P/E and PRICE-to-BOOK RATIOS as PREDICTORS of STOCK RETURNS IN EMERGING EQUITY MARKETS

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Recent research in empirical finance has shown that variables like dividend yields, price-to-earnings (P/E) ratios, book-to-market ratios as well as past returns have significant explanatory power for the variation in cross section of expected returns even after controlling for market risk (see, for example, Fama and French, 1992, for a through coverage of the topic). Similar results are reported for several developed markets (Ferson and Harvey, 1997; Fama and French, 1998), as well as emerging markets (Bekaeert, et. al., 1997; Claessens, Dasgupta and Glen, 1998; Patel, 1998; Rouwenhorst, 1999). Whether these variables are risk proxies in an efficient market or signs of mispricing is the subject an ongoing debate in financial economics. Yet for the practitioner in the market, it is the longer term predictive ability, rather than contemporaneous explanatory power, that is really important. In addition, apart from forecasting individual stock returns, stock market investors are also interested in the forecasting power of market wide averages of variables like dividend yield, P/E and book-to-market ratios as tools in market timing in highly volatile stock markets. The objective of this paper is to investigate the ability of average P/E and book-to-market ratios to predict future stock market returns in emerging equity markets. Emerging markets are differentiated from developed markets with respect to their heterogeneous nature and inherent dynamics. These are the markets characterized by high volatility and high average returns. It has been shown that they are not integrated to the developed markets of the World as evidenced by very low correlation with the rest of the World and among themselves [Bekaert et. al., 1998]. Hence the importance of market timing and country selection for an internationally diversified portfolio investor is obvious. Achour et. al. [1998] stresses the importance of country selection mechanisms as well as stock selection. Erb, Harvey and Viskanta [1995], on the other hand, argue that selection based on country risk rather than traditional attributes such as P/E, dividend yield and book-to-market yields superior results in emerging markets.

Following the earlier research in 1960's and 1970's, which in general support the view that stock returns could not be predicted, more recent studies provide evidence that medium to long term stock returns can be explained by variables like dividend yields, price earnings ratios, term structure, default premiums and past returns (see, for example, Fama and French, 1988 and 1989, Campbell and Schiller, 1988). These findings seem to contradict efficient markets hypothesis. Yet Fama [1991] argues that return predictability is the result of changing expected returns over time, rather then a sign of inefficiency. Investigating the sources of predictability in stock returns, Ferson and Harvey [1991] find that, rather than inefficiencies like fads; it is the change in expected returns and risk sensitivities (betas) that explain predictable component of stock returns. Harvey [1995] asserts that emerging market returns are more predictable than developed market returns.

Return predictability does not necessarily give way to excess profits in the market. In their general equilibrium model that yields predictable stock returns, Balvers, Cosimano and McDonald [1990] suggest that advantages of predictive ability are offset by fluctuations in consumption patterns. Empirically, Fuller and Kling [1994] cannot uncover any evidence for superior profits using return prediction models. As pointed out by Fama [1991], their finding is not surprising in the light of the "poor statistical power" of such models.

Blieberg [1994] employs aggregate data for future stock returns and average P/E ratio to develop a market timing and asset allocation strategy. To this end, he groups historical average P/E ratios into quintiles and relates them with future returns using S&P 500 index. In this paper, we initially adopt a similar approach by grouping observed average P/E and book-to-market ratios (PBV) into quintiles in 19 emerging equity markets and associating them with 3-month, 6-month and 12-month ahead future returns. We also perform econometric tests on the panel data of emerging equity markets for the period between 1986 to 1999 Our results indicate that both P/E and book-to-market ratios have predictive power of future return, especially over longer time periods, hence can be used as tools in forming a market timing and asset allocation strategy in emerging equity markets.

The organization of the paper is as follows. Section two describes the data. Results of simple grouping with respect to P/E and book-to-market ratios are given in Section 3. Econometric tests are presented in Section 4. Summary and concluding remarks are presented in the final section.

DATA

Our study is confined to a group of countries widely known as "emerging equity markets" defined and monitored by International Finance Corporation (IFC) arm of the World Bank. IFC reports market wide data on these countries in its publication titled "Annual Factbook". We obtained end of month national average market P/E and price-to-book (PBV) ratios, as well as values of the national market indices and exchange rates from IFC Annual Factbook for years between 1986 and 1999. National market indices are value weighted and they account for a significant portion of total market capitalization in each country. Financial Times World Index, used to calculate country betas, is obtained from Datastream. Our data set spans from January 1986 to December 1999. In order to deal with the numerical problems inherent in the definition of P/E ratio, we chose to work with its reciprocal, the ratio of earnings to price, or E/P ratio. In most of the analysis that follows, we discarded observations with negative E/P values.

To compute the monthly rate of return, R_t, in a market, we first express the local market index in US dollars and calculate the percentage change in the dollar denominated index, I, from month t-1 to month t.

We present summary statistics for monthly dollar returns, R_t, E/P and PBV for all the countries in the sample in Exhibit 1. Variation across countries and within country variation for all variables are remarkable. For example, simple average monthly dollar rate of return in emerging equity markets is 1.3% with a standard deviation of 12.2%. Same figures for Financial Times World (FTW) index, which heavily reflects developed capital markets, is 0.83% and 4.24% respectively. When Pearson correlations between stock market returns in individual countries are examined (not reported), very low correlation is found. This finding indicates a low level of integration within the group, as well as with the developed markets, as shown by low level of correlation with FTW index, in general.

INSERT EXHIBIT 1 HERE

E/P RATIO AND STOCK RETURNS

We first compute 3-month, 6-month and 12-month ahead returns in each stock market in month *t* by taking that month as the starting period. Hence the 3, 6 and 12 month ahead returns, $R_{t,\,t+j}$, are found as percentage changes in the local market index expressed in US dollars, *I*, in the following manner:

$$R_{t,t+j} = \frac{I_{t+j} - I_t}{I_t} \qquad for\ j = 3,\ 6,\ 12 \tag{1}$$

Thus an investor going long in a market in month *t* receives $R_{t,t+j}$ after *j* months, where *j* takes a value of 3, 6 or 12. As return measurement periods in successive months overlap, we select only those observations with nonoverlapping return horizons. Hence when we work with three month ahead returns (R3), we choose the monthly observations in January, April, July and October of every year in the sample. Similarly we pick January and July for six month ahead returns (R6) and January for twelve month ahead returns (R12). We then investigate if 3, 6 and 12-month future returns can be predicted by looking at the average value of the E/P and book-to-market ratios in a market.

To this end we pool all the E/P ratios in all markets, rank them in descending order, then divide them into 5 equal groups, or quintiles. The first group contains the highest E/P ratios and the fifth the lowest. We then investigate the corresponding 3, 6 and 12 month ahead returns for those quintiles to see if they vary with the level of E/P ratio observable in month t. Panel A of Exhibit 2 displays the average values of 3, 6 and 12 month ahead returns for each quintile of E/P ratios. For all three return horizons, average returns decrease as E/P ratio declines. In other words, an investor is more likely to attain higher returns if he invests in a market where E/P ratio is relatively high. The average returns in all horizons are negative after observing a low E/P value. On the contrary, one can earn more than 40% in US dollar terms 12 months after observing a high E/P ratio, a value in the first quintile. The relationship is much stronger for longer horizon returns as suggested by Exhibit 2. The difference in 12 month returns for high and low E/P quintiles are more pronounced than the difference in 3-month future returns. For all three return horizons, t-tests reject the equality of means between

E/P quintiles. However, in shorter horizons, the difference between average returns for two adjacent quintiles are not always significantly different from zero, and it may even be negative as in the case of the 3 month ahead returns for the third and fourth E/P quintiles. Similar analysis using price-to-book ratios yield more striking results. As shown in Panel B of Exhibit 2, average returns monotonically increase with the price-to-book quintile for each return horizon. The difference in 12 month ahead returns between lowest and highest book-to-market quintiles is more than 45%.

INSERT EXHIBIT 2 HERE

ECONOMETRIC EVIDENCE

The objective in this section is to test the explanatory power of E/P and PBV in the cross-sectional variation of average 3, 6 and 12-month ahead returns in emerging equity markets. This is done by invoking an approach similar to Fama and MacBeth [1973] algorithm (FM) within an international CAPM framework. International extension of CAPM for any national market portfolio stipulates that the excess return on the national portfolio over a riskless rate is related to the excess return on the world portfolio via a sensitivity factor of the national portfolio to the world. Formally:

$$E(R_j) = \beta_j E(R_W) \qquad (2)$$

where R_j and R_W are excess returns in national market j and the world portfolio, β_j is the sensitivity (or risk) factor for market j, E is the expectation operator. The implication of the international CAPM is that variation in expected return across different national markets can only be explained by the risk factor, β_j. No other variable should contribute to the explanation of cross sectional variation in national market returns.

We employ the above framework to test the explanatory power of E/P and PBV in future returns by taking risk sensitivity of the market into consideration. Bekaert et. al. [1998] suggests that the predictability power can be best captured by regression models because of the time varying characteristic of mean returns. First a time series regression is run for each national market to estimate the risk factor using the first 24 monthly observations, between April 86 and March 88:

$$R_{jt} = \alpha_j + \beta_j R_{Wt} + \varepsilon_t \quad (3)$$

where R_{jt} is the return in market j in month t, R_{Wt} is the return on the world portfolio in month t, α_j, β_j are the coefficients, and ε_t is the error term. At the end of this stage we have a set of 19 β estimates, one for each country in the sample. Then, using the cross section of observations for the 25th month, i.e. April 88, we estimate the following regression models via OLS to test the explanatory power of *E/P* and P*BV* on future returns where βs are also included to control risk differences[1]:

$$R_i = \lambda_0 + \lambda_1\, EP_i + \lambda_2\, \beta_i + \varepsilon_i \quad (4)$$

$$R_i = \lambda_0 + \lambda_3\, PBV_i + \lambda_2\, \beta_i + \varepsilon_i \quad (5)$$

$$R_i = \lambda_0 + \lambda_1\, EP_i + \lambda_2\, \beta_i + \lambda_3\, PBV_i + \varepsilon_i \quad (6)$$

where R_i = 3, 6 or 12 month ahead returns in national market i, EP_i is the average earnings to price ratio in market i, PBV_i is the book-to-market ratio in market i, λs are regression coefficients, and ε's are error terms. Each model is estimated for all three return horizons, i.e. 3, 6 and 12-month future returns. We repeat the same process for each non overlapping time period between April 88 and December 1999 by updating β estimates every time. For example, for the estimation of July1988, a β value for each market is found by utilizing time series of observations between May 86 and June 88 in the second model as specified in equation 3, together with E/P and PBV from July 1988. Hence, depending on the return horizon, each equation is estimated 12-47 times, yielding a set of estimates for the regression coefficients in (4) – (6). We are interested to see if coefficients (λs) of *E/P* and *PBV* are different from zero. A t-test on the mean value of the time series of estimated coefficients provide the necessary answer. Rejection of the null hypotheses of zero means for these coefficients would lead to the conclusion that *E/P* and *PBV* have explanatory power of future returns even after controlling for risk.

Results are presented in Exhibit 3. One interesting finding in all the models is the lack of significance of the coefficient of the risk variable, β. Although surprising in terms of the implications of international CAPM, lack of significance of the risk variable is hardly a new empirical phenomenon. In fact in most recent tests of the CAPM, failure of a significant coefficient for the beta risk is very common, albeit in US markets, e.g. Fama and French [1992]. In the international setting, Harvey [1991] finds that world risk exposure can only partially explain the cross-sectional return differences among developed countries. In emerging markets, Rouwenhorst [1999] finds that high beta stocks do not outperform low beta stocks.

Estimation results for equation (4) above are given in the first panel of Exhibit 3. This model tests the impact of E/P ratio on future returns. For longer return horizons, coefficient for the E/P variable is significant. Higher E/P ratios in the market lead to higher returns

[1] We also employed weighted least squares in the estimation of (4)-(6), where residual standard deviations in time series estimation of country betas are used as weights in cross sectional regressions. Results (not reported) are essentially similar.

subsequently. The second model as specified in equation (5), which tests the impact of PBV, is presented in the second panel. Here, the coefficients for the variable of interest carry the expected negative sign, yet lack statistical significance.

INSERT EXHIBIT 3 HERE

The third panel displays the estimation results of equation (6), which includes both E/P and PBV as explanatory variables. In the three estimations corresponding to the three different return horizons, explanatory variables do not have significant coefficients, although they mostly carry he correct sign.

We also tested the relationship between *E/P, PBV* and future returns by pooling cross sectional and time series observations into a panel data set. The three models that we have employed before take the following form in the cross sectional time series estimation:

$$R_{it} = \lambda_0 + \lambda_1 EP_{it} + \lambda_2 \beta_{it} + \varepsilon_{it} \qquad (4')$$

$$R_{it} = \lambda_0 + \lambda_1 PBV_{it} + \lambda_2 \beta_{it} + \varepsilon_{it} \qquad (5')$$

$$R_{it} = \lambda_0 + \lambda_1 EP_{it} + \lambda_2 \beta_{it} + \lambda_3 PBV_{it} + \varepsilon_{it} \qquad (6')$$

All the variables are the same as before, with the addition of time subscripts. As cross sectional components of the error terms could be correlated, we estimated the coefficients with *Seemingly Unrelated Regressions* (SUR) method, with a common intercept term and fixed effects. Findings as listed in Exhibit 4, yield stronger results than those obtained with the Fama and MacBeth algorithm. In the three-month return horizon, explanatory power is low, as indicated by low R^2 values. The t-statistics fail to reject the null that the coefficients of *E/P* and *PBV* are zero. However for 6 and 12-month future return horizons coefficients for E/P and PBV are significant with expected signs in all three panels. The risk variable, β, still lacks significance in 8 of the 9 models estimated.

INSERT EXHIBIT 4 HERE

SUMMARY AND CONCLUDING REMARKS

This paper is an attempt to uncover tools like *E/P* and *PBV* ratios to forecast longer horizon average market returns in emerging equity markets. We pool market averages of E/P and PBV for all emerging equity markets and try to see if they are related with 3, 6 and 12-month future returns. First, we rank the pooled observations with respect to *E/P* (*PBV*) and group them into quintiles. When we relate grouped *E/P (PBV) v*alues to future returns, we find that returns are higher after observing a high *E/P* (low *PBV*) in a market. Two sets of econometric tests are invoked to test the statistical relationship between *E/P, PBV* and future returns. Initially, we employ Fama and MacBeth's methodology to control for worldwide risk in an international CAPM framework. Next, we undertake a time series - cross sectional estimation of international CAPM models. Although FM method does not provide significant coefficients, E/P and PBV appear to predict future returns in pooled estimation. However, explanatory powers are very low in shorter return horizons.

The fact that fundamental variables are related with future returns in less developed, diverse markets have strong implications for asset pricing in general. These variables have been shown to explain cross section of expected returns in developed markets. Yet they do not easily lend themselves to a model of capital market equilibrium; such findings are still regarded as an empirical regularity yet to be explained. Similar phenomenon in emerging equity markets is not therefore very puzzling. In terms of forecasting ability, the relationship between *E/P*, *PBV* and future returns are encouraging, but not very promising for the potential investor. One has only got to consider the low explanatory power of the models estimated in this study.

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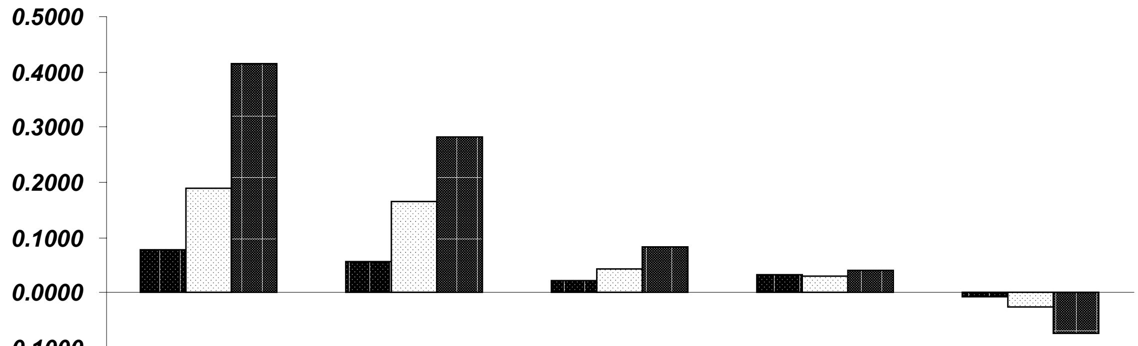
EXHIBIT 1
SUMMARY STATISTICS FOR EMERGING MARKETS

Countries	**Average Monthly Return**		**Earnings to Price (E/P)**		**Price to Book Value (PBV)**		**Pearson Correlation**	
	Mean	*Standard Deviation*	*Mean*	*Standard Deviation*	*Mean*	*Standard Deviation*	*Corr.*	*Sig. (2-tailed)*
Argentina	0.023	0.173	0.098	0.189	1.326	1.118	0.028	0.785
Chile	0.019	0.074	0.116	0.085	1.462	0.604	0.142	0.129
Colombia	0.009	0.116	0.098	0.052	1.099	0.526	0.009	0.924
Greece	0.025	0.119	0.077	0.034	2.695	1.667	0.159	0.090
India	0.004	0.109	0.058	0.022	3.029	1.286	-0.102	0.265
Indonesia	0.001	0.135	0.053	0.018	2.520	0.953	0.102	0.372
Jordan	0.000	0.047	0.075	0.020	1.579	0.218	0.056	0.544
Korea	0.016	0.117	0.048	0.015	1.414	0.558	0.303*	0.001
Malaysia	0.011	0.106	0.043	0.019	2.594	0.986	0.512*	0.000
Mexico	0.031	0.133	0.099	0.066	1.485	0.600	0.317*	0.001
Nigeria	0.007	0.141	0.138	0.044	2.077	0.737	0.085	0.355
Pakistan	0.000	0.101	0.149	0.216	2.055	0.898	0.102	0.262
Philippines	-0.004	0.126	0.065	0.022	2.938	0.957	0.315*	0.001
Taiwan	0.011	0.113	0.063	0.021	2.457	1.432	0.408*	0.000
Thailand	0.024	0.136	0.041	0.018	3.948	2.792	0.296*	0.001
Turkey	0.013	0.131	0.074	0.026	2.253	0.981	-0.104	0.253
Venezuela	0.034	0.191	0.096	0.077	4.040	1.932	0.006	0.952
Zimbabwe	0.014	0.148	0.096	0.062	1.777	0.918	-0.045	0.632
Portugal	0.010	0.096	0.177	0.093	1.374	0.610	-0.016	0.868
Average	*0.013*	*0.122*	*0.088*	*0.058*	*2.217*	*1.041*		

Mean and standard deviation values of (1) Average monthly returns; (2) Earnings to price ratio; (3) Price to book value ratio for 19 countries in the sample. Pearson correlations of individual emerging equity market returns with FTW Index return are reported in the last two columns (Significant correlations at the 0.05 level are marked with "*")

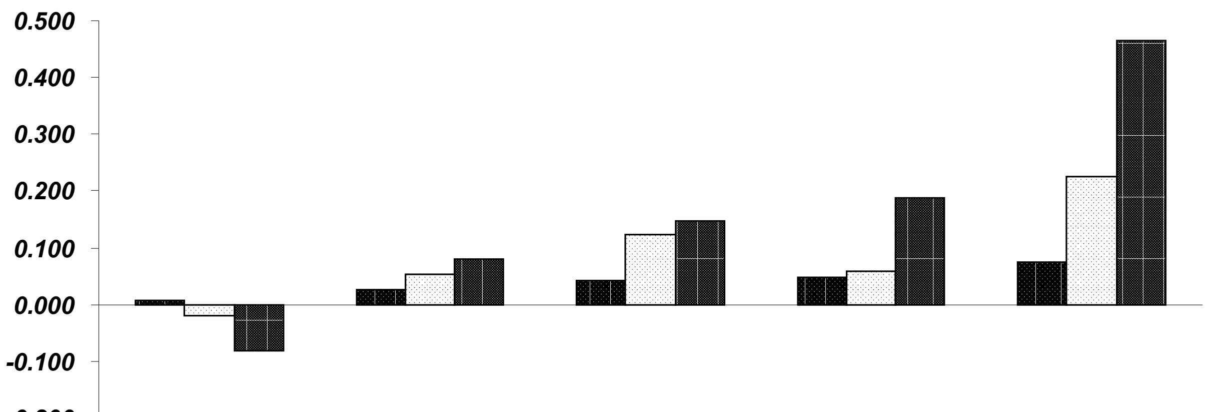
EXHIBIT 2
E/P AND PRICE-TO-BOOK RATIOS AND AVERAGE RETURNS

PANEL A – E/P RATIO and AVERAGE RETURNS



	1	2	3	4	5
R3	0.0767	0.0578	0.0231	0.0329	-0.0080
R6	0.1901	0.1667	0.0427	0.0294	-0.0267
R12	0.4138	0.2822	0.0835	0.0402	-0.0723

PANEL B – PRICE-to-BOOK (PBV) RATIO and AVERAGE RETURNS



	1	2	3	4	5
R3	0.008	0.027	0.043	0.047	0.074
R6	-0.019	0.054	0.123	0.059	0.225
R12	-0.081	0.080	0.146	0.187	0.466

EXHIBIT 3
FM REGRESSION RESULTS

Return (t)	Constant	EP Coefficient	PBV Coefficient	BETA Coefficient
PANEL A $[R_i = \lambda_0 + \lambda_1 EP_i + \lambda_2 \beta_i + \varepsilon_i]$				
R3	0.0199	0.1555		0.0441
	(0.51)	(0.50)		(1.18)
R6	-0.0937	1.3156		0.0538
	(-1.66)	(2.49)*		(1.26)
R12	0.8273	2.7600		0.1506
	(8.29)*	(1.45)		(1.55)
PANEL B $[R_i = \lambda_0 + \lambda_3 PBV_i + \lambda_2 \beta_i + \varepsilon_i]$				
R3	0.0293		-0.0077	0.0296
	(0.99)		(-0.36)	(1.07)
R6	-1.2032		1.2710	0.8334
	(-0.95)		(1.03)	(1.02)
R12	1.0969		0.1682	0.0151
	(4.54)*		(0.66)	(0.20)
PANEL C $[R_i = \lambda_0 + \lambda_1 EP_i + \lambda_2 \beta_i + \lambda_3 PBV_i + \varepsilon_i]$				
R3	0.0523	-0.0012	-0.0249	0.0143
	(1.25)	(-0.004)	(-1.48)	(-0.02)
R6	0.0337	0.5207	0.0107	-0.0071
	(0.28)	(0.72)	(0.16)	(-0.12)
R12	0.8600	2.0527	0.1978	0.0499
	(3.44)*	(1.24)	(0.78)	(0.69)

R3, R6 and R12 are 3, 6 and 12 month ahead returns respectively. Each row represents the estimation results of a model specified by equations 4-6. Figures in the body of the table are coefficient estimates; t-values are reported in parentheses. An "*" denotes statistical significance at the 0.05 level.

EXHIBIT 4
POOLED SAMPLE RESULTS

Return (t)	*Constant*	*EP Coefficient*	*PBV Coefficient*	*BETA Coefficient*
PANEL A $[R_{it} = \lambda_0 + \lambda_1 EP_{it} + \lambda_2 \beta_{it} + \varepsilon_{it}]$				
R3	0.0053	0.0626		0.0113
	(0.55)	(0.95)		(1.43)
R6	0.0182	0.2020		0.0106
	(1.70)	(2.87)*		(1.06)
R12	1.0137	0.8289		0.0304
	(103.1)*	(9.81)*		(3.20)*
PANEL B $[R_{it} = \lambda_0 + \lambda_1 PBV_{it} + \lambda_2 \beta_{it} + \varepsilon_{it}]$				
R3	0.0104		-0.0009	0.0052
	(0.90)		(-0.22)	(0.65)
R6	0.1011		-0.0270	0.0035
	(5.44)*		(-4.69)*	(0.31)
R12	1.3628		-0.1056	-0.0281
	(16.40)*		(-3.79)*	(-0.54)
PANEL C $[R_{it} = \lambda_0 + \lambda_1 EP_{it} + \lambda_2 \beta_{it} + \lambda_3 PBV_{it} + \varepsilon_{it}]$				
R3	-0.0078	0.1601	0.0011	0.0114
	(-0.50)	(1.50)	(0.26)	(1.42)
R6	0.0813	-0.0165	-0.0216	0.0086
	(4.17)*	(-0.18)	(-3.83)*	(0.75)
R12	1.2346	0.5324	-0.0795	0.0040
	(54.05)*	(5.77)*	(-10.80)*	(0.74)

R3, R6 and R12 are 3, 6 and 12 month ahead returns respectively. Each row represents the estimation results of a model specified in equations 4′- 6′. Figures in the body of the table are coefficient estimates; t-values are reported in parentheses. An "*" denotes statistical significance at the 0.05 level.