OPERATING PERFORMANCE AND FINANCIAL SUCCESS: EVIDENCE FROM PAKISTANI COMPANIES

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Abstract

This paper examines the relationship between risk adjusted performance of stocks measured by Sharpe Ratio and the firm's operating performance measured by various indicators of profitability, liquidity, leverage, and size (market capitalization). Using fixed effect panel data models this paper seeks to identify which of the operating performance factors are important indicators of stock market performance in Pakistan's emerging market. In this regard, we have employed the data for 107 companies listed on Karachi Stock Exchange over the period of 12 years from 1996-2007. The empirical findings show that profitability measures, especially return-on-assets and firm size have a positive and significant effect on firm's financial success whereas leverage is negatively related to stock market performance.

Keywords: Investment Performance, Operating Performance, Panel Data, Emerging Markets

JEL Classification: Z 000

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Introduction

There are abundant studies on the impact of stock market performance and a country's economic performance measured by economic growth at the macro level. Considering a firm as an economic entity this paper seeks to provide micro level evidence on whether a firm's business performance measured by various operating performance indicators e.g. profitability, liquidity, size and leverage have an impact on stock market performance of firms. The efficient markets hypothesis stipulates that stock prices fully and instantaneously adjust to new information so that stock prices are not predictable from own history, publicly available information or even private information. See Fama (1991) for more elaboration on this issue. However, long term investors, portfolio managers and believers on behavioral finance would be interested to know whether firm related variables have impact on a firm's risk adjusted stock market performance. Also the prime of objective of the financial management of corporation is to create and enhance value for its shareholders. According to Ross et al. (2010, p-9) this goal translates into maximizing the current price of the stock of the company. However, the stock returns may increase due to increasing riskiness of the company so we will employ the risk adjusted returns. Accordingly the aim of this paper is to provide empirical evidence on relationship between a firm's operating and risk adjusted stock market performance. In an earlier study Johnson and Soenen (2003) investigated the relationship between a firms's operating performance and investment performance of a firm's stock. They employed a binary logit approach to quantify the relationship between individual firm characteristics and the probability that a particular measure of success will be greater or lower than the average of all firms considered. Our study differs from Johnson and Soenen (2003) and other studies in two important aspects. Firstly unlike the Johnson and Soenen we investigate the relationship between financial success and operating performance in an emerging market. Emerging markets are believed to be different from the matured market due to their higher volatility, lower liquidity, relatively infrequent trading of stocks, higher concentration and less efficient microstructure. We employ data from the firms listed on the Karachi Stock Exchange (KSE) which is Pakistan's largest stock exchange. According to Khawaja and Mian (2005) this market shares the typical features of an emerging market. Secondly our methodology differs from Johnson and Soenen

in that we exploit both time and cross section dimension of data and employ panel data model which are likely to yield more precise estimates since these models make better use of available information and are less affected by multicollinearity. Baltagi (2001) describes advantages of panel data in greater detail.

After this introduction this paper is organized as follow: Section 2 provides a review of selected literature. Section 3 provides the definitions of stock market and operating performance indicators. Section 4 discusses data and methodology, section 5 reports the results and associated discussion and section 6 concludes.

Literature Review

Chen et al. (1980) were among the first to investigate the link between macroeconomic factors and stock return. For the US stock market they investigated whether macroeconomic variables e.g. spread between long and short interest rates, expected and unexpected inflation, industrial production, and the spread between high- and low-grade bonds systematically affect stock market returns. They find that these variables are significantly related to stock returns. They found that oil price risk is not rewarded in the stock market.

Fama and French (1993) identified five common risk factors in the returns in the US stock market. There are three stock-market factors: an overall market factor and factors related to firm size and book-to-market equity. Stock returns have shared variation due to the stock-market factors, and they are linked to bond returns through shared variation in the bond-market factors. Most important, the five factors seem to explain average returns on stocks.

Chan et al. (1991) investigated the cross-sectional differences in returns on the Japanese stocks to the underlying behaviors of some macro and financial variable e.g. earnings yield, size, book-to-market and cash flow yield. Using a varied sample from the Tokyo stock exchange, they found a significant relationship between three aggregate financial variables and expected returns.

Kwon et al. (2010) investigated the relationship between stock market returns and macroeconomic variables in the Korean

stock market, using regression models. They found that the Korean stock market incorporates information on macroeconomic variables in stock returns. The significant factors were found to be the dividend yield, foreign exchange rate, oil price, and money supply. They noted that investors' perceptions of stock returns in the Korean market were different from those of U.S. and Japanese investors, suggesting that the Korean market was more sensitive to real economic variables rather than the monetary variables of inflation or interest rate variables.

Ali et al. (2010) examined the causal relationship between macroeconomic indicators and stock market prices in Pakistan using the data from June 1990 to December 2008. The set of macro-economic indicators includes; inflation, exchange rate, balances of trade and index of industrial production, whereas the stock exchange prices were represented by the general price index of the Karachi Stock Exchange. Using the Johansen's co-integration and Granger's causality test they found co-integration between industrial production index and stock exchange prices. However, no causal relationship between macroeconomic indicators and stock exchange prices in Pakistan was uncovered. They conclude that macro-economic indicators cannot be used to predict stock prices and that the stock prices in Pakistan do not reflect the macro-economic condition of the country.

The brief literature review is just a sample of abundant studies linking aggregate stock prices to macroeconomic and aggregate market wide financial variables. Very few studies are aimed at providing firm level evidence of the operating activity of the firm and the consequent impact on the rewards for the shareholder.

Johnson and Soenen (2003) investigated relationship between firms's operating performance and investment performance of firm's stock. They used the data of 478 firms in the US for the period 1982-1998 and found that big sized and profitable firms with high level advertising expenditure have better performance.

Daniati and Suhairi (2006) showed that cash flow from investing activities, gross profit, and company size significantly affect expected return on shares in Indonesia . On the other hand, cash flow from operating activities does not affect expected return significantly.

Martani and Khairurizka (2009) examined the value relevance of accounting information in explaining stock return. They used profitability, liquidity, leverage, market ratio, size and cash flow as proxies of accounting information. Cumulative abnormal return and market adjusted return are used as stock return variables. The samples of the study are listed companies in manufacturing industries that actively traded from 2003 to 2006 in Indonesia stock market. The study found that profitability, turnover and market ratio has significant impact to the stock return.

Stock Market Performance

We measure risk adjusted stock market performance by Sharpe Ratio (*SR*) of the firm computed as

$$SR = \frac{\overline{R} - R_f}{s} \qquad (1)$$

where $\overline{R}$ the stock's average return computed as the average of twelve monthly return. R_f is the return on a benchmark asset, such as the risk free rate of return, and *s* is the standard deviation of the asset return. The idea of the ratio is to judge how much additional return a stock or portfolio can earn for an additional unit of volatility of holding the risky asset. Sharpe Ratio has been extensively employed in academic literature and by practitioners to measure investment performance of stocks and portfolios. We also employ a measure called 'market adjsuted return' by Copeland, Weston and Shastri (2005, p-498) which is computed as:

$$\text{MAR}_{it} = \frac{\Pi(1 + \text{R}_i)}{\Pi(1 + \text{R}_m)} \qquad (2)$$

Here, " represents the product of 12 monthly returns taken individually for each firm. R_i is the return of the individual firm and R_m is the return of an appropriate market portfolio return. We use the KSE-100 index as the market portfolio.

Operating Performance

To measure business performance the following variables and indicators are considered.

Liquidity Ratio

Liquidity refers to the ease and quickness with which assets can be converted to cash. The liquidity measure we employ is the ratio of current assets to total assets of the firm. The more liquid a firm's assets, the less likely the firm is to experience problems meeting its short-term obligations. More liquid firms can undertake positive NPV projects without dependent much on external financing. Thus, the probability that a firm avoids financial distress can be linked to the firm's liquidity. Unfortunately, liquid assets have lower rates of return than fixed assets. For example cash generates no investment income. To the extent a firm invests in liquid assets, it sacrifices an opportunity to invest in more profitable investment opportunities. Thus excessively higher liquidity ratio may signal inefficient management practices. The management is unable to exploit the liquid assets to use it in profitable investment. A high level of liquidity may encourage managers to enjoy their perks rather than transferring it to shareholders. Thus, the effect of liquidity on financial performance might be nonlinear. Its impact on stock market performance is uncertain and has to be determined by the empirical analysis.

Financial Leverage

Financial leverage is related to the extent to which a firm relies on debt financing rather than equity. We employ debt-to-assets ratio i.e. percentage of the company's total assets that are financed by debt (total liabilities). Measures of financial leverage determine the likelihood that the firm will default on its debt contracts. The more levered a firm is the more likely is that the firm will be unable to fulfill its contractual obligations. In other words, too much debt can lead to a higher probability of insolvency and financial distress. In addition, high debt-to-assets ratio may indicate low borrowing capacity of a firm, which in turn will lower the firm's financial flexibility. Also, a firm using high debt might face conflict of interest between creditors and

equity investors. Creditors may want the firm to invest in less risky ventures than those preferred by the equity investors.

Profitability

Profitability measures are used to assess a firm's ability to generate earnings over and above its expenses and other relevant costs incurred during a specific period of time. Profitability ratios show a company's overall efficiency and performance. There is no consensus on how best to measure a firm's profitability. In this paper we employ two measures of profitability:

i) ***Return-on-Assets (ROA)*** is defined as net income as a percent of total assets. This ratio indicates how much is earned by the company for each dollar invested in assets. Return-on-assets is an indicator of how profitable a company is especially when compared to the firms in the same industry. As the scale of production and capital requirements varies across industries, ROA is not very useful for comparisons between industries. Nevertheless this quantity is a signal for investors regarding firm's financial health.

ii) ***Return-on-Equity (ROE)*** is defined as net income (after interest and taxes) divided by average common stockholder's equity. The ROE measures the rate of return on the ownership interest (shareholders' equity) of the common stock owners. It measures a firm's efficiency at generating profits from every unit of shareholders' equity (assets minus liabilities).

Size (Market Capitalization)

Market capitalization is the market value of a company's outstanding shares. Market capitalization (often market cap) is a measurement of the size of a business enterprise (corporation) equal to the share price times the number of shares outstanding of a public company. Company size is an important determinant of asset allocation and asset pricing models. Fama and French (1992) show that stock returns are negatively related to firm size.

Data and Methodology

We collected data on stock prices for firms listed at the Karachi Stock Exchange from the data stream. This database has complete data starting from 1992 onwards for more than 300 firms. However firm level historical data on variables related to business operating performance are not available in the database. Fortunately the State Bank of Pakistan publishes an annual document named "Balance Sheet Analysis of Joint Stock Companies" which has accounting data for non-financial firms. Keeping in view availability we collected data on 107 non-financial firms from 1996 to 2007.

The data structure provides a compelling reason to employ panel data models to investigate the relationship between financial and operating performance.
We employ the following econometric model:

$$Y_{it} = \alpha_i + \beta_1 ROA_{it} + \beta_2 DAR_{it} + \beta_3 SIZE_{it} + \beta_4 LIQ_{it} + u_{it} \quad (3)$$

Y	=	Sharpe Ratio or Market Adjusted Returns
ROA	=	Return-on-assets
DAR	=	Debt-to-asset ratio
SIZE	=	Market Capitalization
LIQ	=	Liquidity Ratio

In some models we replace ROA by return-on-equity (ROE). We also include square and interaction terms to capture non-linearities in relation between financial success and operational performance.

Here α_i is the intercept term, the β_i's are the coefficients of the explanatory variables and $t=1,\ldots,T$; $i = 1,\ldots, N$ where $N= 107$ companies and $T=12$ years. In addition we also investigate the possibility of quadratic relationship and usefulness of interaction terms.

Fixed or Random Effect Model

In model (3) the intercept α_i takes into account the individual features of each company. This individual feature may be the result of several reasons e.g. structure of the firm, management style, area of operation

etc. The intercept varies with individual firms but is time invariant. In this case the firm specific effects are 'fixed effects'. These fixed effects can be incorporated using dummy variable for each firm as:

$$Y_{it} = \gamma_1 D_{1i} + \gamma_2 D_{2i} + ... + \lambda_N D_{Ni} + \beta_1 ROA_{it} + \beta_2 DAR_{it} + \beta_3 SIZE_{it} + \beta_4 LIQ_{it} + u_{it} \quad (4)$$

Where $D_{1i} = 1$ for first firm and zero elsewhere, $D_{21} = 1$ for second firm and zero elsewhere and so on. Year fixed effect can be analyzed similarly. If we are willing to assume that firms are selected at random from all the listed firms at KSE we may employ the 'random effect' or 'error component' model. In this case the intercept is assumed to be a random variable and can be expressed as $\alpha_i = \alpha + \varepsilon_i$ where we assume $\varepsilon_i \sim IID(0, \sigma_\varepsilon^2)$. In this case model (3) can be expressed as

$$Y_{it} = \alpha_i + \beta_1 ROA_{it} + \beta_2 DAR_{it} + \beta_3 SIZE_{it} + \beta_4 LIQ_{it} + w_{it}$$

(5) where $w_{it} = \varepsilon_i + u_{it}$

We have selected a sample of 107 non-financial firms from over 700 firms listed at the KSE keeping in view the data availability so the random effect assumption may not be plausible. We therefore resort to econometric evidence from Hausman (1978) test to determine the likely nature of effects.

Our model specification and estimation strategy is as follows. We start with assumption that our sample of 107 companies is a random sample from all the Karachi Stock exchange companies (which are around 700 at the end of 2007) Therefore we estimated a random firm effect model and no year effect. The Hausman (1978) specification test compares the fixed versus random effects. The null hypothesis is that the unobservable individual effects are uncorrelated with the included regressors in the model. If individual effects are correlated (i.e. null hypothesis is rejected), a random effect model produces biased estimates, violating one of the Gauss-Markov assumptions. So a fixed effect model is preferred. If the Hausman test fails to reject the null hypothesis of uncorrelated effects then we re-estimate the model with fixed firm effect. If the test for redundant dummy variables

is rejected then fixed effect model will be relevant. On the other hand if the redundant fixed effect hypothesis is not rejected then there is no advantage of panel data structure and the OLS on pooled cross-section and time series data would be the most appropriate procedure.

The correct specification of effects is necessary in this case as we have relatively small T and large *N*. According to Taylor (1980) in this case the fixed and random effect estimates will differ significantly. In this case random effect estimators are more efficient than fixed effect estimators. However in a particular case the issue of the effects specification is often settled econometrically. We resolve the effect specification issue via Hausman's (1978) specification test.

Results and Discussion

Table 1 presents some descriptive statistics for the pooled data. The variables differ in scale, variability and magnitude especially the size and liquidity ratios.

Table 1:

Descriptive Statistics for the pooled data

	SR	ROA	SIZE	LIQ	DAR
Mean	0.009	7.9	5454.3	178.1	0.628
Maximum	3.000	105.685	246819.4	229278.9	2.869
Minimum	-2.339	-50.000	2.310	-3793.9	0.026
Std. Dev.	0.442	14.106	16160.7	6400.0	0.298
Observations	1284	1284	1284	1284	1284

Model in equation (3) was estimated with random firm effect and no year effect. The Huausman test statistic was computed to be 48.50 with asymptotic p-value from the Chi-Square distribution with four degrees of freedom being practically zero. Thus the null hypothesis that unobserved omitted variables are uncorrelated with the included explanatory variables is rejected. This result remains unchanged if quadratic terms or interaction between explanatory variables are considered. With cross section random and time fixed effect the Hausman test comes out to be 7.60 with p-value 0.108. Next we specify cross section fixed and no time effects. The least square dummy variable (LSDV) estimation yields the test of redundant fixed effect as 155.39 with p-value 0.0013. Finally specifying cross section fixed and time fixed effects the test for redundant fixed firm effects is computed to be 145.7 (p-value 0.0064) and the test of redundant time effects yields the value 325.6 (p-value practically zero). Thus the

empirical tests clearly favor fixed effect for both firms and years. After specifying the effects structure we now focus on model estimation. The results of regression with firm and year fixed effects are reported below:

Table 2:
Firm and Year Fixed Effect Panel Regressions

Variable	Coefficient	t-Statistic	Prob.
C	0.015092	0.261	0.7943
ROA	0.005306	2.795	0.0053
DAR	-0.186585	-1.876	0.0609
DAR^2	0.095780	2.586	0.0098
SIZE	5.11E-06	2.927	0.0035
SIZE^2	-1.72E-11	-3.078	0.0021
LIQR	1.11E-05	4.529	0.0000
SIZE*LIQR	-6.74E-08	-4.713	0.0000

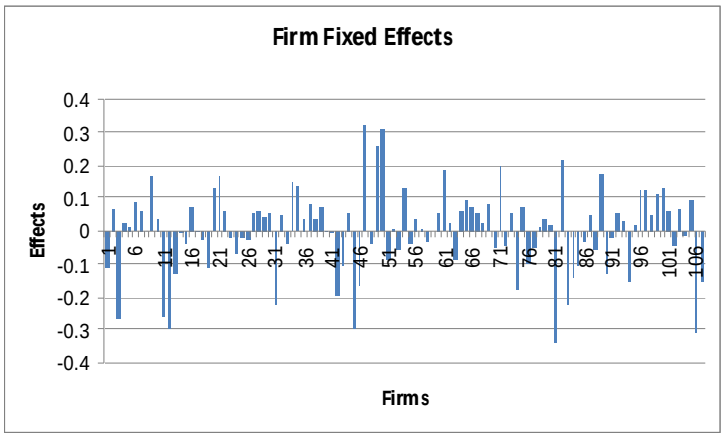
Table 2 presents the results of regression of Sharpe Ratio on explanatory variables with linear and non-linear terms. Profitability measured by return-on-assets (ROA) is significant with expected positive sign. It appears that the performance of a firm's stock is related to the firms operating performance as indicated by return-on-assets. A profitable firm gives signals to investors that the firm's assets are employed efficiently and profitably. This causes firm's stock to react positively and achieve better risk adjusted performance in stock market. This also implies that a profitable firm can easily use stock market to finance their investment in machinery and plant which will generate further revenues for the firm. The leverage variable has a non-linear effect so that as debt to asset ratio increase financial performance decreases but that is reversed at high values of leverage. These results indicate that the firms with higher leverage have lower level of stock market performance. This result makes sense since a highly indebted firm presents a threat to investors who are the residual claim holder.

Table 2 shows that of size variable has a quadratic effect in that as a firm gets bigger the financial performance of the firm increases at a decreasing rate. The seminal work of Fama and French (1992) shows that stock returns are negatively related to size i.e. small firms earn higher return compared to large firms. Employing Sharpe Ratio as a measure of financial performance we found that the results are

opposite to the US evidence of small firm effect. In Pakistani market larger firms are blue chips which are financially attractive to the investors because of their stable dividend policies. Liquidity ratios carry the right sign in the regressions and this variable does not yields positive signal for investors. An interaction term between liquidity and size is also significant. This shows that liquidity improves financial performance but this performance deceases as the firm gets bigger in size.

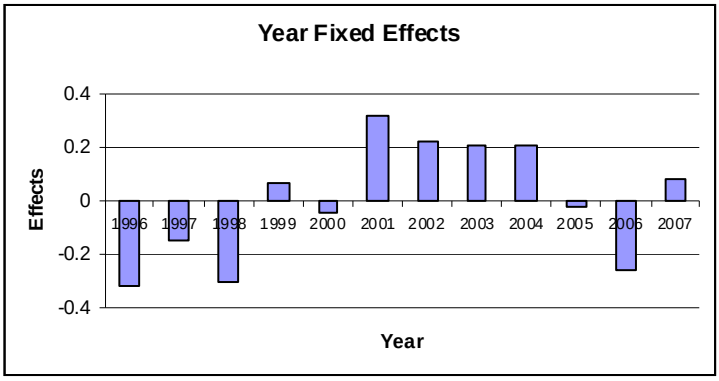
Figure 1a and 1b present the firm and year fixed effects graphically. The effects show considerable variation over firms and over time hence the assumption of fixed effect appears to be reasonable. Two of the most extreme year effects are for the year 1998 and 2001 which correspond to the Pakistan's nuclear test and the World Trade Tower terrorist attack respectively.

Figure 1a:
Firms fixed effects



The results are quite similar with Market Adjusted Return (MAR) as the dependent variable. These results are not presented to the save space.

Figure 1b:
Year fixed effects



Conclusion

This paper examines the link between risk adjusted performance of firm's stocks traded on the stock market and its business operating performance such as profitability, liquidity, leverage and size. We examine 107 non-financial companies over a 12-year period and investigate some possible indicators of successful companies. Success is defined as doing better with average Sharpe Ratio computed from twelve monthly returns. The results show the in most cases the operating performance variables have a complex non linear relationship with stock market performance using the fixed effects panel data model. Contrary to the US evidence of small firm effect we found that size has a quadratic effect i.e. as the firm gets larger the financial performance improves but after a certain size this relationship appears to reverse. Firms with higher level of leverage are associated with weak financial performance but that relation is reversed for firms with large debt to asset ratio.

It can be expected that there are differences in firm's risk adjusted performance due to firm's characteristics which are specific to the firm. Thus panel data models provide better estimates of model parameters since firm specific fixed or random effects are explicitly allowed. We conducted several specification tests which indicate that fixed firm and year effect assumption may be plausible.

Using fixed effect panel data model we found that the important determinant of risk adjusted performance is measure of profitability i.e. return-on-assets. This implies that firms which generate high profits as percent of the employed assets perform significantly better in stock market compared to firms with poor profitability.

Overall, we conclude that stock prices in Karachi stock market are linked to firm's profitability so the pricing of assets is not entirely irrational. The stock prices react positively to firm's profitability.

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