Proceedings of the 2005 International Conference on Simulation and Modelling
D.E.Allen and J. Chimhini

THE WORLD PRICE OF COVARIANCE RISK WITH RESPECT TO EMERGING MARKETS

David E Allen

School of Accounting, Finance and Economics
Edith Cowan University
Joondalup Campus
Joondalup W.W. 6027

Jocelyn Chimhini

School of Accounting, Finance and Economics
Edith Cowan University
Joondalup Campus
Joondalup W.W. 6027

ABSTRACT

This paper tests whether conditional versions of the CAPM are consistent with the behaviour of returns in 20 emerging markets and four developed ones. A country's risk is defined as the conditional sensitivity or covariance of its market return with a world stock return. This risk is permitted to vary through time. The conditional covariances calculated for each emerging market should explain the differences in national stock index performance. The results are varied: those markets with high capitalizations and high correlations with world markets appear to be priced more in terms of world factors whilst others are much more influenced by local factors.

1 INTRODUCTION

Why do countries have different average stock returns? We examine this in the context of emerging markets using a framework provided by Harvey (1991). If emerging markets are viewed as being stock portfolios in a global portfolio, then asset pricing theory suggests that cross-sectional differences in countries risk exposures should explain cross-sectional differences in expected returns.

We test conditional versions of the Sharpe (1964) and Lintner (1965) asset pricing model in 20 emerging markets and four developed ones. If the asset pricing model holds and there is only one source of risk that is priced then the time-varying conditional covariances calculated for each emerging market should explain the differences in national stock index performance.

The results for our sample are varied. Those markets with high capitalizations and high correlations with world markets appear to be priced more in terms of world factors. Other markets are much more influenced by local factors, these include South Africa, Zimbabwe, Jordan, Venezuela and Nigeria.

The paper is organised into four sections, a brief literature review follows in the next section, the research method is presented in the third section, the results in section four and a brief conclusion in section five.

2 PRIOR LITERATURE

The CAPM is a full information equilibrium-based model in which Betas are assumed constant, stock return distributions are time invariant and investors have homogenous expectations. Yet Bollerslev, and Engle and Woodridge (1988) and Shwert and Seguin (1990) report evidence of time-varying return distributions suggesting that the moments of return distributions behave like random variables rather than constants. Time-variation of moments can be incorporated into CAPM and a modified conditional CAPM can be applied to explain stock return variation. Harvey's (1989, 1991, and 1997) work recognizes that the beta is not constant over time.

3 RESEARCH METHOD

3.1 The econometric model

A conditional version of the CAPM is applied to the returns of emerging markets and the results are compared with those obtained in developed markets. We use conditioning information, or some information set Z_{t-1} to calculate expected moments and to test the ICAPM as a relation between expected returns and ex-ante risk. The conditional version of the Sharpe (1964) and Lintner (1965) asset-pricing model restricts an asset's conditionally expected returns to be proportional to its covariance with the market portfolio. The proportionality factor is the price of covariance risk: the expected compensation that the investor receives for taking on a unit of covariance risk. The model is given as:

$$E\left[r_{jt}\middle|\Omega_{t-1}\right]=\frac{E\left[r_{mt}\middle|\Omega_{t-1}\right]}{Var\left[r_{mt}\middle|\Omega_{t-1}\right]}\,Cov\left[r_{jt}\,r_{mt}\middle|\Omega_{t-1}\right]$$

Where r_{jt} is the return on a portfolio of country j equity from time t-1 to t in excess of the risk return, r_{mt} is the excess return on the world market portfolio, and $?_{t-1}$ is the information set that investors use to set prices. The ratio of

the conditional expected return on the market index $E[r_{mt} | \Omega_{t-1}]$ to the conditional variance of the market index $Var[r_{mt} | \Omega_{t-1}]$ is the world price of covariance.

Harvey specified a model of the conditional first moment and assumed that investors process information using a linear filter:

$$R_{jt} - r_{t-1} = Z_{t-1}\delta_j + \varepsilon_{jt} \qquad (2)$$

$$E(\varepsilon_{jt} | Z_{t-1}) = 0 \qquad (3)$$

Where u_{jt} is the investor's error for the return on assets j, $\mathbf{Z}_{t-1}$ is a row of vector of predetermined instrumental variables, which are known to the investor and $\boldsymbol{\delta}_j$ is a column vector of time invariant forecast coefficients.

Given the assumptions the conditional first moment (1) can be rewritten:

$$Z_{t-1}\delta_j = \frac{z_{t-1}\delta_m}{E[u^2_{mt} | z_{t-1}]} E[u_{jt} u_{mt} | z_{t-1}] \quad (4)$$

Where u_{mt} is the investor's forecast error on the world market portfolio $E[u^2_{mt} | Z_{t-1}]$ is the conditional variance and $E[u_{jt} u_{mt} | Z_{t-1}]$ is the conditional covariance. Next, multiply both sides by of equation (4) by the conditional variance:

$$E[u^2_{mt} Z_{t-1}\delta_j | Z_{t-1}] = E[u_{jt} u_{mt} Z_{t-1}\delta_m Z_{t-1}] \quad (5)$$

The deviation from the expectation is:

$$h_{jt} = u^2_{mt} Z_{t-1}\delta_j - u_{jt} u_{mt} Z_{t-1}\delta_m \qquad (6)$$

where h_{jt} is the disturbance that should be unrelated to the information under the null hypothesis that the model is true. h_{jt} is a pricing error which implies that the model is overpriced when h_{jt} is negative and under priced when h_{jt} is positive.

The econometric model to test the asset pricing restrictions is formed by combining equations 2 and 6

$$e = (u_t \quad u_{mt} \quad h_t) = \begin{pmatrix} [r_t - z_{t-1}\delta]' \\ [r_{mt} z_{t-1}\delta_m]' \\ [u^2_{mt} z_{t-1}\delta - u_{mt} u_t z_{t-1}\delta_m]' \end{pmatrix} \quad (7)$$

where u is a 1x n (number of countries) vector of innovations in the conditional means of the country returns. The model implies that $E[\varepsilon_t | z_{t-1}] = 0$. With n countries, there are n +1 columns of innovations in the conditional means (u and u_m) and n columns in h.

Hansen's (1982) generalized method of moments (GMM) is used to estimate the parameters in equation (7). The GMM forms a vector of the orthogonality conditions **g** = vec($\varepsilon' Z$) where ε is the matrix of forecast errors for T observations and 2n + 1 equations and Z is a T x *l* matrix of observations on the predetermined instrumental variables. The parameter vector δ is chosen as to make the orthogonality conditions as close to zero as possible by minimizing the quadratic form **g´wg** where the **w** symmetric weighing matrix that defines the metric used to make **g** close to zero. The consistent estimate of **w** is formed by

$$\left[\sum_{t=1}^{T} (e_t \otimes z_{t-1})' (e_t \otimes z_{t-1})\right]^{-1} \quad (8)$$

The ε depends on the parameters. As a result, the estimation proceeds in stages. Hansen (1982) provides the conditions that guarantee that the estimates are consistent and asymptotically normal.

The minimized value of this quadratic form is distributed χ^2 under the null hypothesis with degrees of freedom equal to the number of orthogonality conditions minus the number of parameters. This χ^2 statistic which is known as the test of the over identifying restrictions will provides a goodness of fit test for the model. A high χ^2 statistic means that the disturbances are correlated with the instrumental variables. This is a symptom of model miss-specification.

Equation (8) is estimated for each country. Equation (8) provides a test of the model's restriction that the conditionally expected excess return on a country portfolio is proportional to its conditional variance with the world return.

3.2 The price of covariance risk in emerging markets

The general framework provided by equation (8) permits all the conditional moments; means, variance and covariances to wander through time. In circumstances where some of these moments are constant more powerful tests can be constructed using this structure. Typically, tests of asset pricing models have assumed that expected returns are proportional to the expected return on a benchmark portfolio. A restriction of this kind can be tested:

$$\mathbf{k}_t = \mathbf{r}_t - r_{mt}\hat{\mathbf{a}}_t \qquad (9)$$

where ß is an n-vector of coefficients which could represent the ratios of conditional covariances of the country excess return to the conditional variance of the benchmark return.

3.3 Instrumental Variables

We use instrumental variables to predict returns in the multi-country setting to try to condition the model on variables which capture the current state of the global economy. Fama and Shwert (1977) Rozeff (1984) Keim and Stambaugh (1986) Fama and French (1988) and Campbell and Shiller (1988) have shown that stock returns are predictable on the basis of the following variables: dividend yield, short-term interest rate, the spread between long term and short term bond yields (the term structure premium), the spread between corporate and government bonds (a default risk spread), stock market returns and exchange returns as well as dummy variables for the January effect and days of the week effect. We include dividends in the test of the CAPM.

3.4 Description of Data Sources

A sample of twenty emerging markets and four developed markets (the USA, Japan plus two composite indices) are used. The emerging markets include Argentina, Brazil, Chile, the Czech Republic, Greece, Hungary, India, Indonesia, Jordan, Korea, Mexico, Malaysia, Nigeria, Philippines, Poland, South Africa, Thailand, Turkey, Venezuela and Zimbabwe. The above markets had data available on the Emerging Market Data Base (EMDB) obtained from Data Stream. The data is comparable across national boundaries and we utilised monthly indexes and data series from January 1976. The Database categorises markets into global, investable and frontier markets.

We consider January 1985 to June 2000 using monthly data for equity indices. The countries are grouped according to data availability and 14 of the countries have data available from February 1985 whilst 20 countries have data from February 1994.

In order to determine how correlated the markets are with the rest of the world indexes the IFC index, the Morgan Stanley Capital International (MSCI) EAFE index, the US index and the Japan index were used. The S&P indexes are treated as a stock portfolio. To test the CAPM relationship between each country index and the world market, the country index and a set of instrumental variables were used. The total number of observations (T) range from 75 to 185. The assets are country index monthly returns measured in excess of the three month US Treasury bill rate. N is the number of assets and there are 24 assets, that is, the 20 emerging markets, the world index, and other proxies for the market portfolio, EAFE, USA and Japan. The number of instruments (L) ranges between five and eight. These are used as conditioning information available at time t-1, denoted by Zt-1 and include the constant, the dividend yield, the default rate, the spread between US Moody's Baa and Moody's Aaa and the world returns index. We also hope to find out if emerging markets are integrated or segmented and hence local instrumental variables are included in the conditioning information. The local instruments include the country specific dividend yield, the rate of change of the exchange rate, the local market index and a country-specific short-term interest rate.

All the monthly returns were calculated in US dollars to make them comparable. The dividend yield and interest rates were scaled down by a factor of 12 to derive the monthly dividend yield and interest rates.

Continuously compounded returns were calculated for all the variables used and were calculated as: $R_{it} = \ln\left(\frac{New\ \mathrm{Price}}{Old\ \mathrm{Price}}\right)$, where ln is natural log.

The excess returns were calculated for all the markets by subtracting the returns on risk free asset from the total country returns and the world market returns.

Summary statistics for our basic series including the means, standard deviations are shown in Tables I. (We also calculated correlation matrices but these are not included)

Regressions of country returns and common information variables

Regressions of country returns using world factors were used to predict returns. A linear regression was used to forecast country returns. The regression equation is:

$$R_{j,t} = \delta_{j,0} + \delta_{j,1} wlss_{t-1} + \delta_{j,2} spread_{t-1} + \delta_{j,3} ustb90_{t-1} + \delta_{j,4} wldy_{t-1} + \varepsilon_{j,t} \quad (9)$$

Where:

$R_{j,t}$ = country's conditional expected return
Wlss = excess return on the world index
Spread = the yield spread between the US Baa Aaa rated bonds
Ustb90 = the US 90day Treasury bill rate
Wldy = Monthly dividend yield on the Standard and Poor 500 stock index
ε = Regression error

The conditioning information variables are available at time t-1 and are used to predict the next period returns for time t. Table II reports the results for these regressions.

Table III is constructed in the same way as table II. However, local variables are also used. Column Z_{t-1} (1) is the same as the regression in table II and Column Z_{t-1} (8) uses local variables only. Columns Z_{t-1} (2) to Z_{t-1} (7) use mixed variables, which include both common and local variables.

Conditional CAPM

The GMM procedure was used to estimate the parameters of the conditional CAPM set in equation (1). The idea behind this is to choose parameters of the model to match the theoretical model as closely as possible with those of the data. The key ingredient to GMM is the specification of the moments or orthogonality conditions. There are l information variables and l x (2n+1) orthogonality conditions

and there are l x (n+1) parameters to estimate leaving l x n overidentifying conditions to estimate. For each country there are 5 (2 +1) = 15 orthogonality conditions and 5 (1+1) parameters to estimate leaving five overidentifying conditions. The weighting matrix determines the relative importance of the various moment conditions.

$$\left[\sum_{t=1}^{T}\left(e_t \otimes z_{t-1}\right)'\left(e_t \otimes z_{t-1}\right)\right]^{-1}$$

From the results u_t and u_{mt} (country and world error terms as defined in equations (3) and (4) were determined. The average conditional covariance was obtained by (u_t x u_{mt}) multiplied by1000 based on a single country estimation with common instrument set.[1]

To see how the model fits the data in an overidentified situation, where it will not be possible to set every moment to zero, a χ^2 statistic was calculated to determine how far the model is from zero.

4. RESULTS

4.1 Statistical Description

Table I represents summary statistics for asset excess returns and the instrumental variables over the period 1985 to June 2000. All returns are calculated in US dollars. Panel A of Table 1 provides summaries of the mean excess returns for the various markets and the two composite indices, plus their standard deviations and the autocorrelations of excess returns at various lags. Panel B Table 1 provides similar statistics for the dividend yield series in these markets and in Panel C for some of the instrumental variables used. Seven of the markets including the USA have mean excess returns higher than the world index. The other ten countries offer less attractive returns than the world market at a higher risk. The world portfolio has the lowest standard deviations when all countries are considered. Harvey (1991) found the same results for developed markets. In addition, evidence shows that emerging markets are more volatile than the three developed markets in the sample except for Jordan with a standard deviation of 0.0446 that is lower than that of Japan and the EAFE. Japan has a relatively high standard deviation when compared with other developed markets. Nigeria has the lowest mean excess return (-0.0011) and a high standard deviation.

TABLE I:
Summary Statistics for the Country Excess Returns and Instrumental Variables

The statistics are based on monthly data from1976: 2 - 2000:7. The country returns are calculated in U.S.dollars in excess of the holding period returns on the 90-day Treasury bill rate. The dividend yields are the average (over the past year) monthly dividend divided by the current month price level. The returns and dividend yields are form Standard and Poor Emerging Market Price Index. The instrumental variables are: the return for holding a 90day US Treasury bill, the yield on Moody's Baa rated bonds less the yield on Moody's Aaa rated bonds (spread) and the dividend yield on the Standard and Poor's 500 stock index less the return90 day bill.4.2

PANEL A			Autocorrelation					
Variable	Mean return	Standard						
Equity returns		Deviation	ρ1	ρ2	ρ3	ρ4	ρ12	ρ24
Argentina	0.0127	0.2038	0.01	0.01	0.04	-0.06	-0.10	-0.01
Brazil	0.0059	0.1798	0.02	-0.05	-0.06	0.05	0.02	0.00
Chile	0.0175	0.0790	0.17	0.20	-0.01	0.02	0.08	0.03
Czech Republic	-0.0120	0.0926	0.17	-0.15	-0.23	-0.23	-0.16	-0.07
EAFE	0.0072	0.0511	0.01	-0.08	0.00	0.03	0.05	0.06
Hungary	0.0045	0.1201	-0.08	-0.11	0.01	-0.08	-0.14	-0.07
India	0.0040	0.0925	0.07	0.02	-0.06	-0.08	-0.09	0.00
Indonesia	-0.0137	0.1490	0.22	-0.11	-0.01	0.21	-0.11	0.05
Japan	0.0038	0.0725	0.05	-0.07	0.08	0.05	0.06	0.00
Jordan	0.0005	0.0446	0.01	0.00	0.13	-0.03	0.03	0.02
Malaysia	-0.0003	0.1036	0.13	0.20	-0.12	-0.06	-0.11	0.07
Mexico	0.0137	0.1367	0.24	-0.05	-0.05	-0.02	-0.04	0.02
Nigeria	-0.0011	0.1521	-0.01	-0.06	-0.09	-0.07	0.02	-0.02
Philippines	0.0102	0.1086	0.33	0.06	0.03	0.05	0.08	-0.01
Poland	-0.0062	0.1408	-0.10	-0.09	0.00	-0.20	-0.19	-0.06
South Africa	-0.0021	0.0880	0.01	-0.04	0.01	-0.23	-0.08	-0.19
Thailand	0.0010	0.1025	0.13	0.14	-0.06	-0.13	0.04	-0.12
Turkey	0.0005	0.1208	0.13	0.07	0.08	0.07	-0.13	0.00
USA	0.0095	0.0441	-0.02	-0.06	-0.05	-0.06	0.02	0.07
Venezuela	0.0035	0.1447	-0.01	0.16	-0.01	0.00	0.02	-0.04
World	0.0079	0.0424	0.01	-0.08	-0.03	-0.05	0.03	0.10
Zimbabwe	0.0080	0.1084	0.21	0.14	0.23	0.16	-0.03	-0.03

Panel B								
Variable	Mean return	Standard deviation	Autocorrelation					
Dividend Yield			ρ1	ρ2	ρ3	ρ4	ρ12	ρ24
Argentina	0.0103	0.0013	0.822	0.707	0.612	0.538	0.428	-0.038
Brazil	0.0029	0.0026	0.867	0.726	0.632	0.523	-0.054	-0.054
Chile	0.0041	0.0019	0.968	0.921	0.884	0.860	0.649	0.314

[1] See Harvey (1991) table V.

Czech Republic	0.0016	0.0006	0.845	0.750	0.693	0.594	0.155	-0.532
Greece	0.0042	0.0027	0.910	0.829	0.767	0.706	0.260	0.004
Hungary	0.0013	0.0006	0.870	0.775	0.702	0.619	0.392	0.056
India	0.0015	0.0006	0.913	0.867	0.831	0.797	0.519	0.364
Indonesia	0.0010	0.0006	0.906	0.801	0.732	0.672	-0.035	-0.205
Jordan	0.0028	0.0016	0.920	0.858	0.795	0.727	0.243	0.066
Korea	0.0016	0.0012	0.926	0.851	0.780	0.719	0.343	0.669
Malaysia	0.0017	0.0006	0.909	0.800	0.680	0.572	-0.077	-0.311
Mexico	0.0020	0.0013	0.941	0.868	0.807	0.774	0.391	0.164
Nigeria	0.0058	0.0019	0.921	0.835	0.747	0.648	0.670	0.010
Philippines	0.0012	0.0012	0.882	0.765	0.648	0.601	0.213	0.282
Poland	0.0010	0.0005	0.857	0.743	0.605	0.479	-0.064	0.037
South Africa	0.0021	0.0003	0.802	0.677	0.501	0.372	0.022	0.789
Thailand	0.0030	0.0022	0.942	0.880	0.814	0.756	0.515	0.366
Turkey	0.0034	0.0018	0.826	0.695	0.589	0.519	0.188	0.123
Venezuela	0.0018	0.0014	0.974	0.947	0.932	0.923	0.606	-0.427
World	0.0023	0.0007	0.997	0.994	0.993	0.993	0.968	0.987
Zimbabwe	0.0544	0.0264	0.908	0.852	0.817	0.781	0.482	0.383

Panel C

Variable	Mean return	Standard deviation	Autocorrelation					
			ρ1	ρ2	ρ3	ρ4	ρ12	ρ24
SPREAD	0.0063	0.0014	0.9554	0.9053	0.8590	0.8303	0.6878	0.5184
USTB90	0.0046	0.0012	0.9757	0.9432	0.9432	0.8822	0.5953	0.1140
World Dividend Yield	0.0023	0.0007	0.9900	0.9809	0.9722	0.9616	0.9184	0.9728

4.2 What are the return and risk characteristics of these markets?

The analysis suggests that emerging markets offer diversification benefits to investors given the risk-return characteristics of these markets but it does not follow that all markets offer the same benefits. The Latin American countries offer high returns at varying levels of risk. The results of the African and European countries are more suspect.

The means, standard deviations and autocorrelations of the countries' dividend yields are shown in panel B of table I. Zimbabwe, Argentina, Greece and Thailand have both high means and standard deviations of dividend yields.

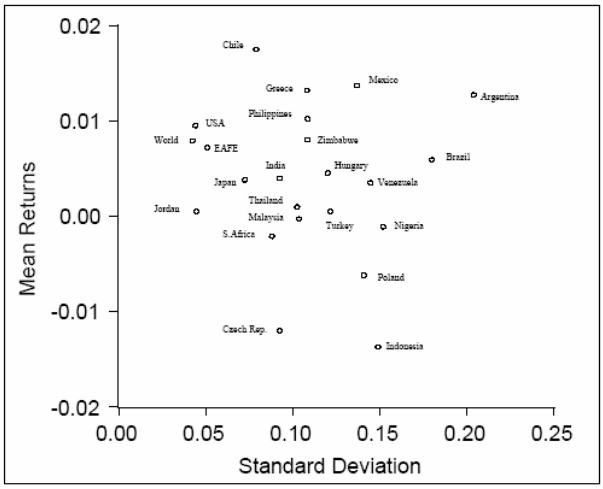
Panel C of table I provides summary statistics for the common instrumental variables. All the instrumental variables show high autocorrelations up to 24 month lags.

4.2 How do these markets correlate with each other and the major world markets?

The cross-country correlations are not presented (available from authors on request). The correlations between the world market index and the developed markets are very high ranging from 68 percent to 92 percent. This suggests that these markets are integrated with the world market. Correlations between the world market and emerging markets vary with seven countries exhibiting a correlation of 25 percent or less. South Africa has the highest correlation of 59 percent and Nigeria has the lowest at -0.07 percent.

Figure I plots a 'traditional' graph of mean excess returns against standard deviation in the 24 markets.

Figure 1: Mean Returns and Variances for Emerging Markets and Developed Markets: 1985-2000



The developed markets are clustered together with low standard deviations and low returns. The Latin American markets have high excess returns and in the case of Argentina and Brazil, high volatility.

4.3 Predictability of Expected Returns Using World Factors

The results of regressions of country returns on a world common set of instrumental variables are shown in table II. The results show a pattern of predictable variation in the emerging market returns. The results of regressions of the emerging market returns on the four information variables are also detailed. The adjusted R^2 for Argentina, India, Jordan, Nigeria, the US and Venezuela are negative. The Philippines has the highest adjusted R^2 of 11 percent.

The world excess return beta is significant in explaining the returns for Mexico only and the rest of the sample show insignificant effects in terms of the impact of the world excess return. The yield between the Moody's Baa and Aaa bond rates (spread) beta is statistically significant in seven markets, and for Chile and the world market at a

10 percent level of significance, and for EAFE, Japan, Korea, the Philippines and Thailand at a 5 percent level of significance. The US 90 day Treasury bill rate beta is significant at a 5 percent level for Japan Korea, Malaysia, Philippines and Thailand in the prediction of returns. The world dividend yield is insignificant for all the countries except for Greece. The constant is significant at a 5 percent level in the Philippines only. The world market portfolio betas have little influence on the expected returns in the emerging markets.

TABLE II: Regressions of country excess returns on the common instrumental variables

The regressions are based on monthly data from 1985:2 -2000:7 The county returns are calculated in U.S. dollars in excess of the holding period return on the treasury bill that is closest to 90 days to maturity. The equity data are from Standard and Poor Emerging Markets Price indices. The t-statistics are in brackets. The model estimated is:

$$r_{j,t} = \delta_{j,0} + \delta_{j,1} wlss_{t-1} + \delta_{j,2} spread_{t-1} + \delta_{j,3} ustb90_{t-1} + \delta_{j,4} wldy_{t-1} + \varepsilon_{j,t}$$

The instrumental variables are: a constant, the excess return on the world index (Wlss) US 90-day treasury bill rate (ustb90), the yield on Moody's Baa rated bonds less the yield on Aaa rated bonds (spread) and the dividend yield on the Standard and Poor's 500 sock index less the return on a 90day bill.

	δ_0	δ_1	δ_2	δ_3	δ_4	R^2
Portfolio	Constant	Wlss (-1)	Spread (-1)	Ustb90 (-1)	Wldy (-1)	
Argentina	0.053	0.278	-6.833	-8.546	18.554	0.012
	[1.0750]	[0.8316]	[-0.6756]	[-0.9512]	[0.9613]	
Brazil	0.022	0.270	-4.663	1.595	0.834	0.006
	[0.6422]	[1.1343]	[-0.6466]	[0.2489]	[0.0606]	
Chile	0.021	0.146	4.421	3.926	8.435	0.040
	[1.3035]	[1.3286]	[-0.4045]	[-2.5602]**	[2.2078]**	
Czech	0.260	0.245	-14.183	-38.987	-25.551	0.056
	[1.3561]	[0.9215]	[-0.4902]	[-1.5199]	[-0.9133]	
EAFE	-0.023	0.009	9.010	-5.822	-0.240	0.046
	[0.2973]	[0.2025]	[1.3570]	[-3.1711]	[1.2981]	
Greece	0.046	0.069	-1.141	-2.490	-8.104	0.028
	[2.2397]**	[0.4928]	[-0.2689]	[-0.6605]	[-1.0007]	
Hungary	0.244	0.365	-14.147	-33.369	-20.087	0.034
	[1.0019]	[0.9863]	[-0.5595]	[-1.0509]	[-0.6304]	
India	0.001	0.167	-1.434	0.239	3.824	0.008
	[0.0558]	[1.4264]	[-0.4049]	[0.0758]	[0.5661]	
Indonesia	-0.076	0.393	25.370	-25.065	9.925	0.057
	[-0.8961]	[1.1972]*	[1.5733]	[-1.8104]*	[0.4211]	
Japan	-0.042	0.018	15.923	-10.219	-3.531	0.066
	[-0.9656]	[0.2005]	[2.3455]**	[-2.8744]**	[0.6821]	
Jordan	0.004	0.052	-4.401	-0.692	11.277	0.028
	[0.4251]	[0.7273]	[-1.9605]*	[-0.3356]	[2.5036]**	
Korea	-0.018	0.007	9.934	-9.839	1.891	0.024
	[-0.7926]	[0.0446]	[2.1054]**	[-2.3478]**	[0.2100]	
Malaysia	-0.021	-0.092	12.252	-16.841	8.831	0.039
	[-0.5494]	[-0.5066]	[1.6036]	[-2.2706]**	[0.5869]	
Nigeria	0.033	0.134	-9.089	2.183	5.582	0.005
	[0.5842]	[0.4957]	[-0.7978]	[0.1974]	[0.2488]	
Philippines	-0.085	0.214	22.648	-22.070	22.303	0.129
	[-2.2575]**	[1.1852]*	[2.9773]**	[-2.9886]**	[1.4887]	
Poland	0.047	0.290	-43.652	-0.263	-18.702	0.010
	[0.2093]	[0.6601]	[-0.2740]	[-0.0070]	[-0.5302]	
South Africa	0.077	-0.393	-3.738	-24.958	17.925	0.053
	[0.5353]	[-1.4572]	[-0.0382]	[-1.0184]	[0.8279]	
Thailand	-0.036	-0.041	10.866	-15.736	16.437	0.058
	[-1.6397]	[-0.2733]	[2.4112]**	[-3.9326]	[1.9121]*	
Turkey	0.014	0.524	-8.747	19.115	-16.340	0.028
	[0.1712]	[1.5399]	[-0.5460]	[1.3995]	[-0.5922]	
USA	0.009	-0.063	2.389	-3.917	-2.318	0.022
	[0.9845]	[-1.0013]	[1.2558]	[0.9084]	[0.2502]	
Venezuela	-0.069	-0.209	11.563	5.612	-10.691	0.014
	[-1.2960]	[-0.8148]	[1.0691]	[0.5345]	[-0.5019]	
World	0.005	-0.026	3.052	-5.271	3.079	0.038
	[0.5364]	[-0.4366]	[1.7152]*	[-3.3349]**	[0.9068]	
Zimbabwe	0.020	0.200	-3.965	-3.628	9.374	0.015
	[0.8454]	[1.2445]	[-0.8142]	[-0.8387]	[1.0088]	

Table III: International Evidence of on the Predictability of Equity Returns Using Common and Country Specific Instrumental Variables

The country returns are calculated in U.S. dollars in excess of the holding period on the U.S Treasury bill that is closest to 90-day maturity. The equity data are from Standard and Poor's Emerging Market Price Indices. The regressions are estimated with eight different sets of conditioning information. The instrumental variables are: excess world returns ($wlss_{t-1}$), U.S 90-day treasury bill rate ($ustb90_{t-1}$), the yield on the Moody's rated bonds less the yield on Aaa rated bonds ($spread_{t-1}$), the U.S dividend yield in excess of the 90 day treasury bill rate ($wldy_{t-1}$), the equity return for each country (Rjt_{t-1}), the dividend yield for each country (Ldy_{t-1}), The return on the US exchange rate for each country (Ex_{t-1}) level of short term interest rates in each country (Lir_{t-1}).

	Z_{t-1} (1) C, Wlss (t-1) Spread (t-1), Ustb90 (t-1), Wldy (t-1)	Z_{t-1} (2) C, Rjt (t-1) Spread (t-1), Ustb90 (t-1), Wldy (t-1)	Z_{t-1} (3) C, Rjt (t-1), Spread (t-1), Ustb90 (t-1), Ldy (t-1)	Z_{t-1} (4) C Rjt (t-1) Spread (t-1), Ustb90 (t-1), Ldy (t-1), Wldy (t-1)	Z_{t-1} (5) C Rjt (t-1) Spread (t-1), Ustb90 (t-1), Ldy (t-1), Ex (t-1)	Z_{t-1} (6) C Rjt (t-1) Spread (-1) Ustb90 (t-1), Ldy (t-1), Lir (t-1)	Z_{t-1} (7) C Rjt (t-1) Spread (t-1), Lir (t-1), Ldy (t-1)	Z_{t-1} (8) C, Rjt (t-1), Ldy (t-1), Lir (t-1) Ex (t-1)
Argentina	-0.018	-0.011	-0.012	-0.016	0.041	-	-	-
Brazil	0.004	-0.012	-0.018	-0.018	-0.035	-0.091	0.074	-0.067
Chile	0.055	0.072	0.080	0.064	0.078	-0.026	-0.035	-0.038
Czech	0.005	0.014	-0.009	-0.025	-0.021	0.007	-0.050	-0.055
Greece	0.009	0.011	-0.005	0.013	-0.004	-0.018	0.010	-0.017
Hungary	-0.018	-0.032	-0.045	-0.045	-0.050	-0.060	-0.045	-0.035
India	-0.014	-0.007	0.007	0.004	0.006	0.025	-0.003	0.003
Indonesia	0.011	0.054	0.060	0.051	0.065	0.055	0.035	0.014
Jordan	-0.004	-0.004	-0.013	-0.008	0.007	-	-	-
Korea	0.011	0.041	0.043	0.038	0.050	0.023	0.030	-0.001
Malaysia	0.018	0.025	0.037	0.036	0.042	0.065	0.024	0.103
Mexico	0.034	0.082	0.101	0.096	-0.015	0.066	0.028	0.030
Nigeria	-0.017	-0.019	-0.019	-0.025	-0.050	-	-	-
Philippines	0.110	0.160	0.176	0.179	0.165	0.171	0.153	0.140
Poland	-0.044	-0.019	-0.011	-0.018	-0.024	-0.012	0.000	-0.013
South Africa	0.001	-0.009	0.101	0.197	0.092	0.289	0.300	0.290
Thailand	0.044	0.052	0.044	0.049	0.055	0.050	0.040	0.025
Turkey	0.0017	0.003	0.039	0.044	0.044	-	-	-
Venezuela	-0.007	-0.011	-0.012	-0.018	0.016	0.023	0.027	0.021
Zimbabwe	0.010	0.085	0.089	0.084	0.080	0.097	0.102	0.099

4.4 Predictability of returns using common and local instrumental variables

Table III presents the results of international evidence on the predictability of returns using common and country specific instrumental variables. Zt-1 (1) comprises the common instrument set, that is, world excess returns, US 90 day treasury bill rate, the spread between the Moody's Baa and Aaa bond rates, and the world dividend yield. In Zt-1 (2) the world excess return is replaced by the country excess return. Zt-1 (3) uses the same variables as in (2) but substitutes the world dividend yield with the country dividend yield. Zt-1 (4) uses the same variables as in (3) plus the world dividend yield. Zt-1 (5) uses the same variables as in (3) plus returns on the US exchange rate us returns on the US exchange rate for each country. Zt-1 (6) comprises the country excess return index, local dividend yield, local interest rate and the US 90day Treasury bill rate. Zt-1 (7) uses the country excess return, local short-term interest rate and the spread as in Zt-1 (1). Zt-1 (8) uses all local instruments, excess returns, local short-term interest rates, and the local dividend yields. Columns Zt-1 (2) to Zt-1 (7) have mixed variables for common and local variables.

Argentina, Jordan, Nigeria and Turkey did not have a local interest variable available in the data and therefore use the return on the exchange rate local dividend yield and the country excess return as the local information set. The adjusted coefficients of determination, in columns Zt-1 (2)-Zt-1 (4) do not show any statistical significance for Argentina. However, column Zt-1 (5) contains three local variables for Argentina, and there is a modest improvement on the adjusted R^2. For Jordan, the R2 improves substantially when Zt-1 (5) is used although it is not significant. Nigeria's R^2 remains negative although it improved slightly when Zt-1 (5) is used. Turkey also exhibits the effect of local instrument set.

The effect of the explanatory power increase in 14 of the regressions when column Z_{t-1} (1) and Z_{t-1} (5) with three local information variables and two common instruments are compared. In the other six markets, the R^2 decreases substantially showing no explanatory power at all. Column Z_{t-1} (6) shows the effect of the local short-term interest rates. In 12 of the countries, the R^2 is better than the regressions of the first column. However, if it is compared to column Z_{t-1} (5) it appears that the local interest rate has more explanatory power than the exchange rate variable. For example, the Czech Republic, India, Malaysia, Mexico, Philippines, South Africa and Zimbabwe the R^2 increased substantially.

In column Z_{t-1} (7), nine of the regressions show an explanatory power which is better than that of the common instrument regressions. The last column contains regressions of local variables only and some interesting results follow. The markets that are more integrated with world markets have a low and negative R^2 for example; Brazil, Mexico, Chile, Greece, Korea and Thailand. Those markets that are more isolated have a higher R^2 indicating the effect of local variables.

4.5 Conditional Asset Pricing with Time Varying Moments

Table V presents the results of estimating equation (7), which allows for time variation in expected returns, condi-

tional covariance and conditional variance. Tests of the asset pricing restrictions are provided for individual countries. The hypothesis that the world market portfolio is conditionally mean variance efficient is tested. The conditional variances are presented in column 2 of table V. We do not present the results for the six countries with a shorter observation period.

The $?^2$ test provides a test of the model's restrictions: a high chi-squared statistic indicates poor fit and a low one indicates a good fit. Three sets of instruments variables are used, the common set, the local instrument A comprising the common instrument set plus the local dividend yields; and local instruments B include the local excess return in place of the world excess return. The model is rejected by Malaysia using the common instrument set and local instrument set A. Argentina, Greece, Korea and Thailand reject the model at 5 percent level of significance when local instrument set B is used. Indonesia rejects the model using the common instrument
set.

The adjusted coefficients of determination (R^2) which are the result of regressing the model's errors on the common information variables are shown in column six of table 1V. A small R^2 indicates that the model fits well. The R^2 are low for 15 countries in the samples. This suggests that the ratio of mean to variance is time varying.
Indonesia and Malaysia have high-adjusted R^2 and they reject the model in the overidentifying restrictions test using a common instrument set.

TABLE IV: Estimation of a Conditional CAPM with Time Varying Expected Returns Conditional Covariances and Conditional Variances

The following system of equations is estimated with the generalized method of moments: =

$$\begin{pmatrix} [r_t - z_{t-1}d]' \\ [r_{mt} z_{t-1} d_m]' \\ [u_{mt}^2 z_{t-1} d - u_{mt} u_t z_{t-1} d_m]' \end{pmatrix}'$$

where r_m is the excess return on the world portfolio, δ represents the coefficients associated with the instrumental variables, u is the forecast error for the country returns, u_m is the forecast error for the world market return and h represents the deviation of the country returns from the model's expected returns. There are three instrumental variable sets Z that are used in the estimation. The common set instrumental variables are: a constant, the excess returns on the world index, US 90-day Treasury bill rate , the yield on the Moody's Baa rated bond less the yield on the Aaa rated bonds and the dividend yield on the Standard and Poor's 500 stock index less the return on the 90 day bill. The local instrument set A is the common set instruments plus the country specific dividend yield. Instrument set B is the same as set A but the world excess return is replaced by the country specific excess returns.

Portfolio	Average Returns	Average Conditional Covariance	Average Error	Average Absolute Error	R^2	Common Instruments χ^2 [p-value]	Local Instruments: A χ^2 [p-value]	Local Instruments: B χ^2 [p-value]
Argentina	0.0127	0.466426	0.004461	0.125911	-0.016	6.09 [0.2977]	2.21 [0.8990]	13.09 [0.0416]
Brazil	0.0059	1.965704	0.007607	0.130755	-0.005	6.14 [0.2921]	6.58 [0.3619]	5.32 [0.5038]
Chile	0.0175	0.859373	-0.00163	0.063683	0.051	7.75 [0.1708]	0.49 [0.9979]	9.52 [0.1462]
EAFE[a]	0.0072	1.9426	0.0005	0.0390	0.0035	5.73 [0.3330]		
Greece	0.0132	1.0644	0.0053	0.0754	0.0066	6.67 [0.2460]	7.24 [0.2580]	14.29 [0.0270]
India	0.0040	-0.1412	0.0019	0.0738	-0.0156	2.53 [0.7720]	7.68 [0.2628]	4.34 [0.6311]
Japan[a]	0.0038	2.2136	-0.0039	0.0555	-0.0056	4.88 [0.4304]		
Jordan	0.0005	0.2168	0.0005	0.0332	-0.0098	3.89 [0.5659]	5.92 [0.4323 4]	4.63 [0.5915]
Korea	0.0038	1.4794	-0.0107	0.0806	0.0045	6.23 [0.2794]	7.16 [0.3064]	10.14 [0.1188]
Malaysia	-0.0003	1.7963	-0.0004	0.0736	0.0166	19.37 [0.0016]	18.56 [0.0049]	5.28 [0.5080]
Mexico	0.0137	2.0859	-0.0024	0.0894	0.0306	6.06 [0.3004]	4.52 [0.6064]	3.97 [0.6810]
Nigeria	-0.0011	0.4198	-0.0015	0.0714	-0.0197	2.48 [0.7802]	0.73 [0.9938]	0.70 [0.9943]

a The local variables for EAFE , Japan and USA were not available on the DataStream bank and therefore the χ^2 for these countries could not be estimated.

Portfolio	Average Returns	Average Conditional Covariance	Average Error	Average Absolute Error	R^2	χ^2	Common Instruments χ^2 [p-value]	Local Instruments: A χ^2 [p-value]	Local Instruments: B [0.4412] [p-value]
Thailand	0.0010	1.9739	0.0280	0.0923	0.0523		5.75 [0.3306]	4.39 [0.6237]	10.57 [0.1026]
Venezuela	0.0035	0.2081	0.0019	0.0999	-0.0054		3.67 [0.6132]	3.39 [0.6407]	2.48 [0.8504]
Zimbabwe	0.0080	0.6294	-0.0134	0.0737	0.0044		3.42 [0.6348]	4.14 [0.6581]	8.26 [0.2200]

5. CONCLUSION

Our results show that the asset return behaviour in emerging markets is changing even though it differs from country to country. Ostensibly, some markets became more integrated with the world markets while others become more segmented in recent times. In most markets in the sample, correlations with developed markets increased. The increase in integration has possibly been due to rising capital flows from developed markets. Further, they are working hard to become part of the economic regional groups, for instance European markets like Greece, Hungary, the Czech Republic and Poland are working hard to be in the European Union. Mexico is now part of the North American Free Trade Agreement.

In some of the emerging markets such as Zimbabwe, Jordan Venezuela and Nigeria, the markets have become more segmented and isolated from the world markets.

The predictability of returns using common instruments suggests evidence of time varying expected returns. Further, the hypothesis that conditional mean returns are constant is rejected. Markets with high capitalizations and high correlations with world markets are affected more by world factors than local factors. Most markets in Asia, Latin America and Europe are integrated with the world economy. However, South Africa, is influenced more by local factor than world factors. In the cases of the markets which are segmented, local factors still play an important role in asset pricing.

Tests using the ? ^{2} statistic indicate that only one country with a long observation period, Malaysia; rejects the model using world factors.

REFERENCES

Bollerslev, T., R.F. Engle, and J.M. Woodridge. 1988. Capital Asset Pricing Model with Time Varying Covariance, *Journal of Political Economy* 96 116-31.

Campbell, J.Y., and R. Shiller. 1988. the Dividend Price Ratio and Expectation of Future Dividend and Discount Factors, *Review of Financial Studies* 1 195-228.

Fama, E., and K. French. 1988. Dividend Yields and Expected Stock Returns, *Journal of Financial Economics* 22 3-26.

Fama, E., and G. W. Shwert. 1977. Asset Returns and Inflation, *Journal of Financial Economics* 5 115-146

Hansen, L. P. 1982 Large Sample Properties of Generalized Methods Moments Estimators, *Econometrica* 50 1029 – 1054

Harvey, R. C., and G. Bekaert. 1997. Emerging Equity Market Volatility, *Journal of Financial Economics* 43 29-77.

Harvey, R. C. 1991. The world price of covariance risk *Journal of Finance* 46 111-157.

Harvey, R. C. 1989. Time-Varying Conditional in the Test of Asset Pricing Models, *Journal of Financial Economics* 24 289-317.

Keim, D., and R.F. Stambaugh. 1986. Predicting Returns In The Stock Markets And Bond Markets. *Journal of Financial Economics* 17 357-390.

Lintner, J. 1965. The valuation of risk assets and the selection of risky investments in portfolios and capital budgets. *Review of Economics and Statistics* 47 13-37.

Rozeff, M., 1984. Dividend Yields Are Equity Risk Premium *Journal of Portfolio Management*, 68-75.

Sharpe, W.F. 1964 Capital asset prices: A Theory of Market Equilibrium under Condition of Risk. *Journal of Finance* 19, 425-442.

Schwert, G. W., and P.J. Seguin. 1990 Heteroskedasticity in stock returns. *Journal of Finance* 45 1129-1156.

DAVE ALLEN is Professor of Finance at Edith Cowan University in Perth, Australia (email: d.allen@ecu.edu.au).
JOCELYN CHIMHINI is a former postgraduate student at Edith Cowan University.