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Beta Wins Again: Case of four Emerging Markets

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We empirically investigate the cross-sectional behavior of stock returns in four emerging markets, namely, Egypt, Jordan, Morocco and Saudi Arabia. We use the "between estimator" panel data regression to test whether price-earning ratio, book-to-market ratio, market capitalization, and beta can predict stock market returns variations. Based on the results we still believe that Beta have a significant explanatory power in predicting stock market returns; the sign is positive. Other fundamentals fail the test.

1. Introduction

Efficient Market Theory (Fama (1970)) predicts that all assets are correctly priced. Late in 1970's less favorable evidence for the CAPM began to appear in the so-called literature of financial anomalies.

We built this study on prior researches work who tried to explain stock returns variations by some fundamental variable supporting the existence of inconsistencies in the Efficient Market Theory.

In this paper we examine the cross-sectional behavior of returns in a number of previously unexplored emerging markets. The sample covers four emerging markets from the *Middle East and North Africa* (*MENA*) countries.[2]

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[2] Emerging markets are characterized by: high average returns, low correlations with developed markets stock returns, returns are more predictable, and volatility is higher (Bekaert, and Harvey 1995).

Price-Earning ratio (P/E), book-to-market ratio (B/M) ratio, Market Capitalization (MCAP), and beta *(B)* are used as predictors of stock returns. The "between estimator" panel data regression, described in Mairesse (1993), is employed for estimation.

The main result of this paper confirms that beta has a significant explanatory power in all of the four markets and the sign is positive. Other variables; P/E, B/M, and MCAP failed to capture any power in predicting stock returns.

Following a brief literature review in section 2, section 3 discusses data and methodology and describes the model and the examination techniques used. The main results are presented in section 4 Conclusions are drawn in section 5.

2. Literature review

Over the past thirty years hundreds of empirical studies have document predictability of stock returns using a bundle of forecasting variable.
In what follows we provide a list of some of the most sited papers in this area of research.

Basu (1977), examine the relationship between investment performance of equity securities and their P/E ratios. Basu results confirm that the lowest price-earnings ratio quintile had the highest average annual rate of return over the examined period.

Banz (1981) , found that small firms earns higher risk adjusted returns than large firms, a term named later as the “size effect”, and became an evident that the capital asset pricing model is miss-specified.

Reinganum (1981), conclude that the simple one-period capital asset pricing model is miss-specified due to factor omissions, which might be related to the firm size and earnings yield. He founds that small-capitalization firms earned higher average return than those of large firms with equivalent beta risk.

Basu (1983), re-examine Reinganum’s (1981) results using different procedure and t time frame, his results confirm that the stocks with high E/P earn on average higher risk-adjusted return than the stocks with low

E/P. His provide evidence that E/P effect is not entirely independent of firm size.

Cook and Rozeff (1984), reexamine the methodologies of Reiganum (1981) and Basu (1983) to see why their results are contradictory[3] . Cook and Rose report that the firm size does not subsume E/P, nor does E/P . The size and E/P are independent effects, with no interaction between them, as claimed by Basu.

Jaffe, Keim, and Westerfield (1989), on the other hand employ a seemingly Unrelated Regression (*SUR*) model, to test the significance of the Size and E/P effects. They found significant E/P and size effect during the whole period. Their findings report a difference between January and the rest of the year. The coefficient of E/P and size are significant in January, but only E/P coefficient is significant outside of January, a result consistent with Cook and Rozeff (1984), but inconsistent with Banz (1981), Basu (1983), and Reinganum (1981).

Keim (1990), find that the strength of predictability increases as firm size decreases and E/P increases. Chan, Hamao, and Lankonishock (1991), examine the cross-sectional predictability of equity returns in Japan, by using Seemingly Unrelated Regression (*SUR*) model and the methodology of Fama and McBeth (1973). Their main findings confirm that B/M ratio and cash flow yield have the most significant positive impact on expected returns; they also report the size effect with no earning yields effect.

Fama and French (1992), employ the methodology of Fama and McBeth (1973); in which the cross-sectional of stock returns is regressed on a number of variables hypothesized to explain average returns, their main findings confirm that size, and B/M ratio capture the cross-sectional variation in stock returns associated with E/P, leverage, and B/M. Fama and French (1993), found that size and B/M seems to do a good job in explaining the cross-sectional of average stock returns,

[3] Reiganum (1981) concludes that the size effect subsume E/P effect and Basu (1983) concludes that E/P subsume the size effect.

Mei (1993) found that the multi-factor model is capable of capturing the size effect and the dividend yield effect, but it is incapable of explaining the B/M effect and E/P ratio effect.

Davis (1994) indicate that the natural log of B/M equity, earning yield, and cash flow yield had significant explanatory power with respect to cross-section of realized stock returns during the test period.

Kothari, Shanken and Solan (1995), main finding confirme that the average returns do indeed reflect substantial compensation for beta risk, and that the beta alone can not account for all the cross-sectional variation in expected returns.

Fama and French (1996), use their three-factor model to explain stock market anomalies. They argued that many of the *CAPM* average return anomalies are related and are captured by the three-factor model in Fama and French (1993).

Kim (1997), confirm that the weak relationship between market beta and average stock returns and the size-related anomalies are due to the failure to correct for error-in-variables (*EIV*) biases. The *EIV* results are conditional on the presumption of the length of beta estimations period. The results are sensitive to the assumption of the extent of beta stationarity.

Loughran (1997), confirms that the size effect has explanatory power only in January, and B/M effect is inconsistent outside the month of January.

Daniel and Titman (1997) concluded that the size and B/M are not risk factor in equilibrium pricing model.

Claessens and Stijn (1998), examine the cross-sectional pattern of returns in nineteen emerging markets using the International Finance Corporation data base. Claessens and Stijn document positive relationship between size and returns contrary to what have been found in most developed countries. They also found that the importance of earnings-to-price effects is limited and Dividend yield plays an important explanatory role only in seven of the sampled countries.

In the same line of research, Aydogan and Kursat (2000) examine the ability of earning price ratio and B/M ratios to predict future stock market returns in nineteen emerging equity markets. Their results indicate that both P/E and B/M ratios have predictive power for future returns, especially over longer time periods; hence they can be used as tools in forming a market timing and asset allocation strategy in emerging equity markets.

Trevino and Robertson (2002) finding indicates that E/P ratios have lower predictive power in short-term horizon returns (holding period less than three years) and suggest that current E/P ratios are useful in estimating long-horizon average returns and the relation between them is negative.

Lewellen (2002) use the same model of Stambaugh (1999), and, Nelson and Kim (1993) in estimating *OLS* regression for *NYSE* equal- and value-weighted returns. They find that dividend yield provide strong evidence of predictability for the whole period from 1946 to 2000, and for various sub-sample. The B/M and E/P ratios is somewhat weaker, in other word, they have limited forecasting power.
Rapach and Wahar (2003) use Monte Carlo simulation to test the increasing statistical power at long horizon in linear framework , the simulation results show that power does not increase at long horizon(in fact it decrease). So that, in linear framework it's difficult to explain stock return predictability.

Lewellen (2004) found that the dividend yield predicts market returns during the period 1946-2000, as will as in various sub samples. B/M and the E/P ratios predict returns during the shorter sample 1963-2000. The evidence remains strong despite the unusual prices run-up in recent years.

Finally, Lyn and Zyowicsch (2004) suggest that the fundamental determinant of returns for developed markets of Eastern Europe is the same as of old emerging markets, as in Fama and French (1988).

As noticed from above, to date the international empirical work concentrated their analytical vision on the more developed markets, especially *U.S* and *U.K* markets, with some evidence from other European markets. In this research we expand the empirical evidence

on the nature of asset returns, by examining the cross-sectional pattern of returns in a number of previously unexplored markets. We examine the effect of a number of risk factors in addition to β on asset returns by employing methodology of “between estimator” panel data regression.

3. Data and Methodology

Data:

Our study cover a group of countries widely classified as emerging markets as defined by the *Standard & Poors* (*S&P*), and the *International Finance Corporation* (*IFC*) of the World Bank. The four markets are from the *Middle East and North Africa* (*MENA*); namely; Egypt, Jordan, Morocco, and Saudi Arabia. The data come from *S&P/IFC* emerging markets data base entitled "Annual Fact Book". The number of firms included in each country was adjusted for survivorship and for their time period test reliability.
In order to compute monthly rates of return in a market, we firstly express the prices for indexes or companies in term of dollars, and then we calculate the returns as percentage changes from month *t-1* to month *t*. The sample period starts from December, 1997, to July 2002.

Methodology:

Our aim is to examine the short-run relationship between the stock returns R_t and their Beta's, P/E, B/M, and MCAP For four emerging markets from *Middle East and North Africa* (*MENA*); (Egypt, Jordan, Saudi Arabia, Morocco) using " between estimator" panel data analysis, the availability of data determine the width of the span period.

In this paper we employ panel data technique of "between estimators" described in Mairesse (1993). Panel data have several advantages over both cross-sectional or time- series data. These advantages are summarized in (Hsiao 2006, pp 3-6); it gives more accurate of model parameters, which usually contain more degree of freedom, less collinearity among variables, more sample variability than cross-sectional data and improve efficiency of econometrics.

The basic framework of the regression model is.

$$y_{it} = X_{it}^{'}\beta + Z_{i}^{'}\alpha + \varepsilon_{it} \qquad (3)$$

Where y_{it} : is dependent variables, X_{it} : independent variables, ε_{it} : is an error terms. There is k-regressor in X_{it} not including a constant term, the heterogeneity or individual effect is $Z_{i}^{'}\alpha$, where Z_{i} contains a constant term and a set of individual or group specific variable which may observed or unobserved. If Z_{i} observed for all individuals, then the entire model cab be treated as an Ordinary Linear Model and fit by Least Square (Greene, 2003, pp 285).

Using observations on i=1, ---, n stocks for each of t=1, ---, T months, if pooled the model under investigation can be written as:

$$R_{it} = \gamma_0 + \beta X_{it} + \varepsilon_{it} \qquad (4)$$

Where:

γ_0 : Overall intercept

X_{it} : Independent variables like *β, P/E, B/M,* and *MCAP*

ε_{it} : Error terms

The between (stock) estimator for the coefficients is obtained by Ordinary Least Squares estimator on the (cross-sectional) equation:

$$\overline{R}_i = \gamma_0 + \gamma_1 \overline{X}_i + \overline{\varepsilon}_i \qquad (5)$$

Where:

$$\overline{R}_i = \frac{1}{T}\sum_{i=1}^{T} R_{it} \qquad (6)$$

Variables in the equation are defined similarly.

Intuitively, the between regression is performed on the average cross-section and can easily deal with unbalanced panel data. Moreover, the estimator reduces the Error-In-Variable (*EIV*) bias through the averaging process that it's entail (Mairessee (1993)). In this paper, with a relatively small number of firms in the cross-section, the between

estimator of individual stocks is preferable to forming portfolio's and able us to avoid the bias documented by Lo and Mackinlay (1990).[4]

Accordingly, we include four variables in equation (4), namely β, P/E, B/M, MCAP to predict stock returns. The betas estimate is calculated from regressing the monthly stock returns of each company on the monthly stock market index returns for each market and use these estimates in a series of cross-sectional regressions beside P/E, B/M, MCAP.

4. Empirical Results

In order to analyze the returns on a common basis, we choose to work with *U.S* dollar returns, we did some filtering on the data to account for survivorship bias and sample periods. This filtering narrows the number of stocks in our database. The result is 23 stocks for both morocco and Saudi Arabia, 60 stocks for Egypt, and 34 stocks for Jordan.

We report the summary statistics for the four countries in table 1. The three explanatory variables presented in the Table 1 display substantial variation across countries; P/E ratios vary across countries, ranging from 9.75% for Egypt to 17.0% for Saudi Arabia. In general B/M ratios rankings agrees with those of P/E rankings.

Market capitalization (in million dollars) ,which stands for size, shows that Saudi Arabia own the largest market CAP followed by Egypt then Morocco and finally Jordan with sizes 61060 , 23514,11389, and 3980 millions respectively.[5]

Table 2 reports the coefficients estimates from running the between estimator for equation (4). The Beta coefficient for Egypt is statistically significantly positive at 1% level (p-value of the β is 0.000). The p-value for P/E, B/M, and MCAP are 0.348, 0.623, and 0.706, respectively, are insignificant.

[4] There is some bias in the test results by grouping stocks into portfolios on the basis of observed characteristics; we can avoid this bias when individual stocks are used.

[5] The market capitalization for Jordan might be larger than this, but because we reduce the sample dramatically market CAP show small number.

The Beta coefficient for Jordan is statistically significantly positive with at 5% level (p-value of the β is 0.018), other explanatory variables show insignificant relationships except for B/M with negative sign and a coefficient of -1.739. P/E and MCAP coefficient are not different form zero. .

In the case of Morocco, the Beta coefficient is statistically significantly positive at 5% level (p-value of the β is 0.022), Again β preserve the monotonicity between risk and return. Other explanatory variables show insignificant relationships except for B/M who seems with negative sign and a coefficient of -4.64. Other variables coefficients are not different from zero.

For Saudi Arabia, only β shows significant positive relationship with a coefficient of 0.889 and p-value of 0.067. All other variables are insignificant.

The main findings presented in Table 2 support the prior findings of CAPM model; the β coefficient for all countries have statistically significant effects on stock returns with p-value (0.000) for Egypt, (0.018) for Jordan, (0.022) for Morocco, and (0.067) for Saudi Arabia.

The positive β coefficients shows that the risk-return positive relationship holds for all the examined countries suggesting that holding stocks with higher betas (or higher volatility relative to the market) is being compensated with higher return .

Summarizing the above result, the CAPM model is still in work, and our findings are consistent with the findings of Kothari, Shanken, and Solan (1995), and Kim (1997).

Among other factors only B/M has statistically significant explanatory power in the two markets; with p-values (0.082) for Jordan and (0.000) for Morocco with negative signs.[6] This finding is contrary to those of Fama and French (1992), (1993), (1996), Davis (1994), Bryant, and

[6] Fama and French (1992) and others commonly use the log of B/M. However, this measure will exclude most firms from the distressed sample since they have negative book-to-market ratio. We therefore use B/M.

Eleswarapu (1997), Aydogan and Kursat (2000), and Lyn, and Zyowicsch (2004).

The P/E has statically insignificant explanatory power in the four markets, a result consistent with those of Chan, Hamao, and Lankonishock (1991), and contrary to those of Basu (1977, 1983), Jaffe, Keim, and Westerfield (1989), Keim (1990), Fama and French (1992), Kim (1997), Aydogan, and Kursat (2000), Trevino, and Robertson (2002), Rapach and Wahar (2002,2003), Lyn, and Zyowicsch (2004).

The size variable MCAP has statically insignificant explanatory power in the four markets, this finding is consistent with the findings of Daniel and Titman (1997), and contrary to the findings of Banz (1981), Reinganum (1981), Basu (1983), Keim (1990), Fama and French (1992), Mei (1993), on the other hand, Fama and French (1993), and Claessens, and Stijn (1998).

5. Conclusions

We investigate the cross-sectional pattern of stock returns for four emerging markets, using the "between estimator" panel data regression. We examined empirically the relationship between different variables; β , P/E, B/M, and MCAP and stock returns.

Our main result confirms that beta has a significant explanatory power in predicting stock returns variations in four emerging markets and the sign is positive, confirming the prediction of Sharpe, Lintner, Mossin, and Black *CAPM*.

The CAPM model is still in work and our finding is consistent with finding of Kothari, Shanken, and Solan (1995), and Kim (1997).

In addition, among other factors only *B/M* has statistically significant explanatory power in the two markets, and their sign is negative.

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Table (1) summary statistics

Countries	Number of listed ompany total	Number of company in the sample	Percentage of the sample of total volume	Mean return	Standard deviation . return	*P/E*	*B/M*	*Size (MCAP)(million of $)*
Egypt	95	60	0.63	-3.22	7.23	9.75	0.38	23514
Jordan	77	34	0.44	-0.66	6.11	14.6	0.64	3980
Morocco	23	23	1.0	-2.13	9.23	16.5	0.54	11389
Saudi Arabia	24	23	0.96	-0.37	4.68	17.0	0.45	61060

Table (2) coefficient estimates

The table contains the between (stocks) estimator coefficients described in equation (34) $R_{it} = \gamma_0 + \gamma_1 X_{1t} + ... + \gamma_k X_{kt} + \varepsilon_{it}$ i=1… n, β is estimated from time series data. All other variable are observed value by one month, estimated coefficient report firstly, t-statistics and p-value in parentheses. * indicate significance at 1%, ** indicate significance at 5%, *** indicate significance at 10%.

country	γ_0	β	*P/E*	*B/M*	*MCAP*
Egypt	-0.539	1.125	0.082	-0.294	0.319
t-statistic, p-value	-0.379 (0.704)	4.628 0.000)*	0.937 (0.348)	-0.492 (0.623)	0.377 (0.706)
Jordan	0.473	0.659	-0.507	-0.502	0.246
t-statistic, p-value	1.011 (0.312	2.366 (0.018)**	-0.195 (0.845)	-1.739 (0.082)***	0.212 (0.832)
Morocco	2.321	0.693	0.019	-5.529	-0.130E-04
t-statistic, p-value	2.739 (0.006)	2.286 (0.022)**	1.162 (0.245)	-4.640 (0.000)*	-0.223 (0.823)
Saudi Arabia	0.891	0.889	0.967E-03	-0.780E-03	0.249E-05
t-statistic, p-value	1.235 (0.217)	1.830 0.067)***	1.250 (0.211)	-1.390 (0.165)	0.082 (0.934)