumption that stocks with a low P/E ratio are low-valuated (cheap) stocks. Nicholson (1960) was the first to assert that stocks with a low P/E ratio have a better investment performance than stocks with a high P/E ratio. A consistent approach though it is, it is prone to sometimes lose validity. It can be seen in studies on the stock markets in developed countries that there are some anomalies. For example, in Basu's (1977) work, it has been identified that stocks with low P/E ratios can provide a higher financial return compared to stocks with high P/E ratios. Strategically, investors pursuing to invest in stocks with low P/E ratios should be attentive, as portfolios based only on the criteria in question may not be optimal.

This study explores the long-run and short-run relations of the dividend yield and stock return rate affecting the P/E ratio in ISE 100 index covering the 2000.01-2000.12 period, and makes an inference by testing the results of previous empirical works in the Turkish context.

2. LITERATURE REVIEW

Many previous studies of the determinants of P/E use the Gordon constant growth theoretical valuation model (1962) as an expositional starting point. In this model, prices are a function of the dividend payout ratio, the required return and the growth rate in dividends. Earlier studies generally use a regression approach and specify a linear relationship between changes in these variables and changes in P/E. The earnings/price ratio (E/P) is frequently used instead of P/E because P/E goes to infinity as earnings go to zero, and because E/P is linearly related to interest rates and earnings growth (see White, 2000, Beaver and Morse, 1978, and Jain and Rosett, 2001).

While the Gordon model was derived under the simplistic assumption of constant perpetual growth, prior research shows that the Gordon variables are empirically significant determinants of P/E. Loughlin (1997) found a positive relation between P/E and both dividend payout and expected earnings growth for the S&P 500 from 1968 to 1993. White (2000) reports similar findings for a longer sample period (1926-1997). Most prior studies decompose required return into the risk-free rate and a risk premium.

A large number of papers provide evidence that low P/E stocks tend to outperform high P/E stocks. In one of the earliest studies documenting this anomaly, Basu (1975, 1977) finds that returns on portfolios of low P/E stocks are higher on average than returns on higher P/E stocks, even after adjusting for risk. Goodman and Peavy (1983, 1986) update Basu's study to address biases in the computation of systematic risk introduced by infrequent trading and find that the low P/E effect persists. Levy and Lerman (1985) incorporate transactions costs and find a low P/E effect only if transactions costs are minimal. Additional studies show that the low P/E effect may be a proxy for the size effect (Banz and Breen (1986) and Goodman and Peavy (1986)) and show that the P/E effect may occur predominately in January (Jaffe, Keim and Westerfield, 1989). Elfakhani (1994) examines the size and low P/E effects using a sample of Canadian stocks and finds that small Canadian firms earn higher risk-adjusted excess returns than large firms. However, he finds no support for the low P/E effect except in quarters ending in December.

Campbell and Shiller (1998, 2001) argue that the time series P/E is mean reverting and provide evidence that valuation ratios have been historically accurate in forecasting stock price changes. If P/E is mean reverting and the ratio takes on a value substantially above or below the mean, mean reversion implies that future prices, earnings, or both must be at least partially forecastable.

Carlson, Pelz and Wohar (2002) find statistical evidence of an upward shift in the mean of the time series P/E ratio for the S&P 500 Index. This structural break in the mean P/E series indicates that the new mean P/E ratio is substantially higher than the historical long run average P/E ratio. Rules that detect overvaluation by comparing the current absolute value of P/E to historical averages will be misleading if the historical average P/E has increased.

Fairfield (1994) shows that P/E is a function of expected *changes* in future profitability while the Price to Book ratio (P/B) is a function of the expected *level* of future profitability. Her model predicts that P/B should correlate positively with the future return on book value and P/E should correlate positively with growth in earnings. Evidence supports this prediction and indicates that different P/E – P/B combinations are associated with distinct patterns of future profitability.

Bremer and Sweeney (1991) look at Fortune 500 firms with large one-day price changes between 1962 and 1986 and find that losers earn an average of 3.95% over the five days following a price drop of 10 percent or greater (virtually no excess returns were found for winners). Fama and French (1992), show that low price-to-book value stocks and low P/E stocks outperformed the market significantly during the 1963-1990 period. Similar results for contrarian investment strategies have been found by Lakonishok, Shleifer and Vishny (1994) and Fuller, Huberts and Levinson (1993), among others.

Although many previous empirical studies have investigated the relationship between stock returns and fundamental ratios such as P/E ratio, dividend yield and book-to-market ratio, the results are ambiguous.

Basu (1983) and Banz and Rolf (1981), among others, find evidence that stock returns are positively affected by their fundamental values. On the other hand, studies by Fama and French (1992, 1988), and Basu (1975) give contradictory results. They find that stock returns are negatively affected by their fundamental values.

3. EMPRICAL ANALYSIS

In this section variables of price to earnings ratio (PE), dividends yields (DY) and common stock return ratio (RE) raw data features are examined, tests of stationarity are applied and then long-run and short-run relationship among variables are researched. Granger causality test will be carried out for the direction of relationships.

3.1. Data Description

In this study PE, DY and RE ratios are examined for ISE 100 index. The ISE National-100 index is used as a main indicator of the National Market. We obtain data from www.imkb.gov.tr. The period between 2000.01 and 2009.12 is handled. Eviews 7.0 software is used to compute. The descriptive statistics for all variables is shown in Table 1.

Table 1: Descriptive Statistics of Variables

Statistics	PE	RE	DY
Mean	34.16	0.67	2.23
Median	14.26	0.45	2.35
Maximum	824.4	5.45	6.45
Minimum	5.93	-0.47	0.00
Stan. Dev.	93.07	0.95	0.66
Skewness	6.55	1.95	2.00
Kurtosis	50.33	8.20	3.64

The standard deviation of PE ratio is larger than RE and DY variables. It shows that raw data of PE ratios has very large range. Because of this PE has more volatile behavior than the other variables.

3.2. Results for Stationarity Tests

The test results of unit root in Table 2 show that the null hypothesis related to stationary of levels for stock return, PE ratio and dividend yields series cannot be rejected. However, when the null hypothesis of nonstationarity of first difference is tested, it is rejected at 5%, 1% and 10% level of significance as shown in Table 2.

Table 2: Unit Root Tests on Level and First Difference

Variables	Level	p value	First Difference	p value
RE	1.9921	0.9890	-13.131	0.0000*
P/E	-2.5818	0.2892	-6.1451	0.0000*
DY	-0.8426	0.9587	-5.4241	0.0001*
*Stationarity at 5%,1% and 10% level				

Variables are taken into analysis as first difference since they are not stationary on level.

3.3. Results for Johansen Cointegration Test

Table 3 presents the Johansen cointegration results. According to Table 3 it is seen that there is a long-term cointegration relation and 1 cointegration vectors to supply that relation.

Table 3: Cointegration Test Results

Series: RE PE DY				
Lags interval (in first differences): 1 to 2				
Unrestricted Cointegration Rank Test (Trace)				
Hypothesized		**Trace**	**0.05**	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.160150	42.30337	29.79707	0.0011
At most 1	0.042987	10.88767	15.49471	0.2185
At most 2	0.016413	2.978765	3.841466	0.0844
Trace test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				
Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Hypothesized		**Max-Eigen**	**0.05**	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.160150	31.41570	21.13162	0.0013
At most 1	0.042987	7.908905	14.26460	0.3880
At most 2	0.016413	2.978765	3.841466	0.0844
Max-eigenvalue test indicates 1 cointegrating eqn(s) at the 0.05 level				
* denotes rejection of the hypothesis at the 0.05 level				
**MacKinnon-Haug-Michelis (1999) p-values				

Table 4: Cointegrating Equation Results

1 Cointegrating Equation(s):	**Log likelihood**	**-991.1083**		
Normalized cointegrating coefficients (standard error in parentheses)				
D(PE)	**D(RE)**	**D(DY)**		
1.000000	22.68775	-45.21874		
	(17.1311)	(11.5364)		

When taking a look at the results of cointegration equation; RE effects negatively on PE in long-run. Namely, there is a reverse relationship between two variables. Fama and French (1998), Poterba and Summers (1988) report negative relationship long-run between PE and RE. Furthermore, DY ratio effects possitively on PE in long-run. This result obtained for ISE 100 index is similar with many studies in the literature.

4.4. Results for Error Correction Model (ECM)

The results for error correction model are reported in Table 5. ECM is used to test for the short-run equilibrium relationships among the variables under study.

Table 5: Error Correction Model (ECM) Results

Error Correction:	D(PE)	D(RE)	D(DY)
CointEq1	9.93E-06	3.20E-05	2.00E-05
	(1.6E-06)	(6.0E-06)	(7.9E-06)
	[6.34519]	[5.30129]	[2.53479]

It is shown that each coefficient of error correction is significant when taking a look at the results of error correction mechanism, and there is a short-run relationships among variables.

4.5. Results of Granger Causality Test

Granger test is applied to determine existance and direction of causality among variables. Granger-causality test is very sensitive to the number of lags included in the regression. Both the Akaike (AIC) and Schwarz Information Criteria (SC) have been used in order to find an appropriate number of lags. After these requirements have been satisfied, Granger-causality tests are computed.

Table 6 : Lag Selection Results

lags	AIC	SC
1	21.56	18.42
2	21.01	22.84
3	28.57	25.03
4	24.63	22.88
6	23.92	19.21
8	18.34	15.49
10	14.04	11.52
12	***13.51***	***10.07***

According to Table 6 result of test are obtained for 12 lags.

Table 7: Granger Causality Tests Results

Pairwise Granger Causality Tests			
Sample: 2000M01 2009M12			
Lags: 12			
Null Hypothesis:	**Obs**	**F-Statistic**	**Prob.**
DPE does not Granger Cause DDY	119	1.47585	0.1288
DDY does not Granger Cause DPE		1.69140	0.0300
DPE does not Granger Cause DRE	119	1.32581	0.1994
DRE does not Granger Cause DPE		11.5065	1.E-20
DRE does not Granger Cause DDY	119	1.30217	0.2129
DDY does not Granger Cause DRE		11.5954	7.E-21

There are unidirectional Granger-causalities from DY to PE (***DY→PE)***, RE to PE (***RE→PE)*** and DY to RE (***DY→RE)*** .

5. CONCLUSION

The P/E ratio is widely used, particularly by practitioners, as a measure of relative stock valuation. P/E ratio is an indicator which indicates current mood of investors how much they are willing to pay per unit of company earnings. The stock price and the earnings per share determine the value of the ratio. P/E increases when investors are willing to pay more per unit of earnings while the earnings remain stable. P/E also grows when both the stock price and the earnings per share increase, however, the increase of stock price must be sharper than the increase in the earnings per share. Another scenario of increasing P/E take place, when stock price remain stable despite there is a decrease in the earnings per share. The price earnings ratio does not change when there is a balance between the growth of the stock price and the earnings per share.

In this research, all data used are quantitative. The purpose of this study is to put forward the long-run and short-run relation among P/E , RE and DY variable which are one of the most important financial indicators. Tests of ADF is applied for stability first difference relating to data for the period 2000.01-2009.12 of ISE 100 index. When taking a look at the descriptive statistical values of series, volatility of P/E variable appears higher.PE carries a serie character showing more variation than RE and DY in the handled period for Turkey. As a result of cointegration test and error-correction models (ECM), there is relationship among variables long-run and short-run. RE effects negatively on PE in long-run and DY ratio effects possitively on PE in long-run. Furthermore it is understood that there are unidirectional Granger-causalities from DY to PE (*DY→PE)*, RE to PE (*RE→PE)* and DY to RE (*DY→RE)* .

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