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The Dynamic Relationship among Dividend, Earning and Investment: Empirical Analysis of Karachi Stock Exchange

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ABSTRACT:
This paper divulges the long term relationship among earning, investment and dividends from 2000 to 2011. Empirical evidence was collected to explore the Modigliani and miller theory of dividend irrelevance. Data was collected from all the sectors but it was ensured that firms did not have negative data of earnings as it is earnings which are either transformed into investment or dividends. Multivariate and bivariate cointegration is used to examine the data. Johansen and Juselius multivariate cointegration disclosed the presence of long term relationship among earning, investment and dividends. The traditional view regarding the dividend irrelevance theorem is rejected by this research and results show that dividend and investment are dependent on each other.

Keywords: *Earnings investment, Dividends and cointegeration*

INTRODUCTION

The question whether dividend policy affects firm's value or not is center of attention for economists for last forty years. The epitome is; there are two views which are consistently discussed. The first view, regarding the traditional "dividend irrelevance" theory presented by Modigliani and miller (1961), is that firm's value is determined by the investment choices available to it instead of the payout decisions. The research emanated from (M M) theory has relied upon the relaxation of perfect market assumptions (No transaction cost, no taxes and no informational asymmetry) and all of them concluded that firm's payout decisions are relevant in the markets with friction. However, recently DeAngelo and DeAngelo (2006) initiated a new debate by contradicting the classic MM model and divulged that dividend payout decisions affect firm's value even in markets with no friction.

This view is further strengthened by work of Gordon (1959), who postulated that uncertainty regarding timing and amount of dividend is enough to determine that firm's value is dependent upon the firm's dividend policy, even in frictionless markets. The research of DeAngelo and DeAngelo has initiated a series of research paper which have attempted to reconcile the contradictory results of DD and MM (Magni, 2007; Handely, 2008).

However, as documented in the literature, if firms place such significant importance on maintaining or systematically increasing the level of the existing dividend, then it may be that firms actually pass up investment projects in order to avoid cutting the dividend level. The latter case would suggest that the dividend decision impacts the feasibility of the firm's investment opportunity set and thus leads to interdependence between the two decisions.

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The potential interdependence between dividend policy and investment policy would have significant implications for theories that have treated the dividend decision as merely a residual second-order decision made after the first-order investment policy decision. Most notably, if the firm's dividend and investment decisions are made jointly, then dividend policy would likely have a direct impact on firm value, a result that contradicts the separation principle.

Dividends, Investment and Firm Value

Miller and Modigliani (1961) in their work put forward their dividend irrelevance theorem, which divulged that, in perfect markets only investment decisions determine the firm value and dividend policy has no impact on determining value of firm. The MM dividend irrelevance theorem is quite intuitive; the value of firm is determined by the value maximizing investment opportunities instead of distribution of these funds to the shareholders. The epitome of this theorem is that the investment decision enjoys the priority over the dividend payment and dividend is merely a residual second-order decision made after the investment decision.

An important inference for the dividend irrelevance theorem is that it confers a strict in dependence between a firm's dividend and investment decisions, a result labeled the "separation principle" by Fama and Miller (1972). Recent research has divulged that a firm's investment and dividend decisions are interdependent, thus postulating that dividend policy is a first-order decision at par with investment decisions (Abor and Bopkin). This proposition is further strengthened by the work of (Lintner, 1956), highlighting the importance of dividend payout. In fact, survey evidence by Brav et al. (2005) suggested that firm managers go as far as passing up profitable investment opportunities rather than electing to omit or to cut dividends.

Literature Review

The question that holds utmost importance in finance literature is whether a firm's dividend policy has any impact on firm value. It might be astonishing to realize that the dividend policy has been a contentious issue over the half century.

Baker and Smith (2006) investigated the sample of 309 firms to analyze behavior consistency with residual dividend policy and also to scrutinize how their competitors place their dividend policy. It is established that model firms are more conventional to uphold a lasting dividend ratio as compared to their counterparts. The sample firms sustain their disbursement ratio by adopting "modified" residual policy. We extract that firms focus on residual dividend policy after considering the investment policy

Chazi (2011) conducted research on emerging markets of UAE. The researcher conducted examination and interviews to look into dividend policy and shares repurchase and discovered that the finance managers are disinclined to cut in dividends. It is explained that dividends are considered as the residual decision after making the investment decisions. It is contribution towards the studies conducted by Brav et al. (2005) and Linter (1956).

Gosh (2004) used cointegeration to determine the relationship between earning and dividend. Results divulged that EPS and DPS share a long-run relationship. Lead lag Relation is also observed between EPS and DPS.

Similar to our study Skinner (2008) analyzed the relationship between earnings and payout over the last three decades. He suggested that relationship between earnings and total payout is stronger than relationship between dividend and earnings. The study proved a strong relationship between earnings and repurchase and results suggested that repurchase was going to become key part of payouts.

Grullon et al. (2002) elucidated that the dividend increasing firms do not augment their investments and let a decrease in profitability in the years following the change in dividend. Inversely, market shows a positive reaction by largest decline in the systematic risk. In the long run, the dividend increasing firms also experience the largest increase in price in following years and value of firm effect positively.

Handley (2008) attempted to compare the MM dividend irrelevance theorem with DD dividend relevance theorem and notes that only the dividend policy is considered by M and M rather the total payout including dividend payout and share repurchases is considered by DD. He suggested that payout policy is not irrelevant in

perfect competition.

Farsio et al. (2004) used cointegeration and granger causality to identify short run and long run relationship between earnings and dividend using cointegeration. This study supported the view that higher dividend payouts signaled an increase in future earnings. This study further divulged there is no significant relationship in earnings and dividend in the long run.

Sarig (2004) conducted a time-series analysis for interaction among payout policies and investment policies. VAR model of earnings, investments, total payout, and the split of the payout between shares repurchases and dividends considering tax changes were used. The result of the study elucidated that investment decisions direct payout policies. The author also explained that increase in total payout is linked with long-term increase in earnings

Wang (2010) examined the casual relationship among financing, investing, dividend policy and corporate performance analyzing the data of Taiwan and Chinese High-tech firms during the period of 2000 – 2007. The researcher found a positive relationship of investment with firm performance in Taiwan firms. However, financing decisions had positive relationship with investment in Chinese firms.

Baker and Wurgler (2004) explicated the catering theory of dividends in this paper. Miller and Modigiliani (1961) divulged that that dividend policy does not determine the value of firm assuming frictionless market. The research postulated that dividends enjoy a strong relationship with value of shares which is antithetical to MM (1961) theory of dividend irrelevance.

Magni (2007) discussed the studies conducted by DeAngelo and DeAngelo (2006) which criticized the study by MM (1961). The results of this study did not support the results of both of the previous studies but because retention or non-retention is not relevant to this decision so he suggested that it is the rate of return which affects the investments decisions or dividend irrelevance.

DeAngelo et al. (2006) explored that firms pay high dividend when business retains major part of earning. The purpose of the study was to examine the life-cycle theory of dividend and results corroborated the life cycle theory, in which internal and external finance define the firm's position. They concluded the high significant relationship between dividend payout and earned/contributed capital mix by using regression analysis subject to controlling total equity, cash balances, firm size, growth, profitability and dividend history.

Many of the researchers have conducted studies on this topic and some of those studies supported that investment and dividends are interdependent, Morelac and Schuruff (2011), Holt (2003) and Brav et al. (2005). Some studies suggests that investment and Dividends are Independent, Fama (1974), Pruit and Gitman (1991) Partington (1985), Modigliani and Miller (1958) and many of the studies said that investment cause dividends; not vice versa (Higgins, 1972; Sarig, 2004).

Data and Methodology

As it is discussed in the literature the relationship among the variables is measured by using different variables, the appropriate data will be extracted to measure the short term and long term relationship among the variables. The data will be collected from 1999 to 2011, listed companies from stock exchange. In this study annual data on a sample of firms from annual reports of listed companies will be collected from 1999 to 2011. It will be assured that;

Firms do not have missing data for at least 10 years on gross property, plant total assets, net income before extraordinary items. Firms do not have negative data of earnings for at least 5 years. Sample is representative of all the sectors of the stock exchange. Data is collected from the website of State bank and Karachi Stock Exchange. Pre-Tax earnings will be taken to avoid the impact of tax rate changes. Incremental investment will be taken i.e. value of fixed assets after accumulated depreciation of current year minus fixed assets after accumulated depreciation of previous year plus depreciation because the data of earnings and dividends peculiar to that year are extracted. Marchical (2007) have adopted that method to calculate investment. Each of the three data series will be divided by total assets to mitigate the problem of heteroskedasticity in the data.

RESEARCH METHOD

In the light of above mentioned literature following techniques appear relevant to examine the relationship among earnings dividend and investments. Cointegration is used to ascertain the long term relationship among the variables. It tells us that lead lag relationship exists or not. If two series are integrated of order one, there may exist a linear combination that is stationary without differencing. If such a linear combination exists then such streams of variables are called cointegrated.

Cointegration tests are divided into two broader categories: (i) residual-based tests, and (ii) maximum likelihood-based tests. Residual-based tests include the Engle-Granger (1987) test while maximum likelihood-based tests include the Johansen (1988, 1991) and Johansen-Juselius (1990) tests. Johansen and Juselius suggest two likelihood ratio tests for the determination of the number of cointegrated vectors. The maximal eigenvalue test evaluates the null hypothesis that there are at most r cointegrating vectors against the alternative of r + 1 cointegrating vectors. The maximum eigenvalue statistic is given by,

$$\lambda max = - T \ln (1 - \lambda r+1) + 1$$

Where λ r+1,…,λn are the n-r smallest squared canonical correlations and T = the number of observations. A trace statistic tests the null hypothesis of r cointegrating vectors against the alternative of r or more cointegrating vectors. This statistic is given by

$$\lambda \text{ trace} = -T \Sigma \ln (1 - \lambda i)$$

In order to apply the Johansen procedure, lag length is selected on the basis of the Akaike Information Criterion (AIC). In order to apply cointegeration, data should be stationary. Stationary data does not have any trends it is random. Unit root test is used to ascertain the stationarity of data. The ADF test investigates the existence of a unit root in an autoregressive model. A basic autoregressive model is

$$Z_t = aZ_{t-1} + \mu_t$$

(Akaik and Shewaz information criteria). This VAR approach is already used by Sarig (2004) to investigate the role of payout policy with aggregated firm data to disclose dynamic changes of the relationship between share repurchases and cash dividends along with change in tax regulations. Lee M. Dunham (2008) used this VAR approach to see the dynamic relationship among dividends, investment and earnings at the firm level using data of sample firms.

RESULTS AND INTERPRETATIONS

Table 1 shows the results of correlation. Correlation is observed but it is not significant. Earnings and dividend have negative relation whereas earnings enjoy positive relation with investment. The results suggest there is no problem of multicollinearity.

Augmented Dickey Fuller Test

Our first step is to test the stationarity of the index series. For this purpose, the ADF test for unit roots has been used at level and first difference. Table 2 exhibits the results of the Dickey-Fuller (ADF test), which clearly show that the linear combination of time series is stationary at level so cointegeration could be applied.

VAR (Vector Auto Regression)

VAR approach is used to measure the lag length to be incorporated for ascertaining the cointegeration. Before measuring cointegeration it has to be ascertained that the series relationship with its own past trends. Incorporation of suitable lag length ensures the mitigation of effect of past trends on the series. Table 3 divulges that lag length of "2" should be incorporated to mitigate the effect of past trends and get reliable results of cointegeration. Having met these prerequisites, cointegration analysis could be performed.

The maximum likelihood-based Johansen (1988, 1991) test and Johansen-Juselius (1990) procedure is used to determine the presence of cointegrating equations in a set of non-stationarytime series. A trace statistic has been used to test the null hypothesis of r cointegrating vectors against the alternative of r or more cointegrating vectors.

Table 1: Correlation matrix

	DI	E	T
DI	1	-0.0011	-0.02968
E	-0.0011	1	0.013958
T	-0.02968	0.013958	1

Table 2: Augmented dickey fuller test

variable name	ADF level
Dividend	-12.1849
Earning	-5.19346
Investment	-22.2966
Test critical values:	
1% level	-3.43881
5% level	-2.86516
10% level	-2.56876

Table 3: Vector auto regression

Lag	LogL	LR	FPE	AIC	SC	HQ
0	1156.326	NA	9.19E-06	-3.08376	-3.065241	-3.07662
1	1191.279	69.53269	8.57E-06	-3.15315	-3.079077	-3.12461
2	1298.036	211.5158	6.60E-06	-3.41454	**-3.284903***	-3.36458
3	1321.454	46.21001	6.35E-06	-3.45309	-3.267897	-3.381720*
4	1335.315	27.23949*	6.27e-06*	-3.466083*	-3.225336	-3.37331
5	1338.729	6.681543	6.36E-06	-3.45115	-3.154843	-3.33696
6	1342.876	8.084343	6.45E-06	-3.43817	-3.086311	-3.30258
7	1346.703	7.428175	6.54E-06	-3.42434	-3.016922	-3.26733
8	1349.684	5.762104	6.64E-06	-3.40825	-2.94527	-3.22983

Multivariate Unrestricted Cointegration Tests

Table 4 and 5 show the results for both Trace statistic and Maximal Eigen statistic and it divulges cointegration among dividends, earnings and investment for the period 1999 to 2011. The trace test and Maximal Eigen statistic indicate the presence of 3 cointegrating equation at the 0.05 level. Therefore, the result provides evidence of a long-term relationship among dividends, earnings and investment.

Table 4: Trace statistics

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.229761	467.1533	29.79707	0.0001
At most 1 *	0.177078	270.5792	15.49471	0.0001
At most 2*	0.151632	123.8242	3.841466	0

Trace test indicates 3 cointegrating eqn(s) at the 0.05 level.

Table 5: Maximum EIguen value test

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.229761	196.574	21.13162	0.0001
At most 1 *	0.177078	146.755	14.2646	0.0001
At most 2 *	0.151632	123.8242	3.841466	0

Table 6: Trace statistics

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.214663	312.2791	15.49471	0.0001
At most 1 *	0.158922	130.3223	3.841466	0

Table 7: Maximum Eigenvalue

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.214663	181.9568	14.2646	0.0001
At most 1 *	0.158922	130.3223	3.841466	0

Bivariate Unrestricted Cointegration tests (Div and Ear)

Table 6 and 7 show the results for both Trace statistic and Maximal Eigen statistic and it divulges cointegration between dividends and earnings for the period 1999 to 2011. The trace test and Maximal Eigen statistic indicate the presence of 2 cointegrating equation at the 0.05 level. Therefore, the result provides evidence of a long-term relationship between dividends earnings.

Bivariate Cointegeration (Inv and Ear)

Table 8 and 9 show the results for both Trace statistic and Maximal Eigen statistic and it divulges cointegration between investment and earnings for the period 1999 to 2011. The trace test and Maximal Eigen statistic indicate the presence of 2 cointegrating equation at the 0.05 level. Therefore, the result provides evidence of a long-term relationship between investment and earnings.

Bivariate Cointegeration (Inv and Div)

Table 10 and 11 show the results for both Trace statistics and Maximal Eigen statistic and it divulges cointegration between investment and dividends for the period 1999 to 2011. The trace test and Maximal Eigen statistic indicate the presence of 2 cointegrating equation at the 0.05 level. Therefore, the result provides evidence of a long-term relationship between investment and dividends and denotes rejection of the hypothesis at the 0.05 level.

Table 8: Trace statistics

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.218035	321.6157	15.49471	0.0001
At most 1 *	0.165704	136.4184	3.841466	0

Table 9: Maximum Eigenvalue

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.218035	185.1973	14.2646	0.0001
At most 1 *	0.165704	136.4184	3.841466	0

Table10: Trace statistics

Hypothesized		Trace	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.192129	284.4835	15.49471	0.0001
At most 1 *	0.151637	123.8285	3.841466	0

Table 11: Maximum Eigenvalue

Hypothesized		Max-Eigen	0.05	
No. of CE(s)	Eigenvalue	Statistic	Critical Value	Prob.**
None *	0.192129	160.6549	14.2646	0.0001
At most 1 *	0.151637	123.8285	3.841466	0

CONCLUSION

DeAngelo and DeAngelo (2006) sparked the debate of whether dividend policy is relevant for firm value by invalidating the classic Miller and Modigliani dividend irrelevance result and showing that dividend decisions do impact firm value, even in frictionless markets. Johansen and Juselius multivariate cointegration disclosed the presence of long term relationship among earning, investment and dividends. The traditional view regarding the dividend irrelevance theorem is rejected by this research and results show that dividend and investment are dependent on each other. The results of Multivariate cointegeration both trace statistics and maximum eigenevalue tests showed 3 cointegrating equations hence vindicating the presence of lead lag relationship. The results of bivarite cointegeration divulged the presence of 2 cointegrating equations for all the variables incorporated i.e. dividend and earnings, dividend and investment, earnings and investment which are consistent with the findings of Gosh (2004), Al-Twaijry (2006) and Farsio et al. (2004). The epitome of this research is that M and M dividend irrelevance theorem which stated that dividends and investment are independent is not applicable in Pakistan as a strong relationship is observed between these variables which suggests that dividend and investments are interdependent and these results are consistent with the previous studies conducted by DeAngelo and DeAngelo (2006), Handely (2008) and Brav et al. (2005).

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