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Regime-Dependent Relationships among Stock Markets in Frankfurt, Vienna and Warsaw

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This paper analyzes short-run relationships between German, Austrian and Polish stock market indices using the Markov Switching VAR (MSVAR) model. The impulse response function is used as the main tool and reveals two market phases. The results are useful for investors; reactions to disturbances are complex and depend on the market phase and the considered pair of variables. There is also a theoretical analysis of the MSVAR model. The theoretical unconditional characteristics of the process driven by the MSVAR model are presented along with calculation techniques which can be applied to other models.

Key Words: Markov switching VAR, regime-dependent impulse response, stock markets, dynamic relationship
JEL Classification: F36, G15

Introduction

The interdependencies between international stock markets have been investigated in many papers. The financial crises which arose in October 1987 and September 2008 provide convincing evidence of the increasing interdependence of global stock markets. A knowledge of the mutual links between different stock markets is important for both investors and policy makers. The hedging and diversification strategies being used by market participants are closely tied to the nature and strength of these interrelationships. If two stock markets are strongly interrelated, it implies that a hedging strategy will not be simple and diversification opportunities will be considerably reduced. Additionally, links between stock markets have an effect on policy makers. They make regulatory policy more complex on the domestic market, because the shocks which come from global stock markets may have an impact on the domestic market, and in consequence a crisis can be 'imported.' Taking into account the importance of possible links, economists have focused on interdependencies

between particular stock markets. An important research problem is the question of how shocks spread to other stock markets (the contagion effect). Researchers have attempted to gain an insight into these processes and determine the factors which motivate these interactions. A knowledge of these mechanisms will provide better understanding of the contagion, hedging and diversification effects observed especially in times of financial crisis.

Underreaction to good news and overreaction to bad news are widely observed on financial markets and can imply that in times of crisis (the bear phase of a stock market) stock returns tend to be more dependent on each other than in optimistic times (the bull phase of a stock market). As regards the risk level of an international portfolio, investors in a bear market phase may lose the advantage of diversification i. e. international portfolios may be more risky than market participants suspect. This asymmetric interdependence is a source of rising diversification costs when it comes to foreign stocks.

The goal of this article is to examine the short-run interrelationships between the stock markets of Germany (the Frankfurt Stock Exchange, FSE), Austria (the Vienna Stock Exchange, VSE) and Poland (the Warsaw Stock Exchange, WSE) represented by their main indices: the DAX30, the ATX20 and the WIG20, respectively. The relationships between these three stock markets are of interest for the following reasons. Firstly, since Germany is the largest economy in the European Union, fluctuations in the real German economy have a significant impact on both Austria and Poland. Secondly, Germany is the prime trading partner of both Austria and Poland. Thirdly, the Vienna Stock Market represented by the ATX20 index is, for cultural, historical, geographical and economical reasons, closely associated with the German Stock Exchange. Moreover, the Vienna Stock Exchange is a local rival of the Warsaw Stock Exchange in Central and Eastern Europe. The Warsaw Stock Exchange represents an emerging stock market of an economy in transition, while the Frankfurt and Vienna stock markets represent well developed markets of different sizes. The VSE exhibits much lower capitalization than the FSE. The WSE and the VSE are similar in terms of capitalization. Taking into account the above reasons we expect that these stock markets are closely linked.

Contributions to date have not been concerned with possible structural breaks between bull and bear regimes in these stock markets. Further, many studies have provided evidence, that stock return characteristics and dynamic links between stock markets vary considerably during

bull and bear market phases. Ignoring these structural breaks may lead to incomplete or incorrect statistical results.

We have chosen the Markov switching vector autoregressive (MSVAR) model to describe the interdependence between these markets under study. We provide a complex analytical characterization of the unconditional distribution of the variable driven by the MSVAR model. We interpret the results and explain how parameter changes affect these characteristics. A convenient and illustrative method for presenting the strength and dynamics of an interrelation is to calculate the impulse response function (IRF). In the case of regime switching models, the regime-dependent IRF is used. We present two different approaches to the regime-dependent IRF. In our opinion this approach provides new insights into the issue of dynamic relationships between stock markets.

Especially we try to compare the strength and dynamics of interrelation between WSE (economy in transition) and VSE (developed economy) and their links to FSE. The empirical results, i. e. types and strength of links can serve as indicator of maturity level of WSE

The remainder of the paper is organized as follows. In the second section we give a literature overview about dependence concepts and empirical results. In the next section our main conjectures are formulated. In the fourth section we present the methodology applied. In the fifth section the dataset and empirical results are presented and discussed. The sixth section concludes the paper.

Literature Overview

The problem of evaluating the dependence structure between stock markets in a time of globalization is a very important topic. The interrelations between stock markets can be approximated through such variables as stock returns, trading volume and volatility. The simplest methodology in investigations of interdependencies is the causality notion and the Vector Autoregressive (VAR) model. Eun and Shim (1989) investigated relationships between nine large stock markets including those of Australia, Canada, France, Germany, Hong Kong, Japan, Switzerland, the UK and the US by means of the VAR model. They found that the US stock market had the predominant impact on other markets. Lin, Engle, and Ito (1994) checked the interdependence between returns and the volatility of the US and Japanese markets based on high frequency data (daytime and overnight returns). The result was that daytime returns in the US or Japanese market were related to each other's overnight returns.

Kim and Rogers (1995) studied the dynamic interdependence between the stock markets of the US, Japan and Korea using the multivariate GARCH model. The conclusion was that the Japanese and US stock markets increased their impact on the Korean stock market after its opening to foreign investors. Booth, Martikainen, and Tse (1997) using the EGARCH model, found strong interdependence among Scandinavian stock markets. Ng (2000) detected one way causality running from the US and Japanese stock markets to six Asian markets, including Hong Kong, Korea, Malaysia, Singapore, Taiwan and Thailand. Lee (comp. Sharkasi, Ruskin, and Crane 2005), by the wavelets technique, found that developed markets (the US, Germany and Japan) had effects on two emerging markets, those of Egypt and Turkey. Antoniou et al. (comp. Sharkasi, Ruskin, and Crane 2005) by the VAR-EGARCH model checked the interdependence between three EU markets: France, Germany and the UK. These results support the notion of cointegration between the stock markets of those countries.

Sharkasi, Ruskin, and Crane (2005) found global co-movements in seven stock markets, three in Europe (namely the Irish, the UK, and Portuguese), two in Americas (the US, and Brazilian) and two in Asia (Japanese and Hong Kong).

Nivet (1997) checked the random walk hypothesis for the Warsaw Stock Exchange. Worthington and Higgs (2004) were concerned with the efficiency of the Hungarian, Polish, Czech and Russian stock markets. The contributors established that only the Hungarian stock market followed the random walk. Gilmore and McManus (2003) found autocorrelations in some stock returns from Central and Eastern European stock markets. In Schotman and Zalewska (2006), the same observation followed from nonsynchronous trading and an asymmetric response to good and bad news.

Todea and Zaicas-Ienciu (2008) investigated the temporal persistence of linear and, especially, nonlinear links between six Central and Eastern European stock markets.

The method, based on extreme value theory, was conducted by Ang and Chen (2002). They drew the conclusion that regime-switching models were most suitable for asymmetry modeling. Regime switching models were introduced into econometrics by Hamilton (1989). Nowadays, they are widely applied in finance. Ang and Bekaert (2002a and 2002b), by the Gaussian Markov switching model, detected two regimes for international returns: a bull regime with a positive mean, low volatilities and

low correlations; and a bear regime with negative returns, high volatilities and correlations.

Patton (2004) detected a significant asymmetry in the dependence of financial returns. Jondeau and Rockinger (2006) applied the skewed-*t* GARCH model to returns with a univariate time-varying skewness and used a time-varying, a switching Gaussian, or a Student *t* copula. Hu (2006) suggested replacing the unconditional margins of a copula with conditional margins from univariate GARCH models. This led to a special case of the copula based multivariate dynamic (CMD) model. Klein, Köck, and Tinkl (2010) conducted an extensive simulation study. They suggested that the copula (mis) specification should play a key role before the adaption of a CMD model.

Rodriguez (2007) and Okimoto (2008) estimated regime-switching copulas for pairs of international stock indices. Okimoto (2008) investigated the US-UK pair. Rodriguez (2007) focused on pairs of Latin American and Asian countries. The authors used the two-variable system. Garcia and Tsafak (2008) estimated a regime-switching model in a four-variable system for domestic and foreign stocks and bonds. They used a mixture of bivariate copulas to model the dependence between studied variables. Chollete, Heinen, and Valdesogo (2009) applied the canonical vine copula, a new type of copula which could be applied to very general types of dependence.

However, there are two serious problems in using copulas. First of all, many of the copulas applied do not have moments that can be directly related to the Pearson correlation. In consequence, it is difficult to compare those results obtained using copulas to those of financial models based on correlations and variances. There is a more essential problem from a statistical point of view. It is not easy to choose a class of parametric copulas which properly fits a given dataset. Some classes of copulas model better near the center and others near the tails of any particular time series distribution. A possible extension to overcome this difficulty is to focus on different shapes of those copulas that are important from a finance perspective, and by using several specification tests which are common in time series analysis. Most contributors do not rigorously justify the choice of particular kinds of copulas.

In their interesting contribution, Qiao, Li, and Wong (2011) combined the multivariate Markov-switching-VAR model developed by Krolzig (1997) and the regime-dependent impulse response analysis technique by Ehrmann, Ellison, and Valla (2003). They investigated dynamic relation-

ships between the stock markets of the US, Australia and New Zealand. The contributors uncovered the existence of two different regimes in the three stock markets. They found that correlations among the three markets were significantly higher in a bear regime than in a bull regime. Moreover, the responses of each of the three markets to shocks in the other two markets were essentially stronger and more persistent in the bear regime than in the bull regime. The authors demonstrated that for the New Zealand stock market, the Australian stock market was more influential than the US stock market, and that for the Australian stock market, the US stock market was more influential than the New Zealand stock market. Our approach, briefly outlined in the introductory section, is somewhat related to that of Qiao, Li, and Wong (2011).

Main Conjectures

Taking into account the literature review, the size of the markets under study and economic reasoning, we can formulate some research hypotheses. As we pointed out earlier, the high level of capitalization in the FSE, its maturity and the size of the German economy imply that impulses coming from the FSE play a predominant role in the VSE and the WSE. Therefore we can expect that:

CONJECTURE 1 *The pairs of indices DAX-ATX and DAX-WIG are likely to be more correlated than the pair ATX-WIG. Moreover, these correlations in a bear phase are stronger than in a bull phase.*

The linkage between real economies and stock markets documented in theoretical and empirical studies and the observation that stock markets in a bear phase are more volatile than stock markets in a bull phase have motivated us to formulate the following:

CONJECTURE 2 *The depth of the recession in an economy will be reflected in the volatility level of its stock market.*

In line with the literature, the impulse response function is related to the market phase. Therefore we expect that:

CONJECTURE 3 *One standard deviation disturbance is higher in a bear market regime than in a bull market. Moreover, the response in the former is more persistent than in the latter.*

Taking into account that ATX and WIG are similar in capitalization we predict that:

CONJECTURE 4 *The responses of the* ATX *and* WIG *to one standard deviation disturbance of the* DAX *are at similar levels.*

In the next section of the paper we outline the methodological background.

Methodology

MARKOV SWITCHING VECTOR AUTOREGRESSION

Let S_t be a two-state unobservable Markov chain. Then, X_t defined by (1) is driven by a Markov Switching Vector Autoregression model with a lag of length p.

$$X_t = \begin{cases} \nu_1 + \sum_{i=1}^{p} A_i^1 X_{t-i} + Q_1 u_t & \text{if} \quad S_t = 1 \\ \nu_2 + \sum_{i=1}^{p} A_i^2 X_{t-i} + Q_2 u_t & \text{if} \quad S_t = 2 \end{cases} \tag{1}$$

where, for $j = 1, 2$, the intercept term is denoted by ν_j, for $i = 1, \ldots, p$, autoregression terms are denoted by A_i^j, disturbances are represented by $Q_j u_t$, where $u_t \sim N(0, I)$ and Q_j is a matrix generating the covariance matrix. Generalization of the model (1) to more than two regimes is possible, although in this article only two regimes are considered. Clearly, in this model the intercept term and the autoregression terms are regime dependent. Moreover, the variance-covariance matrix $\sum_j$ in the regime $j = 1, 2$ takes the following form:

$$\sum_j = E(Q_j u_t u_t' Q_j') = Q_j Q_j'. \tag{2}$$

Therefore the variance-covariance matrix is regime dependent. The hidden process S_t is specified by transition probabilities p_{ij}, where, for $i, j = 1, 2$,

$$p_{ij} := P(S_{t+1} = j | S_t = i). \tag{3}$$

All transition probabilities form a transition matrix P defined by:

$$P := \begin{bmatrix} p_{11} & p_{12} \\ p_{21} & p_{22} \end{bmatrix}, \tag{4}$$

where $p_{11} + p_{12} = p_{21} + p_{22} = 1$.

The estimation procedure for the model is conducted by the Expectation-Maximization (EM) algorithm. Firstly, the optimal inference $\xi_t := P(S_t = j)$ is estimated for chosen starting parameters in the expectation

step. Note that ξ_t is a two-dimensional vector. Formally, $\xi_{j,t}$ are being estimated using the Hamilton filter (see Hamilton 1990):

$$\widehat{\xi}_{t|t} = \frac{\widehat{\xi}_{t|t-1} \odot \eta_t}{1^T(\widehat{\xi}_{t|t-1} \odot \eta_t)}, \tag{5}$$

$$\widehat{\xi}_{t+1|t} = P^T \widehat{\xi}_{t|t}, \tag{6}$$

where η_t denotes the vector of the conditional density under both regimes, $\widehat{\xi}_{t|t} = (P[S_t = j|X_t])_{j=1,2}$ and $\widehat{\xi}_{t+1|t} = (P[S_{t+1} = j|X_t])_{j=1,2}$ the Hadamard's multiplication denoted by $\odot$ means the multiplication coordinate by coordinate.

Secondly, the optimal set of parameters, for the estimated ξ_t, is found in the maximization step. The Maximum Likelihood (ML) estimation in the case of Markov Switching VAR is equivalent to the Least Square estimation weighted by the estimated ξ_t. These steps are repeated until the parameters converge.

Note that, the estimation procedure, for $j = 1, 2$ provides us with estimates of variance-covariance matrices $\sum_j$, and matrices Q_j are chosen as lower triangular matrices fulfilling equation (2). Technically, we use the Cholesky-Banachiewicz algorithm to obtain the estimate of Q_j for an estimate of $\sum_j$, for $j = 1, 2$.

UNCONDITIONAL PROPERTIES OF A VARIABLE DRIVEN BY THE REGIME SWITCHING VAR MODEL

The descriptive statistics of the data illustrate the properties of those data in the most basic way. Moreover, the interpretation of the descriptive statistics is clear, so that using it for a preliminary analysis is convenient. The unconditional characteristics of a series driven by a particular model determine the descriptive statistics of its realization. It is desirable to have the possibility of modeling certain characteristics by the chosen model. For instance, financial time series are usually characterized by a negative skewness and relatively high kurtosis. The chosen model therefore should incorporate these characteristics into its unconditional distribution.

Clearly, the unconditional distribution of the process X_t defined in (1) is a mixed normal distribution. In particular, for some $Z_1 \sim N(\mu_1, \sum_1)$ and $Z_2 \sim N(\mu_2, \sum_2)$, unconditionally:

$$X_t = (2 - S)Z_1 + (S - 1)Z_2, \tag{7}$$

where S is a Bernoulli distributed variable representing the unconditional

MS state process, assuming that the MS process is ergodic, $P(S = 1) = \omega_1 = p_{21}/(p_{12} + p_{21})$ and $P(S = 2) = \omega_2 = p_{12}/(p_{12} + p_{21})$; for $i = 1, 2$; the conditional mean and the covariance matrix on being in state i is denoted by μ_i and $\sum_i$, respectively. Note that the mixture of normal distributions is not the same as a linear combination of normal distributions. In particular, the mixture of normal distributions is not normally distributed. We prove this statement in Appendix. It follows from the results in the Appendix that the distribution of the variable driven by model (1) is a mixture of normal multivariate distributions. The relation between the parameter $\mu_1, \mu_2, \sum_1, \sum_2$ set and the parameters of model (1) is presented in the Appendix. The margins of a multivariate mixed normal distribution have corresponding univariate mixed normal distributions. To be precise, the d-th coordinate of X_t is a variable whose distribution is a mixture of normal distributions $N(\mu_{d,1}, \sigma^2_{d,1})$ and $N(\mu_{d,2}, \sigma^2_{d,2})$, where the mean $\mu_{d,i}$ is the d-th coordinate of μ_i and $\sigma^2_{d,i}$ is the corresponding Schur complement of the matrix $\sum_i$ for $i = 1, 2$.

Combining the calculation results presented in the Appendix, for a given parameter set of model (1), we are able to calculate the theoretical characteristics of the realization. It is possible to obtain multivariate characteristics such as mean (see formula (20)) and covariance matrix (see formula (30)) and interesting univariate ones, like skewness (see formula (16)) and kurtosis (see formula (17)).

Clearly, it is more convenient to simulate a realization of the process and calculate characteristics based on this realization which will be precise enough if the simulation is long enough. However, the presented method is analytical and additionally illustrates how parameters affect skewness and kurtosis. For instance, the skewness (see formula (16)) is significantly negative for $\sigma_1^2 < \sigma_2^2$, $\mu_1 > \mu_2$ and $\omega_2 < \omega_1$. Let the first state correspond to a time of prosperity and the second to one of recession. Intuition, along with theoretical and empirical evidence confirm that the variance is higher in the latter, while the mean is higher in the former, and also that periods of prosperity last longer than those of crisis.

IMPULSE RESPONSE FUNCTION IN THE REGIME SWITCHING MODEL

The impulse response function (IRF) is a very convenient tool in measuring dependencies between financial variables. Intuitively, the IRF presents the influence of a disturbance in one variable on others. The

response Ψ_i^k to a disturbance in the k-th variable conditional on being in regime j during a whole period is defined by:

$$\Psi_j^k(h) := \left.\frac{\partial E_t X_{t+h}}{\partial u_t^k}\right|_{s_t=s_{t+1}=\cdots=s_{t+h}=j}, h > 0 \tag{8}$$

where u^t is the vector of zeros apart from the k-th element which is one. In the case of VAR, the IRF defined in (8) is estimated as follows:

$$\Psi_j^k(0) = \widehat{Q_j} u_0, \tag{9}$$

$$\Psi_j^k(h) = \sum_{i=1}^{max(h,p)} \widehat{A_i^j}^{h-i+1} \widehat{Q_j} u_0 \tag{10}$$

It is inadequate to use formula (8) in the case of a long time horizon or an insufficiently persistent regime process s_t. In this case, the path $s_t = s_{t+1} = \cdots = s_{t+h} = j$ is improbable. The IRF conditional on starting in a particular regime may be more informative value. The response to the disturbance in the k-th variable conditionally on starting in regime j, denoted by Ξ_i^k, is defined by:

$$\Xi_j^k(h) := \left.\frac{\partial E_t X_{t+h}}{\partial u_t^k}\right|_{s_t=j}, h > 0 \tag{11}$$

As in formulas (9) and (10), in the case of MSVAR, the IRF defined in (11) is estimated as follows:

$$\widehat{\Xi_j^k}(0) = \widehat{Q_j} u_0, \tag{12}$$

$$\widehat{\Xi_j^k}(h) = \sum_{i=1}^{max(h,p)} \sum_{J=(j_1=j,j_2,\ldots,j_h)\in\{1,2\}^h} p_{J|j_1=j} \left(\prod_{\nu=1}^{h-i+1} \widehat{A_\iota^{J\nu}} \right) \widehat{Q_J} u_o, \tag{13}$$

where $p_{J|j_1=j}$ denotes the probability of path J conditionall on starting at j. Note that in formulas (10) and (13), for $i < 1$ and $i > p$, matrix A_i^j equals 0.

The evaluation of error for an IRF, in the case of regime switching models, is carried out using the bootstrap method. In order to estimate the distribution of an IRF, the following five step procedure is to be repeated a sufficient number of times:

1. According to formulas (3) and (4), simulate the history of state process S_t, recursively. The elements of the transition matrix are replaced by the corresponding estimates.

TABLE 1 Descriptive Statistics for Percentage Logarithmic Weekly Returns

Item	DAX	ATX	WIG
Mean	0.2063	0.1380	0.1317
Median	0.4077	0.5449	0.1726
Std. dev.	3.2989	3.6951	3.4388
Skewness	−0.5303	−1.8996	−0.2956
Kurtosis	9.3951	18.2820	7.3598
Minimum	−18.8700	−34.1301	−19.9103
Maximum	19.8639	17.2196	19.7664

2. Following formula (1), simulate the history of endogenous variable X_t, recursively. Matrices occurring in (1) are replaced by the corresponding estimates.
3. For the generated process, conduct the estimation procedure presented below. The procedure yields new estimates of autoregression matrices $\{A_i^j\}_{i=1,\ldots,p}^{j=1,2}$, the covariance matrix for errors $\{\widehat{\sum_j}\}_{j=1,2}$, the transition matrix $\widehat{P}$ and the smoothed probabilities $\{\widehat{\xi_t}\}_{t=1,\ldots,T}$.
4. Using the same procedure as for the primary estimation, for $j = 1, 2$, calculate matrix $\widehat{Q_j}$ for matrix $\widehat{\sum_j}$ obtained in step 3.
5. Using formulas (9) and (10) or (12) and (13), calculate estimates of the IRF for the bootstrapped parameters obtained in steps 3 and 4.

The approximation of the distribution of the IRF consists of the N sets of estimates obtained in step 5, where N is the number of repetitions of the procedure.

Dataset and Empirical Results

DESCRIPTION OF THE DATA

The dataset consists of the prices of three stock market indices that is to say the German DAX30, the Austrian ATX20 and the Polish WIG20. Wednesday to Wednesday weekly returns are used in the analysis. Compared to daily returns, weekly return processes have lower autocorrelation and avoid the missing data problem. Moreover, VAR based models work better with smoother weekly data than with noisier daily data. This gives us a sample of 571 weekly returns from January 2003 to December 2013. We apply continuous logarithmic percentage returns.

Firstly, we present some descriptive statistics in table 1.

In the period under study we observe positive means in all three indices. The relatively high absolute value of median and negative skewness suggest asymmetries in these time series. As we stated in the previous section and calculated in the Appendix, model (1) can generate a process with negative skewness and large kurtosis.

MARKOV SWITCHING VAR ESTIMATION RESULTS

Following the notation presented in (1), the estimation results of autoregressive matrices and covariance matrices for the data are presented in table 2. The estimation procedure provides us with two regimes of the VAR model of order two, this order being chosen due to information criteria. In fact, the information criteria for three lags are similar to those of two lags, although it is more convenient to present and interpret VAR estimates of order two. We have conduct a complete analysis of the MSVAR of order three and the conclusions appear to be similar.

The first regime, estimates of which are presented on the left side of table 2, is characterized by negative means for every index, and high volatility. Conversely, the second regime (right side of table 2) is characterized by positive means and relatively small volatility. Additionally, in table 3, we present correlations of the series in both regimes. The correlations are higher in the first regime for all three pairs. These properties clearly describe a bull market (the second regime) and a bear market (the first regime).

There is little point, in terms of information, in analyzing all differences between the parameters sets in the two regimes. We observe similar signs in the majority of autoregression parameters (coefficients of the A matrices) for both regimes. The analysis of the impulse response function presented in the next section is far more practical and informative. An interesting finding is that the highest volatility in the second regime is found for the WIG return process, while it is the least volatile variable in the first regime. A possible explanation of this unexpected finding is that during this whole period, the rate of growth in Poland was positive, while in Germany and Austria there was a recession (especially in 2009).

The stationarity of residual series is essential in IRF analysis. We have performed Augmented Dickey-Fuller (ADF) test and Kwiatkowski-Phillips-Schmidt-Shin (KPSS) test for each residual of the estimated model. Both tests confirm stationary of residuals, the null hypothesis of ADF test is rejected on any reasonable significance level for each of the

TABLE 2 Estimation Results of the Regime

Item	Bear market regime			Bull market regime		
	DAX	ATX	WIG	DAX	ATX	WIG
ν_j	−0.0006	−0.0022	−0.0007	0.0035	0.0026	0.0025
A_1^j	−0.2723	0.1295	−0.2022	−0.1441	−0.0613	−0.1389
	0.0274	−0.1736	0.3020	0.0562	−0.0462	0.2330
	0.1748	0.1181	−0.0355	0.0491	0.1950	−0.0609
A_2^j	0.1074	0.0094	0.0826	0.0384	0.1465	0.0906
	0.1082	0.1153	0.1829	−0.0151	−0.0561	−0.0038
	−0.2351	−0.1816	−0.3195	0.0139	0.0166	−0.0946
σ_j^2	0.0021	0.0027	0.0018	0.0004	0.0005	0.0006

NOTES ν_j is the intercept term, A_1^j and A_2^j denote the first and second lag autoregression matrices, respectively; and σ_j^2 is the diagonal of the variance-covariance matrix, where j denotes the regime.

TABLE 3 Regime Dependent Correlations

Item	DAX-ATX	DAX-WIG	ATX-WIG
First regime	0.7341	0.6938	0.6006
Second regime	0.6356	0.5292	0.5168

NOTE Correlations of the variance-covariance matrix in both regimes.

three variables. The null hypothesis for the KPSS test is not rejected on 5%-significance level for any residual.

IMPULSE RESPONSE FUNCTION ANALYSIS

Responses to DAX impulses are the most important from a practical point of view. The German stock market is much bigger and much more important than the two other markets. The impulse response functions in both regimes are essentially different. The one standard deviation disturbance is much higher in the first regime. The values of the impulse response functions are even more significant. Moreover, the period in which the response is significant is longer in the first regime. The response of the ATX in the first regime is positive in the first week after a DAX disturbance and even stronger in the second week. In the second regime, the second week response of the ATX to DAX disturbance is lower than the first week and close to zero. In the case of the WIG, we observe an interesting relationship in the first regime. After the positive first week response, there is a negative one, with relatively high abso-

TABLE 4 Confidence Interval of the Impulse Response Function in the First Regime

Item	Endpoint	0	1	2	3	4
DAX	Upper	0.0573	−0.0053	0.0110	0.0035	0.0024
	Lower	0.0351	−0.0167	−0.0009	−0.0006	0.0000
ATX	Upper	0.0000	0.0090	0.0060	0.0027	0.0013
	Lower	0.0000	−0.0029	−0.0035	−0.0007	−0.0001
WIG	Upper	0.0000	0.0065	−0.0004	0.0010	0.0010
	Lower	0.0000	−0.0027	−0.0044	0.0002	0.0000

NOTE Upper and lower endpoint of the 90% confidence interval of the impulse response function in the bear market regime.

TABLE 5 Confidence Interval of the Impulse Response Function in the Second Regime

Item	Endpoint	0	1	2	3	4
DAX	Upper	0.0223	−0.0011	0.0045	0.0021	0.0011
	Lower	0.0156	−0.0092	−0.0002	0.0000	0.0000
ATX	Upper	0.0000	0.0047	0.0026	0.0017	0.0004
	Lower	0.0000	−0.0012	−0.0018	−0.0002	0.0000
WIG	Upper	0.0000	0.0041	0.0022	0.0010	0.0004
	lower	0.0000	−0.0019	−0.0004	−0.0004	0.0000

NOTE Upper and lower endpoint of the 90% confidence interval of the impulse response function in the bull market regime.

lute value, in the second week. In the second regime, the ATX and WIG respond similarly to DAX disturbances. The IRF of the DAX to itself is similar in both regimes with unsurprising dynamics. The return series tends to correct itself, a positive disturbance causing a negative outcome in the following week and a positive one in the next. Each absolute value is lower than the preceding one. Applying the bootstrap procedure presented in the previous section, we obtain 90%-confidence intervals of the impulse response to the DAX. We re-sample the series 10,000 times by the bootstrap procedure and each series 571 in the length, the same as the original data. Tables 4 and 5 summarize the results of the IRF.

The impulse response analysis can provide investors with very valuable short-run prognoses. In a time of prosperity (the second regime), the impulse response function process is in line with economic expectations. Apart from the significant difference in values for both regimes, we observe an unexpected IRF path. In particular, it is possible that a pos-

itive disturbance causes another variable to have negative values in the future.

The estimated switching process is not very persistent, following the notation presented in (3), $p_{11} = 0.82$ and $p_{22} = 0.89$. However, the expected time for shifting is nearly 6 in the first regime and greater that nine in the second regime. The expected time for shifting d_j in the regime j, for $j = 1, 2$, equals $1/(1 - p_{jj})$. In table 5, we see that the IRF for lags greater than 3 diverges insignificantly from zero, so that the IRF defined in (11) is similar to the IRF defined in (8), so we have not presented these results.

Concluding Remarks

Empirical results for German, Austrian and Polish markets provide evidence that in a bear market regime correlations among pairs of indices are essentially stronger that in a bull market regime. In addition, these correlations depend on the size of markets. They are more pronounced in the case of the pairs ATX-DAX and WIG-DAX than the ATX-WIG. These findings are in line with the first conjecture.

The financial literature indicates that changes in volatility depend on events which are important to a particular stock market. In addition, negative information in announcements is the source of higher volatility than release of positive information. Moreover, it is well known that emerging stock markets are characterized in general by high volatility, so it is not surprising that the highest volatility in the second regime was estimated for WIG returns. However, WIG is the least volatile index in the first regime. At first sight, this finding contradicts the common conviction, widely represented in the financial literature, that the more mature the market, the lower the volatility. In order to explain this observation, we have to take into account that during this whole analyzed period, the rate of growth of the Polish economy was positive, while in Germany and Austria there was a recession (especially in 2009). This fact is a possible reason for the surprising ranking of the volatilities of markets under study in the bear phase. These findings support the second research hypothesis.

Impulse response functions in both regimes are essentially different. The first observation is that one standard deviation disturbance is much higher in the first regime. In addition, the persistence of the impulse response is more pronounced in this regime. This observation supports the third conjecture. The response of the ATX in the first regime is positive in the first week after a DAX disturbance and it is even stronger in the second week. By contrast, in the second regime, the second week re-

sponse of the ATX to the DAX is lower than that of first week, and very close to zero. In the case of the WIG, see an interesting relationship in the first regime. After a positive first week response, there is a negative and relatively high in absolute value one in the second week. In the second regime, the response of the WIG is very similar to the response of the ATX to DAX disturbances. These findings are only partly in line with the fourth conjecture.

To summarize, these results indicate the predominant role of the DAX index among the three markets. Most results are in line with expectations. However, some of them, for instance, the ranking of volatilities in the first (bear market regime), are surprising. The impulse response function is shown to be an important complementary tool in the testing of market reactions to shocks on both domestic and foreign markets, which is done in the short run context in this contribution. This tool may be essential with respect to the prediction of the very important contagion effect on financial markets especially in a bear phase of world stock markets. Another important issue is the assessment of persistency and under- and overreaction related to the market phase.

The last but not least important result (see the Appendix) is the theoretical unconditional distribution of a process driven by the Markov switching VAR model. We calculated unconditional mean, variance, skewness and kurtosis for the margins of the process. The results illustrate how the parameters of the MSVAR model affect unconditional characteristics and prove that within this model it is possible to model asymmetric variables with unlimited kurtosis. The results can be used to calculate theoretical unconditional characteristics. Having said that, we find it rather inconvenient and prefer to perform calculations using the Monte Carlo Method.

Appendix

Let us compute the mean, variance, and third and the fourth central moments of variable with a mixed univariate normal distribution. Let $X = (2 - S)Z_1 + (S - 1)Z_2$, where $Z_1 \sim N(\mu_1, \sigma_1)$ and $Z_2 \sim N(\mu_2, \sigma_2)$. We use a notation: $P(S_t = 1) = \omega_1$ and $P(S_t = 2) = \omega_2$, such that $\omega_1 + \omega_2 = 1$. In the case of model (1), following notation (3), $\omega_1 = p_{21}/(p_{12} + p_{21})$ and $\omega_2 = p_{12}/(p_{12} + p_{21})$.

$$E(X) = E(E(X|S)) = \omega_1 E(X|S = 1) + \omega_2 E(X|S = 2) = \omega_1\mu_1 + \omega_2\mu_2.$$

Let us denote the mean by μ, thus $\mu := \omega_1\mu_1 + \omega_2\mu_2$ and for $i = 1, 2$, the conditional variable $X_i := (X|S = i)$. The j-th central moment of variable

X is computed as follows:

$$\begin{aligned}
E((X-\mu)^j) &= E(E((X-\mu)^j|S)) = \omega_1 E((X-\mu)^j|S=1) \\
&\quad + \omega_2 E((X-\mu)^j|S=2) \\
&= \omega_1 E((X-\mu_1+\mu_1-\mu)^j|S=1) \\
&\quad + \omega_2 E((X-\mu_2+\mu_2-\mu)^j|S=2) \\
&= \omega_1 \sum_{k=0}^{j} \binom{j}{k} (\mu_1-\mu)^{j-k} E((X_1-\mu_1)^k) \\
&\quad + \omega_2 \sum_{k=0}^{j} \binom{j}{k} (\mu_2-\mu)^{j-k} E((X_2-\mu_2)^k).
\end{aligned}$$

Therefore, the variance takes the following form:

$$\begin{aligned}
D^2(X) = E((X-\mu)^2) &= \sum_{i=1}^{2} \omega_i \sum_{k=0}^{2} \binom{2}{k} (\mu_i-\mu)^{2-k} E((X_i-\mu_i)^k) \\
&= \sum_{i=1}^{2} \omega_i ((\mu_i-\mu)^2 + 0 + E((X_i-\mu_i)^2)) \\
&= \omega_1(\omega_2^2(\mu_1-\mu_2)^2 + \sigma_1^2) + \omega_2(\omega_1^2(\mu_2-\mu_1)^2 + \sigma_2^2 \\
&= \omega_1\sigma_1^2 + \omega_2\sigma_2^2 + \omega_1\omega_2(\mu_1-\mu_2)^2.
\end{aligned}$$

The third central moment is computed as follows:

$$\begin{aligned}
E((X-\mu)^3) &= \sum_{i=1}^{2} \omega_i \sum_{k=0}^{3} \binom{3}{k} (mu_i-\mu)^{3-k} E((X_i-\mu_i)^k) \\
&= \sum_{i=1}^{2} \omega_i ((\mu_i-\mu)^3 + 0 + 3(\mu_i-\mu)E((X_i-\mu_i)^2) + 0) \\
&= \omega_1\omega_2((\omega_1+\omega_2)(\omega_2-\omega_1)(\mu_1-\mu_2)^3 \\
&\quad +3\,(\mu_1-\mu_2)(\sigma_1^2-\sigma_2^2)) \\
&= \omega_1\omega_2(\mu_1-\mu_2)((\omega_2-\omega_1)(\mu_1-\mu_2)^2 \\
&\quad +3\,(\sigma_1^2-\sigma_2^2)).
\end{aligned}$$

Finally, let us compute the fourth central moment:

$$E((X-\mu)^4) = \sum_{i=1}^{2} \omega_i \sum_{k=0}^{4} \binom{4}{k} (\mu_i-\mu)^{4-k} E((X_i-\mu_i)^k)$$

$$
\begin{aligned}
&= \sum_{i=1}^{2} \omega_i((\mu_i-\mu)^4 + o + 6(\mu_i-\mu)^2 E((X_i-\mu_i)^2 \\
&\quad + o + E((X_i-\mu_i)^4)) \\
&= \sum_{i=1}^{2} \omega_i((\omega_{1-i}(\mu_1-\mu_2))^4 \\
&\quad + o + 6(\omega_{1-i}(\mu_1-\mu_2))^2\sigma_i^2 + o + 3\sigma_i^4) \\
&= 3\omega_1\sigma_1^4 + 3\omega_2\sigma_2^4 \\
&\quad + \omega_1\omega_2(\mu_1-\mu_2)^2((\omega_1^2+\omega_1\omega_2+\omega_2^2)(\mu_1-\mu_2)^2 \\
&\quad + 6\,(\omega_2\sigma_1^2+\omega_1\sigma_2^2)).
\end{aligned}
$$

Summarizing:

$$\mu = E(X) = \omega_1\mu_1 + \omega_2\mu_2; \tag{14}$$

$$\sigma^2 = D^2(X) = \omega_1\sigma_1^2 + \omega_2\sigma_2^2 + \omega_1\omega_2(\mu_1-\mu_2)^2; \tag{15}$$

$$
\begin{aligned}
\gamma_1 &= \frac{E(X-\mu)^3}{\sigma^3} \\
&= \frac{\omega_1\omega_2(\mu_1-\mu_2)((\omega_2-\omega_1)(\mu_1-\mu_2)^2 + 3(\sigma_1^2-\sigma_2^2))}{\left(\sqrt{\omega_1\sigma_1^2+\omega_2\sigma_2^2+\omega_1\omega_2(\mu_1-\mu_2)^2}\right)^3};
\end{aligned} \tag{16}
$$

$$
\begin{aligned}
\beta_2 = \frac{E(X-\mu)^4}{\sigma^4} &= \frac{3\omega_1\sigma_1^4 + 3\omega_2\sigma_2^4}{(\omega_1\sigma_1^2+\omega_2\sigma_2^2+\omega_1\omega_2(\mu_1-\mu_2)^2)^2} \\
&+ \frac{\omega_1\omega_2(\mu_1-\mu_2)^2((\omega_1^2+\omega_1\omega_2+\omega_2^2)(\mu_1-\mu_2)^2}{(\omega_1\sigma_1^2+\omega_2\sigma_2^2+\omega_1\omega_2(\mu_1-\mu_2)^2)^2} \\
&+ \frac{6(\omega_2\sigma_1^2+\omega_1\sigma_2^2))}{(\omega_1\sigma_1^2+\omega_2\sigma_2^2+\omega_1\omega_2(\mu_1-\mu_2)^2)^2};
\end{aligned} \tag{17}
$$

where σ^2 denotes the unconditional variance of the variable, γ_1 denotes the unconditional skewness of X and kurtosis is denoted by β_2.

The parameter set $\mu_1, \mu_2, \sigma_1, \sigma_2$ of the variable X_t presented in (7) can be written in terms of the parameters of model (1). Let us introduce an additional notation, for $j \in \mathbb{N}$ and $I \in \{1,2\}^j$, we denote $p_I := \pi^j_{i=1} p_{I(i-1)I(i)}$, where $I(i)$ denotes the i-th coordinate of the I. Intuitively, p_I is the probability of the path I for a Markov chain S_t with a transition matrix (4). For now on, we denote $X_i := (X_t|S_t = i)$. Taking the expected value in the equation (1), we obtain the following system of linear equations:

$$
\begin{cases}
E(X_1) = \nu_1 + \sum_{j=1}^{p} \sum_{I\in\{1,2\}^j} p_{(I,1)} A_j^{I(j)} E(X_{I(j)}) \\
E(X_2) = \nu_2 + \sum_{j=1}^{p} \sum_{I\in\{1,2\}^j} p_{(I,2)} A_j^{I(j)} E(X_{I(j)})
\end{cases} \tag{18}
$$

where (I, i), for $i \in \{1, 2\}$ and $I \in \{1, 2\}^j$, denotes $J \in \{1, 2\}^{j+1}$ such that $J(k) = I(k)$, for $k = 1, \ldots, j$, and $J(j + 1) = i$. Transforming (18), we have:

$$\begin{cases} \left(1 - \sum_{j=1}^{p} \sum_{I \in \{1,2\}^{j-1}} p_{(1,I,1)} A_j^1\right) E(X_1) \\ \qquad = \nu_1 + \sum_{j=1}^{p} \sum_{I \in \{1,2\}^{j-1}} p_{(2,I,1)} A_j^2 E(X_2) \\ \left(1 - \sum_{j=1}^{p} \sum_{I \in \{1,2\}^{j-1}} p_{(2,I,1)} A_j^2\right) E(X_2) \\ \qquad = \nu_2 + \sum_{j=1}^{p} \sum_{I \in \{1,2\}^{j-1}} p_{(1,I,1)} A_j^1 E(X_1) \end{cases};$$

therefore

$$\begin{cases} E(X_1) = (\Xi_1 + \Psi_1 \Xi_2^{-1} \Psi_2)^{-1} (\nu_2 + \Psi_1 \Xi_2^{-1} \nu_2) \\ E(X_2) = (\Xi_2 + \Psi_2 \Xi_2^{-1} \Psi_1)^{-1} (\nu_1 + \Psi_2 \Xi_1^{-1} \nu_1) \end{cases}; \tag{19}$$

hence,

$$\begin{aligned} E(X_t) &= \omega_1 E(X_1) + \omega_2 E(X_2) \\ &= \omega_1 (\Xi_1 + \Psi_1 \Xi_2^{-1} \Psi_2)^{-1} (\nu_2 + \Psi_1 \Xi_2^{-1} \nu_2) \\ &\quad + \omega_2 (\Xi_2 + \Psi_2 \Xi_1^{-1} \Psi_1)^{-1} (\nu_1 + \Psi_2 \Xi_1^{-1} \nu_1), \end{aligned} \tag{20}$$

where

$$\Xi_1 := 1 - \sum_{j=1}^{p} \sum_{I \in \{1,2\}^{j-1}} p_{(1,I,1)} A_j^1, \tag{21}$$

$$\Xi_2 := 1 - \sum_{j=1}^{p} \sum_{I \in \{1,2\}^{j-1}} p_{(2,I,1)} A_j^2, \tag{22}$$

$$\Psi_1 := \sum_{j=1}^{p} \sum_{I \in \{1,2\}^{j-1}} p_{(2,I,1)} A_j^2, \tag{23}$$

$$\Psi_2 := \sum_{j=1}^{p} \sum_{I \in \{1,2\}^{j-1}} p_{(1,I,1)} A_j^1. \tag{24}$$

System (19) shows us how to compute $\mu_1 := E(X_1)$ and $\mu_2 := E(X_2)$.

In order to compute $\sum_1$ and $\sum_2$, an additional notation is needed. Let, for $i = 1, 2$,

$$X_{i,t}^* := ([X_t', \ldots, X_{t-p}']' | S_t = i). \tag{25}$$

Then, rewriting (1), we have:

$$X^*_{i,t} = v^*_i + \sum_{j=1}^{2} \Xi^*_{i,j} X^*_{j,t-1} + \varepsilon^*_{i,t}, i = 1, 2, \tag{26}$$

where

$$v^*_i := \begin{bmatrix} v_i \\ 0 \\ \vdots \\ 0 \end{bmatrix}, i = 1, 2; \tag{27}$$

$$\Xi^*_{i,j} := \sum_{I \in \{1,2\}^p} p_{(I,i)} \begin{bmatrix} \chi_j(I(p))A^j_1 & \chi_j(I(p-1))A^j_2 & \cdots & \chi_j(I(1))A^j_p \\ 1 & 0 & \cdots & 0 \\ \vdots & \ddots & 0 & 0 \\ 0 & 0 & 1 & 0 \end{bmatrix}, i = 1, 2; \tag{28}$$

$$\varepsilon_{i,t} := \begin{bmatrix} Q_i u_t \\ 0 \\ \vdots \\ 0 \end{bmatrix}, i = 1, 2; \tag{29}$$

Therefore, for $i = 1, 2$,

$$\begin{aligned} X^*_{i,t} &= v^*_i + \sum_{j=1}^{2} \Xi^*_{i,j} X^*_{j,t-1} + \varepsilon^*_{i,t} \\ &= v^*_i + \sum_{j_1=1}^{2} \Xi^*_{i,j_1} (v^*_{j_1} + \sum_{j_2=1}^{2} \Xi^*_{j_1,j_2} X^*_{j_2,t-2} + \varepsilon^*_{j_1,t-1}) + \varepsilon^*_{i,t} \\ &= v^*_i + \varepsilon^*_{i,t} + \sum_{j_1=1}^{2} \Xi^*_{i,j_1} (v^*_{j_1} + \varepsilon^*_{j_1,t-1}) \\ &\quad + \sum_{j_1=1}^{2} \sum_{j_2=1}^{2} \Xi^*_{i,j_1} \Xi^*_{j_1,j_2} (v^*_{j_2} + \sum_{j_3=1}^{2} \Xi^*_{j_2,j_3} X^*_{j_3,t-3} + \varepsilon^*_{j_2,t-2}) \end{aligned}$$

$$= \cdots = \nu_i^* + \varepsilon_{i,t}^* + \sum_{j=1}^{\infty} \sum_{\substack{I \in \{1,2\}^{j+1} \\ I(1)=i}} \left(\prod_{k=1}^{j} \Xi_{I(k),I(k+1)}^* \right) (\nu_{I(j+1)}^* + \varepsilon_{I(j+1),t-j}^*).$$

The $\varepsilon_{i,t-j}^*$ are iid, thus we have:

$$\sum_i := \mathrm{Var}(X_{i,t}^*) = Q_i Q_i' + \sum_{j=1}^{\infty} \Psi_{i,j}^* Q_i Q_i' \Psi_{i,j}^{*\prime}, \; i = 1, 2, \tag{30}$$

where

$$\Psi_{i,j}^* := \sum_{\substack{I \in \{1,2\}^{j+1} \\ I(1)=1}} \left(\prod_{k=1}^{j} \Xi_{I(k),I(k+1)}^* \right), \; i = 1, 2, j \in \mathbb{N}. \tag{31}$$

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Modelling Stock Market Volatility: Evidence from India

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This study empirically investigates the volatility pattern of Indian stock market based on time series data which consists of daily closing prices of S&P CNX Nifty Index for ten years period from 1st January 2003 to 31st December 2012. The analysis has been done using both symmetric and asymmetric models of Generalized Autoregressive Conditional Heteroscedastic (GARCH). As per Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC), the study proves that GARCH (1,1) and TGARCH (1,1) estimations are found to be most appropriate model to capture the symmetric and asymmetric volatility respectively. The study also provides evidence for the existence of a positive and insignificant risk premium as per GARCH-M (1,1) model. The asymmetric effect (leverage) captured by the parameter of EGARCH (1,1) and TGARCH (1,1) models show that negative shocks have significant effect on conditional variance (volatility).

Key Words: asymmetric volatility, conditional volatility, GARCH models and leverage effect
JEL Classification: C32, C53

Introduction

Volatility refers to the amount of uncertainty or risk about the size of changes in a security's value. A higher volatility means a security's value can potentially be spread out over a larger range of values whereas, lower volatility means a security's value does not fluctuate dramatically, but changes in value over a period of time. Over the last few years, modelling volatility of a financial time series has become an important area and has gained a great deal of attention from academics, researchers and others. The time series are found to depend on their own past value (autoregressive), depending on past information (conditional) and exhibit

non-constant variance (heteroskedasticity). It has been found that the stock market volatility changes with time (i. e., it is 'time-varying') and exhibits 'volatility clustering.' A series with some periods of low volatility and some periods of high volatility is said to exhibit volatility clustering.

Variance (or standard deviation) is often used as the risk measure in risk management. Engle (1982) introduced Autoregressive Conditional Heteroskedasticity (ARCH) model to the world to model financial time series that exhibit time varying conditional variance. A generalized ARCH (GARCH) model extended by Bollerslev (1986) is another popular model for estimating stochastic volatility. These models are widely used in various branches of econometrics, especially in financial time series analysis. Besides, with the introduction of models of ARCH and GARCH, there have been number of empirical applications of modelling variance (volatility) of financial time series. However, the GARCH cannot account for leverage effect, however they account for volatility clustering and leptokurtosis in a series, this necessitated to develop new and extended models over GARCH that resulted in to new models viz., GARCH-M, EGARCH, TGARCH and PGARCH.

GARCH-in-Mean model (GARCH-M), a variation under GARCH model is used to identify the risk return relationship (Engle, Lilien, and Robins 1987). Further, Nelson (1991) proposed an Exponential GARCH model, which is the logarithmic expression of the conditional volatility used to capture the asymmetric effects. Later, a number of different specifications of these models and extensions were derived. One of them is Threshold GARCH (TGARCH) model (Zakoian 1994), which was used to identify the relation between asymmetric volatility and return. It is also known as the GJR model (Glosten, Jagannathan, and Runkle 1993). In addition, Schwert (1989) introduced the standard deviation GARCH model, whereby the standard deviation is modelled rather than the variance. This model, along with several other models, is generalized (Ding, Engle, and Graange 1993) with the Power ARCH specification.

All these models were designed to explicitly model and forecast the time-varying conditional variance of a series. Hence, the present paper aims at modelling the volatility of Indian stock market by the use of different GARCH family models and provides empirical evidence on the fit of conditional volatility for the Indian stock market.

Review of Literature

Several studies were made in modelling the stock market volatility both in developed and in developing countries. Many researchers investigated

the performance of GARCH models in explaining volatility of emerging stock markets (French, Schwert, and Stambaugh 1987; Chou 1988; Baillie and DeGennaro 1990; Bekaert and Wu 2000; Chand, Kamal, and Ali 2012; Kenneth 2013). Besides, few studies were attempted on Egyptian market too. Zakaria and Winker (2012) examined the return volatility using daily prices of Khartoum Stock Exchange (KSE) and Cairo and Alexandria Stock Exchange (CASE) and found that GARCH-M model described conditional variance with statistically significant for both the markets; there existed a leverage effect in the returns of KSE and CASE with positive sign.

Further, Floros (2008) investigated the volatility using daily data from two Middle East stock indices viz., the Egyptian CMA index and the Israeli TASE-100 index and used GARCH, EGARCH, TGARCH, Component GARCH (CGARCH), Asymmetric Component GARCH (AGARCH) and Power GARCH (PGARCH). The study found that the coefficient of EGARCH model showed a negative and significant value for both the indices, indicating the existence of the leverage effect. AGARCH model showed weak transitory leverage effects in the conditional variances and the study showed that increased risk would not necessarily lead to an increase in returns. Ahmed and Aal (2011) examined Egyptian stock market return volatility from 1998 to 2009 and his study showed that EGARCH is the best fit model among the other models for measuring volatility. The study showed that there is no significant asymmetry in the conditional volatility of returns captured by GARCH (1,1) and GARCH (1,1) and it was found to be the appropriate model for volatility forecasting in Nepalese stock market (Bahadur 2008).

Although many research studies were undertaken on modelling the volatility of the developed stock markets, only few studies has been done on Indian context. Recently, few studies have been done on modelling the stock market volatility of Indian market but most of the studies are limited to only symmetric model of the market. Karmakar (2005) estimated volatility model to capture the feature of stock market volatility in India. The study also investigated the presence of leverage effect in Indian stock market and the study showed that the GARCH (1,1) model provided reasonably good forecasts of market volatility. Whereas, in his another study he (Karmakar 2007) found that the conditional variance was asymmetric during the study period and the EGARCH-M was found to be an adequate model that reveals a positive relation between risk and return.

Goudarzi and Ramanarayanan (2010) examined the volatility of Indian stock market using BSE 500 stock index as the proxy for ten years. ARCH

and GARCH models were estimated and the best model was selected using the model selection criterion viz., Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC). The study found that GARCH (1,1) was the most appropriate model for explaining volatility clustering and mean reverting in the series for the study period. Further, in their (Goudarzi and Ramanarayanan 2011) another study, they investigated the volatility of BSE 500 stock index and modelled two non-linear asymmetric model viz., EGARCH (1,1) and TGARCH (1,1) and found that TGARCH (1,1) model was found to be the best preferred model as per AIC, Schwarz Information Criterion (SBIC) and Log Likelihood (LL) criteria.

Mittal, Arora, and Goyal (2012) examined the behaviour of Indian stock price and investigated to test whether volatility is asymmetric using daily returns from 2000 to 2010. The study reported that GARCH and PGARCH models were found to be best fitted models to capture symmetric and asymmetric effect respectively. Vijayalakshmi and Gaur (2013) used eight different models to forecast volatility in Indian and foreign stock markets. NSE and BSE index were considered as a proxy for Indian stock market and the exchange rate data for Indian rupee and foreign currency over the period from 2000 to 2013. Based on the forecast statistics the study found that TARCH and PARCH models lead to better volatility forecast for BSE and NSE return series for the stock market evaluation and ARMA (1,1), ARCH (5), EGARCH for the foreign exchange market.

Most of the Indian studies attempted on modelling volatility found that the GARCH (1,1) is considered the best model to capture the symmetric effect and for leverage effects, EGARCH-M and PGARCH models have been found to be appropriate by the previous studies. However, the choice of best fitted and adequate model depends on the model that is included for the evaluation in the study. Hence, the present study used different GARCH family models both in symmetric as well as asymmetric effect to capture the facts of return and to study the most appropriate model in the volatility estimation.

Objectives of the Study

The primary objective of the study is to fit appropriate GARCH model to estimate market volatility based on Nifty index. The paper aims at:

- To investigate the volatility pattern of emerging Indian stock market using symmetric and asymmetric models.

- To identify the presence of leverage effect in daily return series of stock market using asymmetric models.
- To analyse the appropriateness of Generalized Autoregressive Conditional Heteroscedastic (GARCH) family models that capture the important facts about the index returns and fits more appropriate.

Research Methodology

DATA SOURCE

The study is based on the secondary data that were collected from Centre for Monitoring Indian Economy (CMIE), Prowess database. S&P CNX Nifty indices were used as proxy to the stock market. The daily closing prices of Nifty indices over the period of ten years from 1st January 2003 to 31st December 2012 were collected and used for analysis.

RESEARCH METHODS

Various statistical tools viz., ADF, PP, and ARCH-LM tests and GARCH family models were applied and analysed using E-views 7 Econometrics package. Volatility has been estimated on return (r_t) and hence before going for all these tests, first the daily returns were calculated. The Nifty return series is calculated as a log of first difference of daily closing price, which is as follows:

$$r_t = log\frac{P_t}{P_{t-1}}, \tag{1}$$

where r_t is the logarithmic daily return on Nifty index for time t, P_t is the closing price at time t, and P_{t-1} is the corresponding price in the period at time $t-1$.

BASIC STATISTICS OF NIFTY RETURN

Descriptive Statistics

To specify the distributional properties of the daily return series of Nifty market index during the study period, the descriptive statistics are reported in table 1. It shows mean ($\overline{X}$), standard deviation (σ), skewness (S), kurtosis (K) and Jarque-Bera statistics.

Test for Stationarity

First of all, there is a need for testing whether the data are stationary or non-stationary and it is found out by unit root test, which is conducted

by Augmented Dickey-Fuller Test (ADF) (Dickey and Fuller 1979) and Philips-Perron Test (PP) (Phillips and Perron 1988).

Test for Heteroscedasticity

One of the most important issues before applying the GARCH methodology is to first examine the residuals for the evidence of heteroscedasticity. To test the presence of heteroscedasticity in residual of the return series, Lagrange Multiplier (LM) test for Autoregressive conditional heteroscedasticity (ARCH) is used. It is sensible to compute the Engle (1982) test for ARCH effect to ensure that there is no ARCH effect.

Volatility Measurement Technique

GARCH models represent the main methodologies that are applied in modelling the stock market volatility. The present study employed GARCH (1,1) and GARCH-M (1,1) for modelling conditional volatility and for modelling asymmetric volatility EGARCH (1,1) and TGARCH (1,1) were applied.

The following GARCH techniques are applied to capture the volatility in the return series.

Symmetric Measurement

To study the relation between asymmetric volatility and return, the GARCH (1,1) and GARCH-M (1,1) models are used in the study.

The Generalized ARCH Model

The GARCH model (Bollerslev 1986), which allows the conditional variance to be dependent upon previous own lags, conform to the conditional variance equation in the simplest form as:

$$\text{mean equation: } r_t = \mu + \varepsilon_t \text{ and} \tag{2}$$

$$\text{variance equation: } \sigma_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2, \tag{3}$$

where $\omega > 0$, $\alpha_1 \geq 0$, $\beta_1 \geq 0$, and r_t is the return of the asset at time t, μ is the average return, and ε_t is the residual return.

The size of parameters α and β determine the short-run dynamics of the volatility time series. If the sum of the coefficient is equal to one, then any shock will lead to a permanent change in all future values. Hence, shock to the conditional variance is 'persistence.'

Managing Global Transitions

The GARCH-in-Mean (GARCH-M) Model

In GARCH model, the conditional variance enters the mean equation directly, which is known generally as a GARCH-M model. The return of a security may depend on its volatility and hence a simple GARCH-M (1,1) model can be written as:

$$\text{mean equation: } r_t = \mu + \lambda\sigma t_\tau^2 + \varepsilon_t \text{ and} \tag{4}$$

$$\text{variance equation: } \sigma_t^2 = \omega + \alpha\varepsilon_{t-1}^2 + \beta\sigma_{t-1}^2. \tag{5}$$

The parameter λ in the mean equation is called the risk premium. A positive λ indicates that the return is positively related to its volatility, i. e. a rise in mean return is caused by an increase in conditional variance as a proxy of increased risk.

Asymmetric Measurement

The main drawback of symmetric GARCH is that the conditional variance is unable to respond asymmetrically to rise and fall in the stock returns. Hence, number of models have been introduced to deal with the issue and are called asymmetric models viz., EGARCH, TGARCH and PGARCH, which are used for capturing the asymmetric phenomena. To study the relation between asymmetric volatility and return, the EGARCH (1,1) and TGARCH (1,1) models are used in the study.

The Exponential GARCH Model

This model is based on the logarithmic expression of the conditional variability. The presence of leverage effect can be tested and this model enables to find out the best model, which capture the symmetries of the Indian stock market (Nelson 1991) and hence the following equation:

$$\ln(\sigma_t^2) = \omega + \beta_1 \ln(\sigma_{t-1}^2) + \alpha_1 \left\{ \left| \frac{\varepsilon_{t-1}}{\sigma_{t-1}} \right| - \sqrt{\frac{\pi}{2}} \right\} - \gamma \frac{\varepsilon_{t-1}}{\sigma_{t-1}}. \tag{6}$$

The left-hand side is the log of the conditional variance. The coefficient γ is known as the asymmetry or leverage term. The presence of leverage effects can be tested by the hypothesis that $\gamma < 0$. The impact is symmetric if $\gamma \neq 0$.

Threshold GARCH Model

The generalized specification of the threshold GARCH for the conditional variance (Zakoian 1994) is given by:

$$\sigma_t^2 = \omega + \alpha_1 \varepsilon_{t-1}^2 + \gamma d_{t-1} \varepsilon_{t-1}^2 + \beta_1 \sigma_{t-1}^2, \quad (7)$$

The γ is known as the asymmetry or leverage parameter. In this model, good news ($\varepsilon_{t-1} > 0$) and the bad news ($\varepsilon_{t-1} < 0$) have differential effect on the conditional variance. Good news has an impact of α_i, while bad news has impact on $\alpha_i + \gamma_i$. Hence, if γ is significant and positive, negative shocks have a larger effect on σ_t^2 than the positive shocks.

Results and Discussion

Descriptive statistics on Nifty return are summarized in table 1.

The $\overline{X}$ of the returns is positive, indicating the fact that price has increased over the period. The descriptive statistics shows that the returns are negatively skewed, indicating that there is a high probability of earning returns which is $>\overline{X}$. The K of the series is > 3, which implies that the return series is fat tailed and does not follow a normal distribution and is further confirmed by Jarque-Bera test statistics, which is significant at 1% level and hence the null hypothesis of normality is rejected.

To make the series stationary, the closing price of the Nifty index is converted into daily logarithmic return series. Figure 1 shows volatility clustering of return series of the S&P CNX Nifty for the study period from 1st January 2003 to 31st December 2012. From the figure 1, it is inferred that the period of low volatility tends to be followed by period of low volatility for a prolonged period and the period of high volatility is

TABLE 1 Descriptive Statistics of Daily Return

Mean	0.000673	Minimum	−0.130142	Kurtosis	11.87825
Median	0.001372	Std. dev.	0.016528	Jarque-Bera	8225.742
Maximum	0.163343	Skewness	−0.259137	*N*	2496

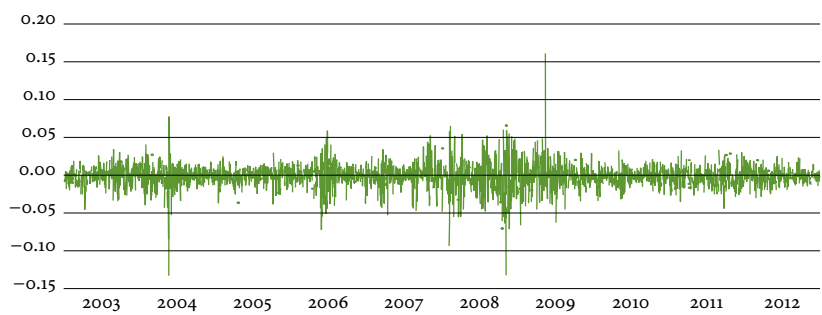

FIGURE 1 Volatility Clustering of Daily Return of S&P CNX Nifty

TABLE 2 Result of Unit Root Test and ARCH-LM Test for Residuals

Value	ADF	PP
t-statistics	−10.5260	−46.7430
Prob.	0.000	0.000
Critical Value		
1%	−3.4327	−3.4327
5%	−2.8625	−2.8625
10%	−2.5673	−2.5673
ARCH-LM test statistics		122.79
Prob. (1)		0.0000

followed by period of high volatility for a prolonged period, which means the volatility is clustering and the return series vary around the constant mean but the variance is changing with time.

Table 2 shows the presence of unit root in the series tested using ADF and PP tests and the presence of heteroscedasticity tested using ARCH-LM test. The *p* values of ADF and PP are < 0.05, which lead to conclude that the data of the time series for the entire study period is stationary. Both the ADF and PP test statistics reported in table 2 reject the hypothesis at 1% level with the critical value of –3.43 for both ADF and PP tests of a unit root in the return series. Hence, the results of both the tests confirm that the series are stationary. The ARCH-LM test is applied to find out the presence of ARCH effect in the residuals of the return series. From the table 2, it is inferred that the ARCH-LM test statistics is highly significant. Since $p < 0.05$, the null hypothesis of 'no ARCH effect' is rejected at 1% level, which confirms the presence of ARCH effects in the residuals of time series models in the returns and hence the results warrant for the estimation of GARCH family models.

After volatility clustering is confirmed with return series and stationarity using ADF and PP test, heteroscedasticity effect using ARCH-LM test, the study focuses on determining the best fitted GARCH model to the return series. Therefore, GARCH model is used for modelling the volatility of return series in the Indian stock market.

The result of GARCH (1,1) and GARCH-M (1,1) models is shown in table 3, which reveals the parameter of GARCH is statistically significant. In other words, the coefficients viz., constant (ω), ARCH term (α), GARCH term (β) are highly significant at 1% level. In the conditional variance equation, the estimated β coefficient is considerably greater than α co-

TABLE 3 Estimated result of GARCH (1,1) and GARCH-M (1,1) Models

Coefficients	GARCH (1,1)	GARCH-M (1,1)
Mean		
μ (constant)	0.001206*	0.001105**
Risk premium λ	—	0.636885
Variance		
ω (constant)	$4.73e^{-6}$*	$4.73e^{-6}$*
α (ARCH effect)	0.121501*	0.121586*
β (GARCH effect)	0.864800*	0.864757*
$\alpha + \beta$	0.986301	0.986343
Log likelihood	7123.909	7123.986
Akaike info. criterion (AIC)	−5.705056	−5.704315
Schwarz info. criterion (SIC)	−5.695725	−5.692652
ARCH-LM test for heteroscedasticity		
ARCH-LM test statistics	0.4726	0.4961
Prob. Chi-square (1)	0.4917	0.4811

NOTES Source: Computed from the compiled and edited data from the CMIE data source. * Significant at 1% level.

efficient which resembles that the market has a memory longer than one period and that volatility is more sensitive to its lagged values than it is to new surprises in the market values. It shows that the volatility is persistent. The sizes of the parameters α and β determine the volatility in time series. The sum of these coefficients (α and β) is 0.978, which is close to unity indicating that the shock will persist to many future periods. Since the risk-return parameter is positive and significant at 1% level, it shows that there is a positive relationship between risk and return. Further, ARCH-LM test is employed to check ARCH effect in residuals and from the results, it is inferred that the $p > 0.05$, which led to conclude that the null hypothesis of 'no ARCH effect' is accepted. In other words, the test statistics do not support for any additional ARCH effect remaining in the residuals of the models, which implies that the variance equation is well specified for the market.

The GARCH-M (1,1) model is estimated by allowing the mean equation of the return series to depend on a function of the conditional variance. The constant in mean equation is significant at 5% level, indicating that there is an abnormal return for the market. From the table 3, it is in-

ferred that the coefficient of conditional variance (λ) in the mean equation value is positive however, it is statistically insignificant, which implies that there is no significant impact of volatility on the expected return, indicating lack of risk-return trade off over time. In the variance equation of GARCH-M (1,1), the parameters viz., ω, α and β are highly significant at 1% level. The sum of α and β is 0.986, which infers that shocks will persist in the future period. However, the ARCH-LM test is applied on residuals and shows that the test statistics do not exhibit additional ARCH effect for the entire study period indicating that the variance equation is well specified.

In order to capture the asymmetries in the return series, two models have been used viz., EGARCH-M (1,1) and TGARCH (1,1). γ captures the asymmetric effect in both EGARCH-M (1,1) and TGARCH (1,1) models. The asymmetrical EGARCH (1,1) model is used to estimate the returns of the Nifty index and the result is presented in table 4. The table reveals that ARCH (α) and GARCH coefficient (β) are greater than one, reporting that conditional variance is explosive; the estimated coefficients are statistically significant at 1% level. γ, the leverage coefficient, is negative and is statistically significant at 1% level, exhibiting the leverage effect in return during the study period. The analysis reveals that there is a negative correlation between past return and future return (leverage effect); hence, EGARCH (1,1) model supports for the presence of leverage effect on the Nifty return series. Finally, the ARCH-LM test statistics reveals that the null hypothesis of no heteroscedasticity in the residuals is accepted.

An alternate model to test for asymmetric volatility in the Nifty return is TGARCH, which shows (see table 4) the estimated result of TGARCH (1,1) model. In it, the coefficient of leverage effect (γ) is positive and significant at 1% level, which implies that negative shocks or bad news have a greater effect on the conditional variance than the positive shocks or good news. The diagnostic test is performed to test whether the residuals are normally distributed. The ARCH-LM test statistic for TGARCH (1,1) model does not show any additional ARCH effect present in the residuals of the model, which implies that the variance equation is well specified for the Indian stock market.

Summary of Findings of the Study

Based on the empirical analysis, the following are the findings of the study:

TABLE 4 Estimated result of EGARCH (1,1) and TGARCH (1,1) Models

Coefficients	EGARCH (1,1)	TGARCH (1,1)
Mean		
μ (constant)	0.000902*	0.000897*
Variance		
ω (constant)	−0.496798*	$6.18e^{-6}$*
α (ARCH effect)	0.241448*	0.055275*
β (GARCH effect)	0.963610*	0.859030*
γ (leverage effect)	−0.090619*	0.124030*
$\alpha + \beta$	1.205058	0.914305
Log likelihood	7139.688	7142.083
Akaike info. criterion (AIC)	−5.716879	5.718817
Schwarz info. criterion (SIC)	−5.705234	5.707153
ARCH-LM test for heteroscedasticity		
ARCH-LM test statistics	0.0527	0.5299
Prob. Chi-square (1)	0.8182	0.4665

NOTES Source: Computed from the compiled and edited data from the CMIE data source. * Significant at 1% level.

- In GARCH (1,1) model, the sum of the coefficient ($\alpha + \beta$) is 0.9863, which implies that the volatility is highly persistent.
- In GARCH-M (1,1) model, the coefficient of conditional variance or risk premium (λ) in the mean equation is positive however, insignificant, which implies that higher market risk provided by conditional variance will not necessarily lead to higher returns.
- The asymmetric effect captured by the parameter (γ) in EGARCH model is negative and statistically significant at 1% level providing the presence of leverage effect, which reveals that positive shocks have less effect on the conditional variance when compared to the negative shocks.
- The asymmetric effect captured by the coefficient of leverage effect (γ) is positive and significant at 1% level, providing the presence of leverage effect during the study period.
- The best fitted models both in symmetric as well as in asymmetric effect are selected based on the minimum AIC and SIC value and the highest log likelihood value. Likewise, the AIC, SIC value (−5.7050; −5.695) is low and log likelihood value (7123.909) is high

for GARCH (1,1) when compared to its alternate symmetric model, called GARCH-M (1,1). Hence GARCH (1,1) model is found to be the best fitted model.

- The AIC, SIC (–5.7188; –5.7071) and log likelihood value (7142.08) for TGARCH (1,1) conforms the norms and hence TGARCH (1,1) model is apparently seems to be an adequate description of asymmetric volatility process.

Concluding Remarks

In this study, volatility of Nifty index return is tested using the symmetric and asymmetric GARCH models. The daily closing prices of Nifty index for ten years are collected and modelled using four different GARCH models that capture the volatility clustering and leverage effect for the study period i. e. from 1st January 2003 to 31st December 2012. GARCH (1,1), GARCH-M (1,1), EGARCH (1,1), and TGARCH (1,1) models are employed in the study after confirming the unit root rest, volatility clustering and ARCH effect. The results show that the coefficient has the expected sign both in the EGARCH (negative and significant) and in the TARCH (positive and significant) models. Finally, to identify the best fitted model among the different specifications of GARCH models, Akaike Information Criterion (AIC) and Schwarz Information Criterion (SIC) are used, which prove that GARCH (1,1) model has been found to be the best fitted model among all to capture the symmetric effect as per AIC and SIC criterion. Further, TGARCH (1,1) model is found to be the best fitted model to capture the asymmetric volatility based on the highest log likelihood ratios and minimum AIC and SIC criterion.

The overall conclusion of the study supports the findings of previous research studies of Karmakar (2007), Zakaria and Winker (2012) and Zivanayi and Chinzara (2012); and more particularly the study differs in the way of selecting the appropriate model using diagnostic test. Nevertheless, the results presented in the study (in the said tables) are in contrary to the research findings of Karmakar (2007) where the risk premium is significant. On a whole, the study concludes that increased risk did not increase the returns since the coefficient is insignificant for the selected variables for the study period.

LIMITATIONS OF THE STUDY

1. The study suffers from the limitation of non-calculation of intraday volatility.

2. The study used only ten years data of S&P CNX Nifty Index from 1st January 2003 to 31st December 2012.

SCOPE FOR FURTHER STUDIES

The study aims at modelling the volatility of an emerging stock market and investigated if there is any asymmetric volatility in its return structure. The study tried to address three issues. First, does stock return volatility have long term impact? Second, is there asymmetric volatility in Indian stock market? Finally, what is the relationship between risk and return? The investigation has been made on market index S&P CNX Nifty Index. In addition to these three issues, the study can also be extended using intra-day volatility with the help of high frequency data. The present study focused on modelling volatility on Indian stock market, therefore the study can also be done comparing the volatility of Indian stock market with other stock exchanges of developed countries.

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Foreign Direct Investment, Economic Freedom and Economic Performance in Sub-Saharan Africa

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The controversies that trailed whether direct impact of Foreign Direct Investment (FDI) on growth are conditional on a certain intermediating links or not, has made an inquiry into the likely mediating links in the FDI-growth space a recurring subject of discourse. While the importance of institution has prominently featured as playing a vital role on the one hand, economic freedom (a key institutional component) has consistently been elected, as a good candidate surrogate on the other hand. It is against this backdrop this study examines the effect of FDI inflow on economic performance in the SSA region giving prominence to economic freedom. The results support the view that economic freedom is germane in influencing the economic-wide performance in the region but have insignificant effects on the different sector performances. It is recommended that economic freedom be given priority in the region and FDI should be attracted to other sectors other than the primary sector, as it is the case.

Key Words: FDI inflow, economic freedom, economic performance, panel data analysis
JEL Classification: C33, H7, H30, F21

Introduction

One of the most highly researched subjects in the development finance literature focuses on what constitutes the key determinants of foreign direct investment (FDI), and the channels through which FDI impacts are transmitted to growth trajectory. While the ensuing arguments on the former seemed to be fading out rather quickly on the one hand, that of the latter, on the other hand, kept waxing stronger and gaining more momentum, particularly within the folds of academic and policymaking bodies alike. The seeming rationale for the sustained attention can

be premised on three major considerations. First, the impacts of FDI on growth have, controversially been argued, not to be directly correlated, thus suggestive of some missing intermediating links in FDI-growth relations. There exists a broad consensus that a country is predisposed to attracting and reaping the benefits associated with FDI but subject to the country's initial conditions. Such conditions have been linked to absorptive capacity[1] of a country in the literature. Azman-Saini, Baharumshah, and Law (2010) submitted that the growth effect of FDI might not be strong in countries with low (or poor) absorptive capacity. In other words, host countries must have certain qualities that allow them to absorb the benefits linked to FDI flows. Second, the nature of intricacies involved in the conjecture underpinning bivariate-multivariate frameworks existing in FDI-growth space. Lastly, the need to seek further clarification into the real causes of growth reinvigorates the debate.

Needless to say, the mechanism through which FDI impacts are transmitted still remains open for further discourse and research. Noteworthy however, is the growing interests on the role of institutions on economic outcomes. The seminal contribution of Douglas North (1990) has greatly stimulated research interests on institutions, which by extension, affects FDI. His epoch-making input marked the beginning of additional strand of knowledge into FDI-growth repository. Recent empirics in the development finance literature have recognized the useful role of institutions as crucial in mediating in FDI-growth interactions. Of institutional qualities however, the useful role of economic freedom (EF)[2] has been found critical as constituting one of the reasons that could attract the attention of foreign investors. It has been widely acknowledged among growth analysts that a country, which enjoys more EF, tends to attract more FDI inflows and growth faster than country that is being denied enjoying same freedom (see Ayal and Karras (1998), Cebula and Mixon (2012) and Ajide (2013) for more narratives). Nonetheless, the role of EF has, thus far, been less recognized or at best receives limited consideration in the empirical literature. The only exceptions in this regard are studies by Bengoa and Sanchez-Robles (2003), Azman-Saini, Baharumshah, and Law (2010) and Tiwari (2011).

It is against this background that the paper is interested in uncovering the tripartite relationship between FDI-economic performance and EF for SSA region. Undertaking the study for the region seems reasonable for the following reasons: (i) The region is beset with poor institutional frameworks and policies as compared with other competing continents;

(ii) the proponents of Washington Consensus have attributed the poor growth records[3] and weakness of the private sectors of some economies to lack of economic freedom and (iii) there are a prevalence of excessive government interference in the level of economic activities; this typically characterizes the mode of governance of most countries within the region. Arguably, the overbearing influence of government is capable of stifling growth potentials inherent in the private-led economy. Thus, attracting FDI inflows under these circumstances may be somewhat difficult if not impossible, as FDI seems to thrive on free competitive environment. The conjecture perhaps meaningless, and hence, lack objectivity if not subjected to empirical verification.

The rest of the paper is structured as follows. The second section contains a succinct review of the literature on the economic freedom and FDI-economic performance linkage. The third attempts stylized facts about economic freedom and FDI-economic performance within the context of SSA countries, while the fourth section describes a Heritage Economic Freedom and the fifth presents the empirical model and dataset. The results are presented and discussed in the sixth section. The seven and final section succinctly concludes.

Brief Literature Review

The section initially attempts at terse presentation of various mediating links in FDI-growth interactions as espoused in the empirical literature, after which delve into a particular strand of literature that situates the useful role of economic freedom in FDI-growth space. The previously mentioned is aptly pursued in what follows.

The age-long controversy both in the theoretical[4] and empirical[5] literature as it relates to FDI-growth interaction,[6] basically centres on contention surrounding the presumed benefits of FDI spillovers by the recipient country. By implication, the supposed benefits between the two seemed non-automatic but rather conditional. The direction of benefits however, is typically linked to the presence of absorptive capacity in the host environment. By way of confirmation, a huge body of empirical evidence has emerged to either validate or refute the claims using different mediating channels.

Arguing along the different dimensions of absorptive capacity of the host country in FDI-growth relations are Blomstrom, Kokko, and Zejan (1994), that asserted the importance of country's level and stage of development; Balasubramanyam, Salisu, and Sapsford (1996), stressed the use-

ful role of trade policy of the recipient country; De Mello (1997), focused on the cruciality of physical capital accumulation; Benhabib and Spiegel (1994) and Borensztein, Gregorio and Lee (1998) supported the presence of sound human capital development while Hermes and Lensink (2003), Alfaro et al. (2004), Durham (2004) and Adeniyi et al. (2012) argued in favour of recognition as well as institution of a well developed domestic financial sector.

That apart, the emergence of institutional economics by Douglas North (1990), has added a new dimension to the mediating links' discourse in FDI-growth repository. Among the adherents that tilted along institutional lines of reasoning are Knack and Keefer (1995), Demetriades and Law (2006) and Rodrik, Subramanian, and Trebbi (2004). They extolled the virtues of institutional factor as an important growth recipe more than any other conditioning variables. Largely, the strand of literature that creates a role for EF (a vital aspect of institutional quality) in FDI-growth relation is undoubtedly scarce or at best rudimentary. The arguably exceptions however, are Bengoa and Sanchez-Robles (2003) and Azman-Saini, Baharumshah, and Law (2010) and Tiwari (2011).

Bengoa and Sanchez-Robles (2003) explored the interplay between economic freedom, foreign direct investment and economic growth using panel data for a sample of 18 Latin American countries over the period spanning 1970 through 1999. Their results suggest that FDI is positively correlated with economic growth. They also observed that the host country requires adequate human capital, economic stability and liberalized markets to benefits from long-term capital flows. Azman-Saini, Baharumshah, and Law (2010) also investigated the systemic link between economic freedom, foreign direct investment (FDI) and economic growth in a panel of 85 countries. The empirical results, based on the generalized method-of-moment system estimator, reveal that FDI by itself has no direct (positive) effect on output growth. Instead, the effect of FDI is contingent on the level of economic freedom in the host countries. This means the countries promote greater freedom of economic activities gain significantly from the presence of multinational corporations (MNCs). To date, empirical studies on FDI-growth relationship still largely remain limited particularly with respect to the effects of EF on FDI spillovers.

Arguably, countries that promote greater freedom of economic activities are more likely to gain from the presence of MNCs (Azman-Saini, Baharumshah, and Law 2010). Tiwari (2011) examined the effectiveness

of foreign aid, foreign direct investment, and economic freedom for selected 28 Asian countries in a panel framework. The model includes foreign aid, foreign direct investment, economic freedom, labour force, and capital stock. The estimation procedure was carried out on pooled annual time series data for the period 1998–2007. Both static and dynamic panel data techniques were employed. The results indicated that an increase in the fiscal freedom, financial freedom and domestic capital stock were significant factors positively affecting economic growth. Freedom from corruption, inflow of foreign direct investment and foreign aid were significant factors negatively affecting economic growth. Further, they found that life expectancy played a significant and positive role in economic growth. Foreign aid had a non-linear impact (negative impact of high aid flows) upon economic growth.

In light of the foregoing, the study's contributions to the extant stock of literature stems from the following angles: first, the mediating role of EF is examined in relation to FDI-economic performance nexus using both economic-wide as well as sectoral economic performance measures like: value-added in the agriculture, manufacturing, and service sectors. The import of using the latter measure is in twofold: (i) the use of only aggregative economic-wide performance measure have a tendency of masking sectoral peculiarities inherent in the region. Thus, using sectoral economic performance measures typically avert this type of problem (ii) a clear policy messages becomes easily discernible rather than basing it on presumptive conclusion of aggregation bias that may have possibly submerged the emanated policy outcomes into the sea of fallacy. Second, despite the scanty nature of an empirical literature on tripartite relationship involving EF and FDI-growth interactions (even the few ones that have been conducted are done for other regions)[7] we are yet unaware of any study that has specifically examined EF and FDI-economic performance interactions for SSA region. We use only countries in Sub-Saharan Africa to capture the unique characteristics of the region and suggest regional-specific policy interventions. This further lends support to our claim of being one of the pioneering attempts in this direction at least for the region.

Data and Methodology

It is assumed that a good proxy for the quality of institutional background in the host country is the index of economic freedom and institutional quality has been recognized as one of the cardinal determinant of growth

empirics and as well, a channel through which FDI can influence economic performance, hence a study of this sort is inevitable. The study is also at variance with previous studies because it examines not only the effect of FDI and economic freedom on economic growth but also on different sectoral performance (agricultural sector, manufacturing sector and the service sector) in the SSA region.

Our empirical model is espoused from the works of De Gregorio (1992), Sanchez-Robles (1998) and Bengoa and Sachez-Robles (2003) on the link between FDI and Economic Performance when Index of Economic Freedom is controlled for in the model. However, these authors (De Gregorio 1992, Sanchez-Robles 1998) used data until 1985 while Bengoa and Sachez-Robles (2003) data ends in 1995 whereas the period considered in this present study ends in 2010 and it is on the specific case of SSA region.

The underlying specification is the model of the form:

$$\begin{aligned} \text{PCGDP}_{it} = {} & \alpha_0 + \alpha_1 \text{DI}_{it} + \alpha_2 \text{FDI}_{it} + \alpha_3 \text{EF}_{it} + \alpha_4 \text{OPENX}_{it} \\ & + \alpha_5 \text{M2GDP}_{it} + \varepsilon_{it}, \end{aligned} \tag{1}$$

where PCGDP is Per Capita GDP, DI is Domestic Investment measured as Gross Fixed Capital Formation/GDP ratio minus FDI/GDP ratio, FDI is Foreign Direct Investment inflow as percentage of GDP, EF is Index of Economic Freedom, OPENX is Trade Openness measured as Total Trade/GDP ratio, M2GDP is Financial Development Indicator measured by broad money supply over GDP. It is quite instructive to mention that the choice of control variables is guided by previous literature.

The second model presented below examines the impact of FDI and Economic Freedom on different sectoral performance in the SSA region:

$$\begin{aligned} \textit{Sectoral performance} = {} & \psi_o + \psi_1 \text{DI}_{it} + \psi_2 \text{FDI}_{it} + \psi_3 \text{EF}_{it} \\ & + \psi_4 \text{OPENX}_{it} + \psi_5 \text{M2GDP}_{it} + \eta_{it}, \end{aligned} \tag{2}$$

where sectoral performance is defined by three specific sectoral output growths in the sub-Saharan Africa region vis-à-vis: Agricultural, Manufacturing, Service sector and Industrial sectors. DI, EF, OPENX and M2GDP as earlier defined.

The study employed the panel data analysis approach and data for the study covers the period 1995–2010 for 19 SSA countries[8] selected based on data availability and we extracted the data from WDI[9] and Open Data for Africa database of ADB.[10]

TABLE 1 Results on the Impact of FDI, Economic Freedom on Economic Growth in SSA

Regressors	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Constant	3.50	3.51	3.51	5.52	5.53	5.53	5.08	5.08	5.08
	(5.52)*	(2.67)**	(2.92)**	(17.56)*	(4.41)*	(4.74)*	(31.04)*	(4.10)*	(4.37)*
M2GDP	0.43	0.43	0.43	0.49	0.48	0.49	0.43	0.43	0.43
	(8.01)*	(11.74)*	(11.68)*	(7.25)*	(12.79)*	(12.74)*	(11.97)*	(12.03)*	(11.98)*
DI	−0.13	−0.13	−0.13	−0.13	−0.13	−0.13	−0.13	−0.13	−0.13
	(−2.45)**	(−5.10)*	(−5.07)*	(−2.07)**	(−4.71)*	(−4.69)*	(−5.16)*	(−5.19)*	(−5.17)*
FDI	0.01	0.01	0.01	0.01	0.01	0.01	–	–	–
	(1.28)	(2.24)**	(2.23)**	(1.08)	(1.69)***	(1.69)***			
OPENX	0.16	0.16	0.16	0.18	0.18	0.18	0.17	0.17	0.17
	(1.99)**	(3.89)*	(3.87)*	(2.08)**	(4.09)*	(4.07)*	(4.29)*	(4.32)*	(4.31)*
EF	0.57	0.57	0.57	–	–	–	0.01	0.01	0.01
	(3.59)*	(6.64)*	(6.60)*				(7.11)*	(7.16)*	(7.13)*
R^2	0.99	–	–	0.99	–	–	0.99	–	–
Hausman	–	0.44	0.54	–	0.20	0.23	–	0.54	0.61
Tests		(0.99)	(0.99)		(0.99)	(0.99)		(0.97)	(0.96)

NOTES Dependent variable: GDP per capita. Column headings are as follows: (1) fixed effect, (2) Swamy-Arora random effect, (3) Nerlove random effect, (4) fixed effect, (5) Swamy-Arora random effect, (6) Nerlove random effect, (7) fixed effect, (8) Swamy-Arora random effect, (9) Nerlove random effect. *, **, *** indicate 1%, 5% and 10% level of significance respectively. *t*-statistics are presented in parenthesis.

Empirical Analysis

Table 1 presents three different scenarios in which columns (1), (2) and (3) controlled for foreign direct investment and economic freedom, while columns (4), (5) and (6) excluded only economic freedom and columns (7), (8) and (9) are without foreign direct investment respectively. It can be observed from the table that the coefficients on all the explanatory variables have the expected a priori signs except for domestic investment that carries a negative sign thus contradicting theoretical prediction between it and per capita GDP. Thus, when both FDI and economic freedom variables are controlled for, we observed that the financial markets of sub-Saharan African region appeared to be more deepened over the period of review as indicated by the 1% conventional level of significance. The result is similar for both fixed and random effects. In terms of relative effects, the results from both fixed and random effects show that a 10% increase in the ratio of broad money to gross domestic product will increase per capita GDP (a measure of economic-wide performance) by 4.3% for both estimators. Many reasons may have contributed to this spectacular

improvement for the region. However, specific mention must be made of financial sector reforms' effects that almost took off about the same time for most of the countries within the region.

The coefficient on variable of domestic investment has a significant but negative effect on per capita GDP thus confirming the worsening conditions of the region's prevailing capital stock. One of the prevalent features of the region is that of the worsening condition of capital stock, which came in the wake of persistent crises occasioned by war and other civil disturbances. Besides, investment in the region is dominated by public investment which is prone to rent seeking activities which might affect the desired effect on growth, hence the effect on domestic investment is not surprising. In fact, virtually every country within SSA region is involved in one form of crises or the other. Thus, a 10% increase in domestic investment tends to reduce per capita GDP by 1.3%. This is found to be consistent for both fixed and random effects.

More importantly, the coefficients of foreign direct investment variables consistently bear the expected theoretical signs in both estimators but having little and negligible impacts on economic-wide variable. This is clearly indicated by the magnitude of relative impacts of 1% in both fixed and random effects. These results are not surprising as most FDI inflows to the region are directed mostly at extractive industries whose impacts are rather sectionalized. The result is significant only in random model but appears insignificant in fixed effects. In addition, the level of statistical significance also occurs at 5% as indicated in the table. The level of integration of the region, measured by the degree of openness variable, has a positive and statistically significant impact on economic-wide performance as 10% increase in trade openness increases the region's performance by 1.6% and this occurs at 1% conventional levels in both estimators.

The coefficients on economic freedom index are also found to be positive and statistically significant both in fixed and random effects. The contribution from economic freedom index is more than any other explanatory variables judging by the magnitude of importance in the relative effects. For instance, a 10% increase in the overall economic freedom index tends to increase per capita GDP of the region by 5.7%. This further underscores the importance of economic freedom as a catalyst of driving growth. The contribution from each dimension of economic freedom index may have greatly contributed to this feat for the region.

The results in columns (4), (5) and (6) are not too different when eco-

TABLE 2 Results on the Impact of FDI, Economic Freedom on Sectoral Performance in SSA

Regressors	(a)			(b)			(c)		
	(1)	(2)	(3)	(1)	(2)	(3)	(1)	(2)	(3)
Constant	2.64	3.10	2.82	0.22	0.12	0.15	2.54	2.22	2.29
	(1.47)	(4.76)*	(4.30)*	(0.25)	(0.23)	(0.29)	(3.32)*	(6.41)*	(6.52)*
M2GDP	−0.27	−0.28	−0.27	−0.16	−0.14	−1.14	0.06	0.08	0.07
	(−1.67)	(−4.12)*	(−4.19)*	(−1.39)	(−2.54)**	(−2.67)**	(0.74)	(2.11)**	(1.96)*
DI	0.05	0.05	0.05	−0.05	−0.06	−0.05	0.04	0.03	0.04
	(0.25)	(0.93)	(0.32)	(−0.66)	(−1.44)	(−1.39)	(0.42)	(1.22)	(1.29)
FDI	−0.002	−0.003	−0.03	−0.008	−0.001	−0.001	0.004	0.003	0.003
	(−0.22)	(−0.31)	(−0.32)	(−0.17)	(−0.19)	(−0.17)	(0.04)	(0.07)	(0.07)
OPENX	−0.21	−0.19	−0.20	0.19	0.20	0.20	−0.11	−0.10	−0.10
	(−1.03)	(−2.70)**	(−2.82)**	(0.16)	(3.43)*	(3.34)*	(−0.86)	(−2.57)**	(−2.58)**
EF	0.49	0.37	0.44	0.46	0.48	0.48	0.36	0.42	0.41
	(0.96)	(2.34)**	(2.85)**	(2.19)**	(3.76)*	(3.76)*	(1.66)	(4.92)*	(4.63)*
R^2	0.96			0.94			0.77		
Hausman		26.96	11.69		11.78	8.06		8.06	6.18
Tests		(0.006)	(0.04)		(0.04)	(0.15)		(0.15)	(0.29)

NOTES Dependent variables: (a) agricultural value added, (b) manufacturing value added, (c) service sector value added. Column headings are as follows: (1) fixed effect, (2) Swamy-Arora random effect, (3) Nerlove random effect. *, **, *** indicate 1%, 5% and 10% level of significance respectively. *t*-statistics are presented in parenthesis.

nomic freedom index is not accounted for as can be observed from the table. The manifestation of this could be seen from the decline in the level of statistical significance of foreign direct investment from 5% to 10%.

In addition, there seems to be no clear difference in results when foreign direct investment is not controlled for as presented in column (7), (8) and (9) respectively. The only noticeable difference occurs at the substantial level of reduction in the relative effects of economic freedom index from 0.57% to 0.01%. The import of this result is that omission of key variable like foreign direct investment in tripartite relationship (involving FDI, economic and economic performance) could exert a greater influence on economic-wide performance.

Given the results on table 1, is noteworthy to mention that random effect model is preferably elected based on non-significances of values of Hausman tests in both estimators.

Unlike the results obtained under economic-wide performance, while two explanatory variables namely domestic investment and economic freedom index conform with a priori expectation, others like ratio of broad money to GDP, foreign direct investment and openness bear con-

tradictory signs. None of the variables appears as significant under fixed effects, whereas three explanatory variables were statistically significant but occur at varying levels under random effects.

Unlike economic-wide performance results in table 1, the ratio of broad money to GDP and degree of openness exert negative significant impacts on agricultural sector performance. In terms of relative effects, a 10% increase in the level of financial deepening variable tends to reduce agricultural value added by 2.7% but occurs at highest level of significance of 1%. This can be explained in part by the fact that the financial markets in SSA region are not financially connected with the sector that is believed to be operating at smaller scales. Same results in terms of negativity can be said of the degree of openness but this occurs at 5% level of significance. By implication, a 10% increase in the degree of trade openness reduces agricultural value added by 19% to 20% respectively.

Interestingly, economic freedom index appears to be significant at 5% level. However, Hausman tests support expression of preference for fixed effects' results over random effects given the value of its statistical significance.

The results of manufacturing sector performance present a different scenario from that of agriculture at least in terms of signs on the variables' coefficients. In this case, domestic investment bears a negative a priori expectation while degree of openness has a positive signs. The financial sector variable significantly affects manufacturing sector performance while degree of openness has a significant positive impact. The possible explanation could be likened to the advantages derivable from importation of both capital and raw material resources require in the production process. The criterion for estimator selection favours fixed effect model given the significant value of Hausman tests via Swamy-arora transformation but the preference changed in favour of random effects under Nerlove transformation as indicated on table 2 (a). Interestingly however is the statistical importance of economic freedom index.

Unlike agriculture and manufacturing sectors, the explanatory variables bear the hypothesized signs but with the exception of the degree of openness variable which carries a negative sign in both estimators. Apart from financial development variable that has a significant positive impact on service sector performance, both FDI and economic freedom index are also found to be positively correlated with service sector value added. While economic freedom has a significant positive impact on the one hand, foreign direct investment impacts do not appear to be significant

statistically. Just like the case of agriculture, degree of openness seems to exert negative impact on service sector performance but occurring at 5% level of significance. In addition, economic freedom variable is statistically significant at a 1% level of significance.

Conclusion

This study examines the relationship between foreign direct investment inflow and economic performance while economic freedom is controlled for in a panel of nineteen sub-Saharan African countries. The selection of the countries was based on data availability consideration and of which the study period covers 1995 to 2010. The panel data modelling approach was adopted for the analysis and both the fixed and random effects models were estimated.

However, decision on which of the model is considered appropriate is made by the Hausman test result. Apart from the economic-wide performance measure (proxied by GDP per capita), three different proxies of economic performance were also adopted namely: agricultural performance measure proxied by agricultural value added, manufacturing sector performance captured by manufacturing sector value added and lastly, service sector performance measured by service sector value added in the SSA region.

The study revealed that FDI inflow has a significant positive influence on a measure of overall economic-wide performance captured by GDP per capita in the region when economic freedom is controlled for. However, the effect was found to be little and negligible and this is unsurprising in a region where the bulk of FDI flows are directed at the extractive sector whose impacts are known to be sectionalized and hence limited. This may be likened to the nature of inelasticity of the demand for the products both locally and internationally. On a sectoral basis, FDI inflow was found to have insignificant effect on agricultural sectoral performance. This could be said to have been due to several factors like non profitable nature of the sector as compared to other sectors like mining and extractive industries; smallness and subsistence nature of the sector at least in the region, which is mostly non commercial both in terms of its scale and modus operandi; being relegated in terms of usefulness as compared to other sectors and as well as its relative uncompetitiveness owing largely to vagaries of the farm produce.

In terms of manufacturing sector performance estimation, the result was not significantly different from that of agricultural sector. This per-

haps plausibly explains by the moribund state of manufacturing sector in the region. FDI was also found to have a positive but insignificant effect on the service sector performance in the region however; this is not surprising because the sector is still at its infancy in the region.

Quite interestingly however, economic freedom was found to be germane in influencing economic performance in all the models. In the light of the resulting outcomes, it is therefore recommended that policies aimed at strengthening economic freedom culture being given top priority on the developmental policy agenda. This can be achieved by according every dimensions of economic freedom index utmost importance. In other word, by ensuring as well as maintaining investment and business freedoms, making banking industry enjoys both financial and policy independent devoid of government control, and putting in place law and regulations prohibiting any forms of flagrant abuses of copyrights, patent and franchise rights. The region also needs to adopt targeted approach which places the region in a vantage position at attracting FDI into the manufacturing and service sector as these sectors are likely to provide superlative value added to the region's economy than that of the primary sector.

Notes

1 A plethora number of studies have examined the absorptive capacity of the host country via different mediating links which include: domestic economy's trade, human capital policies, physical capital accumulation, market size, natural resource endowment, financial sector development and institutional factors among others.

2 The two most important definitions of EF are that given by Heritage Foundation and Frazer Institute. The former defined EF as 'the absence of government coercion or constraint on the production, distribution, or consumption of goods and services beyond the extent necessary for citizens to protect and maintain liberty itself.' By extension, the highest form of economic freedom provides an absolute right of property ownership; fully realized freedoms of movement for labour, capital and goods. The latter conceived EF as: individuals have economic freedom when the property they acquire without the use of force, fraud, or theft is protected from physical invasions by others; and they are free to use, exchange, or give their property to another as long as their actions do not violate the identical rights of others (Gwartney, Lawson, and Block 1996).

3 SSA growth records have been described as 'abysmally disappointing' in spite of the incipient recovery in growth rates in the last decade, they are

still far lower to accommodate the desired threshold require to launch the region on the path of sustainable development.

4 Explore modernization and core-periphery theories of FDI for detail expositions.

5 Some studies in this literature have found that FDI exerts a positive growth effect on the recipient countries (De Mello 1999, Chong et al. 2010), while others have found no such evidence (Ericsson and Irandoust 2001) or even a negative effect (Moran 1998) on growth.

6 Such studies have neglected regional specific peculiarities. It would amount to policy misapplication if other continents' experiences have to be extrapolated for a continent with distinct socio-economic and political settings like SSA.

7 Angola, Botswana, Cote D'Ivoire, Ethiopia, Gabon, Ghana, Guinea, Kenya, Lesotho, Madagascar, Malawi, Mozambique, Namibia, Senegal, South Africa, Swaziland, Uganda, Tanzania and Togo.

8 World Development Indicator.

9 African Development Bank.

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Poverty and Economic Growth in Swaziland: An Empirical Investigation

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This paper examines the causal relationship between poverty reduction and economic growth in Swaziland during the period 1980–2011. Unlike some of the previous studies, the current study uses the newly developed ARDL-bounds testing approach to co-integration, and the ECM-based Granger causality method to examine this linkage. The study also incorporates financial development as a third variable affecting both poverty reduction and economic growth – thereby leading to a trivariate model. The results of this study show that economic growth does not Granger-cause poverty reduction in Swaziland – either in the short run or in the long run. Instead, the study finds a causal flow from poverty reduction to economic growth in the short run. These findings, however, are not surprising, given the high level of income inequality in Swaziland. Studies have shown that when the level of income inequality is too high, economic growth alone may not necessarily lead to poverty reduction.

Key Words: poverty, economic growth, ARDL-bounds testing approach, Swaziland
JEL Classification: C320, I320, O550

Introduction

The eradication of extreme poverty and hunger comprises the first, and possibly the most important, of the Millennium Development Goals (MDGs) of the United Nations. Despite meeting the target of halving global extreme poverty rates (by 2015), five years ahead of schedule, more than 1.2 billion people are still living on less than USD 1.25/day (United Nations 2014). Many countries in Sub-Saharan Africa and Asia are lagging behind in meeting the MDGs. In Sub-Saharan Africa for instance, there has been very little reduction (if any), in the proportion of the poor in the region. Approximately 48% of the population in the developing countries was still living below the USD 1.25/day international standard,

in 2010. In contrast, 58% of the population was living below the poverty line in 1999, and 52% in 2005 (World Bank 2014a). The slow improvement in the living standards of the poor comes in the wake of the region experiencing positive growth rates in recent years, with an average annual GDP growth rate of approximately 4.9% since 2000.

Swaziland, like many other Sub-Saharan African countries, is characterised by very high-income inequalities. With a *per capita* gross national income (GNI) of USD 2,233 in 2011, the country is classified as a lower-middle-income economy. However, the proportion of the poor in the country has remained relatively high over the years. Approximately 40.6% of the population were living on less than USD 1.25/day in 2010, while 60% of the population survived on less than USD 2/day (World Bank 2014a).

The current study adds to the literature on poverty in developing countries by investigating the causal relationship between economic growth and poverty reduction in Swaziland. The study makes use of the recently developed ARDL-bounds testing approach to co-integration, and the ECM-based Granger causality model to examine this linkage. In addition, the study incorporates a measure of financial sector development, as a third variable, affecting economic growth and poverty.

The relationship between financial development and economic growth, on the one hand, and financial development and poverty reduction, on the other hand, is well documented in economic literature. Researchers have found that financial development has a positive effect on economic growth (Caporale et al. 2004; King and Levine 1993; Christopoulos and Tsionas 2004). Likewise, financial development impacts positively on poverty (Beck et al. 2004; DFID 2004; Honohan 2004; Jalilian and Kirkpatrick 2005; Odhiambo 2009b; 2010; Jeanneney and Kpodar 2005).

To our knowledge, this might well be the first study to examine in detail the relationship between poverty reduction and economic growth in Swaziland – using modern time-series techniques. The rest of the paper is organized as follows: the second section provides an overview of the poverty and income trends in Swaziland, while the third section reviews the literature. The fourth section discusses the estimation techniques used in the analysis, as well as the regression results. Lastly, the fifth section concludes the study.

Overview of GDP and Poverty Trends in Swaziland

The population in Swaziland was approximately 1, 249 million in 2013, with nearly 79% of the total population living in rural areas. The poverty

in Swaziland mostly emanates from the high inequalities in income distribution. For instance, while the per capita GNI was over USD 2,000 in 2011, more than 50% of the total income went to the richest 20% of the population in 2010. In contrast, the poorest 20% accounted for only 4% of the total income. In addition, the Gini coefficient (which is a measure of the extent to which the distribution of income/consumption expenditure among individuals or households within an economy deviates from a perfectly equal distribution) is approximately 50.45% (World Bank 2014a).

To address the high-income inequality in the country, the government of Swaziland implemented the Poverty Reduction Strategy and Action Plan (PRSAP) in2005, through the Ministry of Economic Planning and Development. The PRSAP's target was to reduce poverty by more than 50% by 2015, and ultimately to eradicate it by 2022. The main goals of the PRSAP include: (i) macro-economic stability with sustainable economic growth; (ii) rapid acceleration of economic growth based on a broad participation; (iii) empowering the poor to generate income and reduce inequalities; (iv) improvement of the quality of life of the most vulnerable; (v) strengthening of governance institutions to increase the impact of policies for poverty reduction; and (vi) fair distribution of the benefits of growth through fiscal policy (Ministry of Economic Planning and Development 2005).

An assessment of poverty in Swaziland, as measured by international poverty measures shows that there has been a decline in poverty in the country over the years. Approximately 78.59% of the population lived on less than USD 1.25/day in 1995. This figure declined to 62.85% in 2001, and 40.63% in 2011 (World Bank 2014a).

Likewise, non-monetary measures of poverty indicate that there has been a considerable improvement in the living standards of the people of Swaziland. For instance, as shown in figure 1, overall access to sources of drinking water has improved over the years. While only about 39% of the total population had access to reliable sources of water in 1990, the figure rose to 74% in 2012. The greatest improvement has been in the provision of water to the rural population, which comprised 77% and 78% of the total population in 1990 and 2012, respectively. Improved access to drinking water increased from 25% of the population in 1990, to 69% in 2012 among the rural population.

On the other hand, access to drinking water to the urban population has remained relatively high over the years. Whereas 86% had access to drinking water in 1990; about 94% of the urban population had access to reliable sources of drinking water in 2012 (World Bank 2014b).

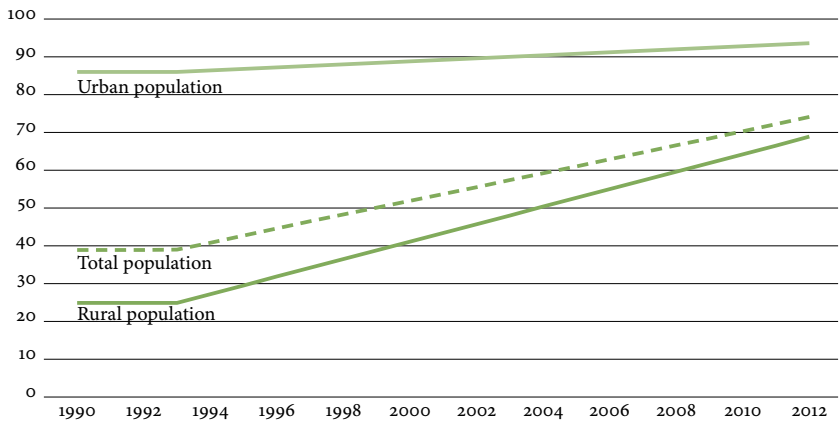

FIGURE 1 Improved Water Source in Swaziland (% of population, based on data from the World Bank 2014b)

Provision of improved sanitation has, however, been less successful than that of access to drinking water. Whereas, approximately 49% of the total population had access to improved sanitation in 1990, the figure increased to only about 58% in 2012. Similarly, in the last 22 years, improved sanitation to the rural population has increased from 44% of the population in 1990, to 56% in 2012. Access to improved sanitation to the urban population has, however, remained at about 63% of the population over the years.

A major challenge for the country is that economic growth has been declining over the years. Average per capita GDP fell from 4.79% in the 1980s, to 2.49% in the 1990s, 1.12% in the 2000s, and –0.10% during the last four years (World Bank 2014b). This is in sharp contrast to most of the other sub-Saharan African countries, which have experienced remarkable growth during the last 15 years.

Another challenge the country faces is that the manufacturing sector is one of the leading sectors that provides employment in the country; and it is a major source of income for many families. The United States is one of the major destinations of exports from the textile industry. However, with the country recently losing its African Growth and Opportunity Act (AGOA) privileges, there is a strong possibility of many job losses in the manufacturing sector, which would likely exacerbate the decline in economic growth, and possibly increase poverty in the country. Figure 2 shows the trends in per capita GDP growth in Swaziland over the years.

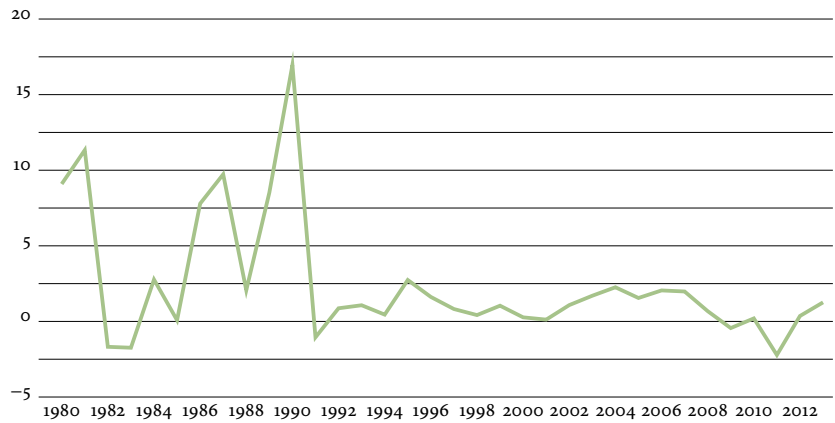

FIGURE 2 Per Capita GDP Growth in Swaziland (%, 1980–2013, based on data from the World Bank 2014b)

Literature Review

There are two contentious views on the relationship between economic growth and poverty in the literature. The 'trickle-down theory' contends that economic growth plays an essential role in poverty reduction in any given country – provided that the distribution of income remains constant. Proponents of this view believe that the benefits of higher economic growth in a country trickle down to the poor. As such, poverty reduction policies should be aimed at boosting economic growth (Aghion and Bolton 1997; Todaro 1997; Roemer and Gugerty 1997; Dollar and Kraay 2002; Norton 2002; Ravallion and Chen 2003; Bourguignon 2004; Thorbecke 2013).

On the other hand, the 'trickle-up theory' asserts that economic growth does not improve the lives of the very poor; but rather, the 'growth processes' tend to 'trickle-up' to the middle classes and the very rich (Todaro 1997). This, in turn, results in a worsening of the distribution of income (i. e., increases in inequality), which then increases poverty.

Put differently, the theory asserts that there are reinforcing factors that maintain poverty amongst the poor population and impede them from contributing to economic growth. The literature essentially contends that countries do not grow fast, because they are simply too poor to grow. This is because poverty dampens economic growth – by creating a vicious circle, whereby high poverty levels lead to lower aggregate growth.

In turn, low growth results in high levels of poverty. In such a scenario, development policies should be aimed at improving the living standards

of the poor, which in turn, would ultimately result in virtuous circles that promote economic growth (Norton 2002; Bourguignon 2004; Lopez 2006; Johannes and Joëlle 2011; Thorbecke 2013).

The extent to which economic growth results in a reduction in poverty in a particular country depends on the initial income distribution, and on how it shifts, as the economy grows. The Kuznets (1955) curve hypothesis asserts that, as incomes grow in the early stages of development, income inequality initially increases – as a wider proportion of the population partakes in the rising national income. However, if the disparity in income distribution and growth worsens, then there would be an increase in poverty (McKay 2013). Thus, the higher the income inequality in an economy, the less effect growth would have on reducing poverty (Lustig, Arias, and Rigolini 2000).

Notable studies on the relationship between poverty and growth include those by De Janvry and Sadoulet (2000), Ravallion and Chen (2003), Basu and Mallick (2008), Odhiambo (2009a; 2011), Sala-i-Martin and Pinhovskiy (2010), Arif and Farooq (2011), Young (2012), McKay (2013), and Okoroafor and Chinweoke (2013). De Janvry and Sadoulet (2000) analysed the determinants of change in poverty and inequality in 12 Latin American countries for the period 1970–1994. They found evidence suggesting that per capita aggregate income growth leads to a reduction in the incidence of urban and rural poverty.

Ravallion and Chen (2003) calculated the distributional component of a poverty measure in China in the 1990s,by fixing the mean relative to the poverty line. In addition, they calculated the mean growth rate for the poor. They found that the changes in the distribution of income were poverty reducing only in the early part of the decade. Basu and Mallick (2008) made use of several measures to examine the relationship between economic growth and poverty in India. They found little evidence to suggest that economic growth led to a reduction in poverty. They concluded that the emergence of capital-labour substitution had inhibited the trickling down of the benefits of economic growth to the poor.

Using the ARDL-Bounds testing approach, Odhiambo (2009a) examined the causal relationship between financial development, economic growth and poverty reduction in South Africa for the period 1960–2006. The author found that a unidirectional causal flow from economic growth to poverty reduction existed in South Africa. Sala-i-Martin and Pinhovskiy (2010) estimated income distributions, poverty rates, and inequality and welfare indices for African countries for the period 1970–

2006. They found that the recent spurt in growth in Africa was accompanied by a symmetrical and sustained reduction in poverty, and thus, had a 'trickle-down' effect.

In a later study, Odhiambo (2011) investigated the dynamic relationship between economic growth, unemployment, and poverty reduction in South Africa for the period 1969–2006 using the ARDL-Bounds testing approach. The author found no evidence of a causal relationship between poverty reduction and economic growth in South Africa. Young (2012) uses estimates of the level and growth of real consumption to investigate changes in poverty in 29 sub-Saharan and 27 other developing countries. The author found that living standards in sub-Saharan countries have improved during the last two decades – thereby implying a reduction in poverty.

McKay (2013) analysed the growth and poverty reduction nexus in 25 of the largest sub-Saharan countries in the last two decades, using information from household surveys. The author found that there has been a significant reduction in poverty in most of these countries. However, the reduction in non-monetary poverty was to a lesser extent than that of monetary poverty. Okoroafor and Chinweoke (2013) made use of the OLS technique to examine the relationship between poverty and economic growth in Nigeria for the period 1990–2011. They found no evidence of a correlation between the two variables. They attributed this to the poor attitude of government towards human-capital development.

Estimation Techniques and Empirical Analysis

STATIONARITY TESTS

Although the ARDL-bounds testing approach does not require all the variables included in this analysis to be integrated of the same order, it requires that variables be either integrated of order zero [i. e. I(0)], or order one [i. e. I(1)]. In other words, the technique cannot be used when any of the variables in the regression analysis is integrated of order two or higher.

Consequently, it is important to conduct a unit root test, in order to ensure that none of the variables included in this analysis is I(2) or higher. For this purpose, three unit root tests have been used, namely the Phillips-Perron (PP) Test, the Dickey-Fuller GLS Test and the Ng-Perron Test. The results of these tests in levels are reported in tables 1–3.

The results reported in tables 1 and 2 show that all the variables employed in this study are non-stationary in their levels. The results of the

TABLE 1 Stationarity Tests of Variables: Phillips-Perron and Dickey-Fuller-GLS Tests

Variable	Phillips-Perron				Dickey-Fuller-GLS			
	Without trend		With trend		Without trend		With trend	
	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Ly/N	−2.37	−4.81***	−1.07	−5.00***	−1.13	−3.42***	−1.02	−4.59***
LPOV	−0.78	−4.96***	−2.19	−5.09***	−0.71	−4.32***	−1.71	−5.22***
LFD	−1.39	−5.55***	−0.86	−6.19***	−1.21	−4.77***	−1.14	−5.95***

NOTES Column headings are as follows: (1) level, (2) 1st difference. The truncation lag for the PP tests is based on Newey and West (1987) bandwidth. Critical values for Dickey-Fuller GLS test are based on Elliot-Rothenberg-Stock (1996, table 1). *** denotes statistical significance at the 1% level.

TABLE 2 Stationarity Tests of Variables: Ng-Perron Test (Level)

Variable	Without trend				With trend			
	MZ	MZ_t	MSB	MPT	MZ	MZ_t	MSB	MPT
Ly/N	−5.56	−1.54	0.28	4.74	−1.90	−0.76	0.39	34.63
LPOV	−1.47	−0.69	0.47	13.33	−3.21	−1.23	0.38	27.49
LFD	−2.89	−1.11	0.38	8.26	−2.92	−1.01	0.34	26.03

TABLE 3 Stationarity Tests of Variables: Ng-Perron Test (First Difference)

Variable	Without trend				With trend			
	MZ	MZ_t	MSB	MPT	MZ	MZ_t	MSB	MPT
DL$y/N$	−11.39**	−2.27**	0.19**	2.59**	−15.29*	−2.76*	0.18*	5.97*
DLPOV	−14.19***	−2.65***	0.19**	1.75***	−22.65**	−3.31**	0.14**	4.35**
DLFD	−11.40**	−2.34**	0.20**	2.31**	−75.44***	−6.12***	0.08***	1.28***

NOTES *, ** and *** denote 10%, 5% and 1% level of significance, respectively.

Phillips-Perron (PP), the Dickey-Fuller – GLS and Ng-Perron tests reject the stationarity – irrespective of whether the test is conducted at the 1%, 5% or 10% levels of significance. The variables are, therefore, differenced once, in order to perform stationarity tests on differenced variables.

Based on the results reported in tables 1 and 3, it is clear that after differencing the variables once, all the variables were found to be stationary. The results of all the unit-root tests employed here show that all the three variables are integrated of order one. This applies irrespective of whether the variables are estimated with or without trend. This shows that none of the variables is integrated of order 2 or higher. Consequently, we can now

use the recently introduced ARDL-bounds testing approach to examine the long-run relationship between these three variables.

CO-INTEGRATION TEST: THE ARDL-BOUNDS TESTING PROCEDURE

The Autoregressive Distributed Lag (ARDL)-Bounds model used in this study can be expressed as follows (see also Odhiambo 2011):

$$\begin{aligned}\Delta \ln y/N_t = {} & \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta \ln y/N_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta \ln \mathrm{POV}_{t-i} \\ & + \sum_{i=0}^{n} \alpha_{3i} \Delta \ln \mathrm{FD}_{t-i} + \alpha_4 \ln y/N_{t-1} + \alpha_5 \ln \mathrm{POV}_{t-i} \\ & + \alpha_6 \ln \mathrm{FD}_{t-i} + \mu_t, \end{aligned} \tag{1}$$

$$\begin{aligned}\Delta \ln \mathrm{POV}_t = {} & \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \ln \mathrm{POV}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \ln y/N_{t-i} \\ & + \sum_{i=0}^{n} \beta_{3i} \Delta \ln \mathrm{FD}_{t-i} + \beta_4 \ln \mathrm{POV}_{t-i} + \beta_5 \ln y/N_{t-1} \\ & + \beta_6 \ln \mathrm{FD}_{t-i} + \mu_t, \end{aligned} \tag{2}$$

$$\begin{aligned}\Delta \ln \mathrm{FD}_t = {} & \delta_0 + \sum_{i=1}^{n} \delta_{1i} \Delta \ln \mathrm{FD}_{t-i} + \sum_{i=0}^{n} \delta_{2i} \Delta \ln y/N_{t-i} \\ & + \sum_{i=0}^{n} \delta_{3i} \Delta \ln \mathrm{POV}_{t-i} + \delta_4 \ln \mathrm{FD}_{t-i} + \delta_5 \ln y/N_{t-1} \\ & + \delta_6 \ln \mathrm{POV}_{t-i} + \mu_t, \end{aligned} \tag{3}$$

where $\ln y/N$ is the log of real per capita income, $\ln \mathrm{POV}$ is the log of private consumption per capita (a proxy for poverty reduction), $\ln \mathrm{FD}$ is the log of domestic credit to the private sector (a proxy for financial sector development), μ_t is white noise error term, and Δ is the first difference operator.

The annual time-series data, which cover the period 1980–2011, have been used in this study. The data were obtained from various issues of the International Financial Statistics (IFS) and the World Development Indicators.

Due to the lack of time-series data on poverty in most developing countries, a number of proxies have been proposed in the literature as

possible measures of poverty. For example, some previous studies have used datasets based on Deininger and Squire (1996) and Lundberge and Squire (1998). These datasets, give both the income and headcount data for the poor, as well as the Gini coefficient. Others have, however, used the annual income per capita as a proxy for poverty.

Unfortunately, the annual income per capita is somewhat unreliable – as it fails to account for other dimensions of poverty (see Odhiambo 2009a; 2011). On account of this weakness, we decided to use per capita consumption rather than per capita income as a proxy for poverty (see also Odhiambo 2009a; 2011; Quartey 2005). Moreover, previous studies have shown that consumption expenditure among the poor is usually more reliably reported; and it is more stable than income (see Ravallion 1992). Hence, our assumption is that the higher the per capita private consumption, the lower the poverty rate in the study country, and vice versa. This measure is also consistent with the World Bank's definition of poverty as, 'the inability to attain a minimal standard of living,' when measured in terms of basic consumption needs (World Bank 1990).

The current study uses the newly developed ARDL-bounds testing approach to examine the causal relationship between economic growth, financial development and poverty reduction in Swaziland. The ARDL-bounds testing approach was originally introduced by Pesaran and Shin (1999) and later extended by Pesaran, Shin, and Smith (2001). It involves two steps. In the first step, the appropriate lag lengths of the differenced variables in Equations (1)–(3) are selected. For this purpose, we use the Schwartz-Bayesian Criterion. In the second step, we apply the bounds-*F*-test to equations (1)–(3), in order to establish a long-run relationship between the variables of economic growth, poverty reduction and financial development. The results of the bounds test are reported in table 4.

The results reported in table 4 show that the calculated *F*-statistic is higher than the upper-bound critical value in the two equations, namely poverty reduction and financial development, but not in the economic growth equation. The calculated *F*-statistics in the poverty reduction and financial development equations are higher than the asymptotic critical values at the 1% and 5% levels, respectively. This, therefore, confirms the existence of a co-integration relationship among economic growth, poverty reduction and financial development in these two equations. Unlike in the case of poverty reduction and financial development, the calculated *F*-statistic in the economic growth equation is lower than the upper-bound critical value, which means that the null hypothesis of no co-integration cannot be rejected in this case.

TABLE 4 Bounds *F*-test for Co-integration

Dependent variable		Function		*F*-test statistic	
ln*y*/*N*		ln *y*/*N* (lnPOV, lnFD)		1.9701	
lnPOV		lnPOV (ln*y*/*N*, lnFD)		6.4101***	
lnFD		lnFD(ln*y*/*N*, lnPOV)		4.8963**	
Asymptotic critical values					
1%	1%	5%	5%	10%	10%
I(0)	I(1)	I(0)	I(1)	I(0)	I(1)
4.13†	5.00†	3.10†	3.87†	2.63†	3.35†

NOTES ** and *** denote statistical significance at the 5% and 1% levels, respectively. † Pesaran, Shin, and Smith (2001, 300).

GRANGER NON-CAUSALITY TEST

Having established that there is a long-run relationship between economic growth, poverty reduction and financial development, the next step is to examine the short-run and long run causality between these variables. For this purpose, we use the following error-correction based Granger causality model in a trivariate setting (see also Odhiambo 2011; Narayan and Smyth 2006; 2008).

$$\Delta \ln y/N_t = \alpha_0 + \sum_{i=1}^{n} \alpha_{1i} \Delta \ln y/N_{t-i} + \sum_{i=0}^{n} \alpha_{2i} \Delta \ln \mathrm{POV}_{t-i} + \sum_{i=0}^{n} \alpha_{3i} \Delta \ln \mathrm{FD}_{t-i} + \alpha_4 \mathrm{ECM}_{t-1} + \mu_t, \quad (4)$$

$$\Delta \ln \mathrm{POV}_t = \beta_0 + \sum_{i=1}^{n} \beta_{1i} \Delta \ln \mathrm{POV}_{t-i} + \sum_{i=0}^{n} \beta_{2i} \Delta \ln y/N_{t-i} + \sum_{i=0}^{n} \beta_{3i} \Delta \ln \mathrm{FD}_{t-i} + \beta_4 \mathrm{ECM}_{t-1} + \mu_t, \quad (5)$$

$$\Delta \ln \mathrm{FD}_t = \delta_0 + \sum_{i=1}^{n} \delta_{1i} \Delta \ln \mathrm{FD}_{t-i} + \sum_{i=0}^{n} \delta_{2i} \Delta \ln y/N_{t-i} + \sum_{i=0}^{n} \delta_{3i} \Delta \ln \mathrm{POV}_{t-i} + \delta_4 \mathrm{ECM}_{t-1} + \mu_t, \quad (6)$$

where ECM_{t-1} is the lagged error-correction term obtained from the long-run equilibrium relationship.

TABLE 5 Granger Non-Causality Test

Variable	$\Delta \ln y/N_t$	$\Delta \ln POV_t$	$\Delta \ln FD_t$	ECM_{t-1}
$\Delta \ln y/N_t$	–	4.735 (0.0185)**	0.334135 (0.7192)	–
$\Delta \ln POV_t$	0.331007 (0.7219)	–	2.711782 (0.0896)*	−0.070692 [−0.760714]
$\Delta \ln FD_t$	6.932 (0.0049)***	1.612626 (0.2231)	–	−0.254334*** [−3.551433]

NOTES ***, ** and * denote statistical significance at the 1%, 5% and 10% levels, respectively.

The causality in this case is examined through the significance of the coefficient of the lagged error-correction term and the *F*-statistic. The results of the causality tests are reported in table 5. While the short-run causality is represented by the significance of the *F*-statistic, the long-run causality is determined by the *t*-statistic on the coefficient of the lagged error-correction term (see also Odhiambo 2009b; 2011; Narayan and Smyth 2006). The results of the causality tests are reported in table 5.

The results reported in table 5 show that economic growth does not Granger-cause poverty reduction in Swaziland. This applies irrespective of whether the causality test is conducted in the short run or in the long run. Instead, the results show that it is poverty reduction that Granger-causes economic growth in the short run. The causality from economic growth to poverty reduction has been rejected by the coefficients of the error-correction term and the *F*-statistic in the poverty reduction equation, which were found to be statistically significant.

The short-run causality from poverty reduction to economic growth, on the other hand, has been accepted by the corresponding *F*-statistic, which is statistically significant in the economic growth equation. Other results show that: (i) There is a distinct short-run and long-run causal flow from economic growth to financial development in Swaziland; and (ii) financial development Granger-causes poverty reduction in Swaziland in the short run.

Conclusion

In this study, we have examined the causal relationship between poverty reduction and economic growth in Swaziland – using time-series data from Swaziland. There are currently two conflicting views regarding the

causal relationship between economic growth and poverty reduction. The first view posits that higher economic growth trickles down to the poor. The second view, however, maintains that economic growth does not necessarily lead to poverty reduction. In fact, the latter view argues that the beneficial effects of economic growth 'trickle up' to the middle-class and the super rich. Unlike some of the previous studies, the current study makes use of the recently developed ARDL-bounds testing approach to co-integration and the ECM-based Granger-causality model to examine the dynamic linkage between economic growth and poverty reduction in Swaziland.

The results of this study show that economic growth does not Granger-cause poverty reduction in Swaziland – either in the short run or in the long run. Instead, the study finds a causal relationship from poverty reduction to economic growth in the short run. These findings, however, are not surprising given the high level of inequality in Swaziland. Studies have shown that when the level of income inequality is too high, economic growth alone does not necessarily lead to poverty reduction. Previous studies have shown that economic growth is unlikely to trickle down to the poor when the country's level of income inequality is high. Swaziland, whose GINI coefficient is estimated to 50.45, is currently ranked number eight (8) in Africa-based on the current CIA country comparison. Other results show that: (i) There is a distinct short-run and long-run causal flow from economic growth to financial development in Swaziland; and (ii) financial development Granger-causes poverty reduction in Swaziland in the short run.

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Managing Consumer-Based Brand Equity in Higher Education

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The purpose of this study is to establish the key elements of brand equity for international students by exploring existing brand equity theory in its applicability to international higher education (HE). The main objective of this research is to enhance academic understanding of brand equity in the HE sector and explore the implications for management practice. Quantitative data collected via a self-completion survey are used to test a model of brand equity in the context of HE. The empirical setting is Slovenia, which has a mixture of public and private provision and an increasingly competitive environment. The results provide support for the proposed conceptual model, with image-related and awareness-related determinants. The findings of this research provided evidence that the customer-based brand equity model can be applied to the HE context as an element of competitive advantage and used to guide marketing activities for Universities internationally.

Key Words: brand perception, brand equity, higher education, services marketing, European Union, Slovenia
JEL Classification: A10, C30, M30, M31

Introduction

The potential to provide customers with information about experience and credence qualities in advance of purchase has resulted in widespread recognition of the significance of brands in relation to consumer choice in the service sector. Arguably, what is of particular significance in this process is brand equity. It is often suggested that marketing in the service sector is relatively challenging due to the unique characteristics of the service and the dominance of experience and credence qualities. A particular consequence is that perceived risk is generally higher in a service selection decision because consumers find services more difficult to evaluate in advance of purchase (Laing et al., 2002). In this situation, the brand can play an important role as a risk reliever, giving consumers greater confidence in their decision making and increasing trust (Erdem and Swait

1998). In essence, the brand provides a signal or a promise to consumers about the service that will be delivered, thus mitigating some of the problems associated with experience and credence qualities (De Chernatony and McDonald 1998). As well as a risk reliever, because the brand is a source of information, it can also serve as a tool for differentiation and ease the consumer choice process by creating distinctiveness (Gabbott and Hogg 1998). Thus, the brand has been increasingly recognized as an important determinant of consumer choice in the service sector (Turley and Moore 1995).

Over the past two decades in particular, marketing research and marketing practice have paid increasing attention to the processes associated with building a strong relationship between brand and consumer and it is often argued that the brand is the most valuable asset for any company (Kapferer 1997; Aaker 1991; 2003). The concept of brand equity is of particular relevance to consumer choice. In essence, brand equity measures the equity of the brand, both to the organization and to the consumer. For the consumer, this added equity arises from the brand's role as an indicator of desirable attributes and as the basis for building an emotional bond (Teas and Grapentine 1996). The current study works with existing models of brand equity as an element of competitive advantage and adapts them for use in the service sector and in the specific context of HE. The resulting brand equity model is then tested in an HE market using current HE students.

Over the past 50 years, HE, like most industries, has been impacted by globalisation. During this time, international student mobility within HE has grown exponentially resulting in universities around the world competing for international students. While marketing may be regarded in many academic circles as a dirty word, this hasn't stopped institutions from recognising that they need to market themselves in a climate of international competition (Hemsley-Brown and Oplatka 2006). HE provides an interesting and important context for the research, since HE institutions across the world have become increasingly 'marketing oriented' and students increasingly become 'consumers' (Mazzarol and Soutar 2008). The distinctive contribution of this research arises from an integration of the existing brand equity models which results in a conceptual multi-dimensional framework for the determinants of brand awareness, brand image and brand equity in service industries. The research makes a novel empirical contribution through testing the proposed conceptual framework in Slovenia as an example of an HE market.

This paper begins with a review of literature on customer-based brand equity theory and research conducted into brand equity within HE. Following on from this will be the methodology and then the empirical analysis before finishing with conclusions.

Theoretical Backgrounds

BRAND EQUITY

The first section of this literature review will analyse established theory concerning brand equity, and more specifically customer-based brand equity. The second section will look at research conducted into marketing of HE. As this study will be focusing on identifying the critical elements of creating brand equity in a HE marketing context as an element of competitive advantage, the focus of the literature review will be on customer-based brand equity. Aaker (1991, 4) offers that brand equity can: help a customer interpret, process, store, and retrieve a large quantity of information about products and brands; affect the customer's confidence in the purchase decision; and enhance a customer's satisfaction when the individual uses the product. Perhaps the first step to building a strong brand and fostering brand equity is to identify the power of the brand. Aaker (1991, 4) proposes five brand equity assets as the source of the equity created, they are: brand loyalty, brand name awareness, perceived brand quality, brand associations in addition to perceived quality, and other proprietary brand assets (patents, trademarks etc.). It is common for managers to recognise the importance of brand equity as an asset however their actions are sometimes more focused on short-term results than on that of building brand equity. Further, if brand-building activities are overlooked in lieu of activities that are more beneficial for short-term performance, declines in brand equity may not be realised if adequate systems to measure it are not in place. Brand building activities warrant a long-term focus, however are often sacrificed for sales promotions that yield a short-term return (Aaker 1991, 4). A great brand is not built by accident, but rather it is the result of accomplishing a series of logically linked steps with consumers (Keller 2008). Farquhar (1990) offers three elements for building a strong brand; they are a positive brand evaluation, accessible brand attitude and a consistent brand image. Positive brand evaluations involve the consumer believing that the brand delivers superior performance. Accessibility of a brand attitude relates to how quickly an individual can retrieve something stored in memory (Farquhar 1990), which is similar to Keller's (2008) brand recognition and recall. Finally,

Farquhar (1990) describes the importance of a consistent brand image, meaning that all marketing communications should be integrated and the message to be consistent throughout all mediums. Ultimately, it has been found that 'it is the consistency of this brand-consumer relationship that counts; if one changes, the other must too' (Farquhar 1990, 6).

Brand equity has been defined by Aaker (1991, 4) as: a set of assets such as name awareness, loyal customers, perceived quality, and associations that are linked to the brand and add equity to the product or service being offered. Keller (1993), on the other hand, defines brand equity as the effect of the brand on the consumers response to the marketing activities associated with a particular product. It is clear from the above definitions that 'brand equity is a multi-dimensional concept' (De Chernatony and McDonald 1998, 396) and can be considered from a number of different perspectives, including financial markets, the consumer, the firm, the employees and the channel of communication (Supornpraditchai et al. 2007). From a consumer's point of view, brand equity represents attributes such as better product performance, stronger risk reduction, lower information costs and a positive image of the product. Consumer-based brand equity represents the added equity of the brand to the consumer (Farquhar 1989).

For many, a university degree is a one-time purchase. Therefore, when looking at brand loyalty and brand equity and the application of existing theoretical models to HE marketing, one must consider these differences. For instance in the HE context there could be less emphasis on developing brand loyalty in terms of repeat purchase, and more emphasis on building customer-based brand equity to promote positive word of mouth marketing. This is not to say that brand loyalty is not pertinent to HE marketing as it is. But rather brand loyalty may look somewhat different in HE. In Keller's (2001) pyramid, brand loyalty assumes top priority and alludes to the importance of this in generating repeat purchases. It is described as the 'ultimate relationship' between brand and consumer and should be the underlying goal in marketing decision-making (Keller 2001). However, repeat purchase in HE may not be the key driver, but rather it could be student satisfaction, i. e. the experience involving the use of the product, as the key measure in developing customer-based brand equity. Keller's (2001) model for establishing brand equity is possibly the most comprehensive and will serve as the foundation for the discussion on establishing customer-based brand equity in the HE sector.

CUSTOMER-BASED BRAND EQUITY

Customer-based brand equity is the differential effect of brand knowledge on consumer response to the marketing of the brand (Keller 1993). It occurs when the consumer holds some favourable, strong and unique brand associations in their memory. A brand is said to have positive customer-based brand equity when consumers react more favourably to an element of the marketing mix for the brand than they do to the same marketing mix element when used by a fictitiously named or unnamed version of the product or service (Keller 1993). In other words, it can be defined as how much a customer likes the brand and how much this affinity toward the brand influences purchase behaviour. A true measure of the strength of a brand depends on how consumers think, feel, and act with respect to that brand (Keller 2008). Further, a key consideration when defining brand equity is that it is not absolute but relative to competition, i. e. it is the amount of confidence consumers place in a brand relative to its competitors and is thus the consumers' willingness to pay a premium price for that brand (Lassar, Mittal, and Sharma 1995).

Customer-based brand equity is said to have been achieved when the consumer has a high level of awareness and familiarity with the brand and holds some strong, favourable, and unique brand associations in memory (Keller 2008). This is an important factor when applying it to HE as it could take a number of years for a student to achieve these feelings. For example, a prospective student may be aware of a University as a brand but may not be familiar with the product having never used it. Furthermore, the student may not achieve strong, favourable and unique associations with the brand until they have completed a degree, or even longer, possibly years after graduation. The key focus of Keller's statement should be in achieving a high level of awareness, as students' decisions on study destinations are quite often made on recommendations from family, friends and current teachers (Maringe 2006).

THE BRANDING OF HE

The role of the brand in HE has been considered as very important. The brand is possibly the most important connection a prospective student has with an institution. The brand of a University carries with it a promise of a particular level of service and student outcomes. In the case of education, the service is more than a simple set of tangible features but is a complex bundle of benefits that satisfy customer's needs (Ivy 2008; Dermol et al. 2013). The level of satisfaction in a customer will influence the

level of brand equity. Further, brand image and reputation help to conjure up a level of brand equity in a prospective student. Image and reputation are critical in developing customer loyalty among University students. In the context of HE, loyalty can include a student's decision to stay on for advanced (postgraduate) studies following the completion of a bachelor (undergraduate) degree (Nguyen and LeBlanc 2001).

The concept of branding, as applied to HE, is somewhat different from branding in the commercial sector. Most notably, branding in HE is about who we are, and is not limited to what a particular product offers the marketplace. An educational brand is often equated to an institution's academic reputation. But, that explanation is far too limiting. Think of a college or university brand as being synonymous with the institution's personality-congruent with its mission, defined by its values. Perhaps the most significant benefit of branding in HE is the focus it brings to an institution. The values-centric approach inherent in branding provides an institution with an anchor to guide responses to constituent needs and expectations. The brand is defined by where the institution's values and the constituents' expectations intersect. In this paradigm, the brand becomes the filter through which everything is vetted (e. g., strategic directions, resource allocations, hiring decisions, and curriculum development). It serves as a lens to strategically focus the institution in the midst of fluid internal and external pressures as well as opportunities.

HE represents a context in which brand image potentially plays a major role in reducing the risk associated with such service largely because the assessment of quality takes place after consumption (Binsardi and Ekwulugo 2003; Chen 2008). Hence, having a strong brand is important as a risk reliever that simplifies the decision-making process (Erdem and Swait 1998). That is to say, the brand represents a differentiation tool that gives cues to the consumers during the decision-making process (Lockwood and Hadd 2007). In addition, there are a number of other factors that directly influence the evaluation of the educational quality and hence the perception of the university brand (Kurz, Scannell, and Veeder 2008). These factors include the quality of the staff, location, size, history and international agreements (Mazzarol and Soutar 2008; Mourad 2010). It was noted that many universities adopt a brand management strategy in order to improve their ranking in the HE market (Brunzel 2007). Finally, the social image of the educational institution as well as its overall position in the market are important in influencing the HE brand and thus impact on the selection process (Paden and Stell 2006).

There has been a great deal of research conducted on marketing of HE institutions internationally (Hemsley-Brown and Oplatka 2006; Ivy 2008). However, there has been limited research into the notion of branding in HE (Hemsley-Brown and Oplatka 2006). More specifically, there has been minimal, if any, amount of research conducted into establishing what builds customer-based brand equity within this specific industry.

Research Design and Data Collection

Conceptual Framework

The focus of this research is to determine the applicability of existing theory on customer-based brand equity to HE. The nature of the research is such that it will focus on the international student context of customer-based brand equity. The model used in this paper builds on the work of Keller and Aaker. Following Keller (1993) brand equity is presented as a two-dimensional construct-based around brand awareness and brand image. Brand loyalty is treated as an outcome of brand equity rather than one of its dimensions. Aaker (1991) defined brand awareness as the ability of a potential consumer to recognize the brand as a member of a specific product category and emphasized that awareness and recognition are essential before attaching attributes to the brand. While brand awareness is about the ability to link the brand to a product category, brand image is concerned with the associations that an individual makes with the brand. 'A brand association is anything "linked" in memory to a brand' (Aaker 1991, 109) and collectively, these brand associations define a brand image (Keller 1993). Brand associations may include a variety of attributes such as perceived quality, brand name and product attributes. The model for service brand equity developed in the current study focuses directly on the determinants of brand equity and is shown in figure 1.

Recognizing that brand equity has an awareness dimension, it is argued that awareness is largely driven by marketing activities including promotion activities and that these attributes will therefore serve as an important potential influence on overall brand equity. Similarly, with respect to the brand image dimension, key drivers of image and therefore of brand equity include service attributes, symbolic attributes and finance attributes. A broad range of factors have been identified as determinants of brand equity, recognizing that some attributes may be relevant to the awareness dimension while others may be relevant to the image dimension. Using a modification of the approach suggested by Vorhies (1997), these determinants have been categorized under a number of headings:

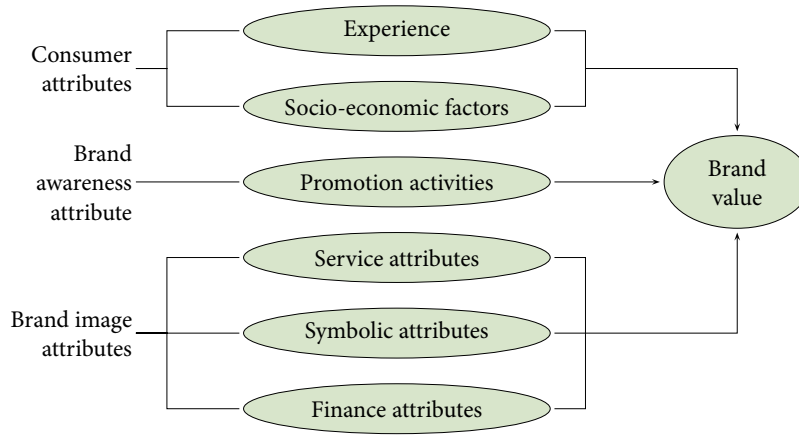

FIGURE 1 Proposed Conceptual Model of Brand Equity in HE

- *Consumer attributes.* These relate to the consumers own socio-economic characteristics and experience with the brand. In the proposed model consumer attributes were included age, experience with the service provided, gender and level/type of education (Lockwood and Hadd 2007).
- *Promotion activities.* This covers all the promotion activities conducted by the HE institutions (Chen 2008).
- *Service attributes.* These relate to attributes such as the perceived quality of the education service (Kurz, Scannell, and Veeder 2008; Chen 2008), range of courses, study method and quality management.
- *Symbolic attributes.* This encompasses associations relating to brand personality and identity and in our proposed model, represents the overall image, social responsibility, innovation and international area orientation of the faculty (Cheng and Tam 1997).
- *Finance attributes.* This covers the relationship between services quality and price and financial stability of the faculty.

RESEARCH METHOD

The current study concerns itself with the service sector and particularly, with HE. There is little empirical work addressing brand equity in HE (Palacio, Meneses, and Perez 2002), despite the potential significance of HE brands in student choice and the importance of credence qualities as well as experience qualities. The empirical setting is Slovenia, which has

mixed public and private provision and an increasingly competitive environment. In such competitive environment, brands have an important role to play in communicating the investment that has been made to ensure high-quality provision (Konrad 1995; Vukasovič 2011; 2012). The key data properties are expressed by descriptive statistics. The linear relations between the selected variables were determined by a correlation coefficient. The conceptual model and correlations in the model were tested by a linear structural equation modelling.

The sample chosen for the current study targeted 185graduate students, first and second year in Slovenia. University students were selected from the popular faculty in Slovenia. The most respondent of students were women (75%). The most respondent of students were in the group between 21 and 55 years, 81% of respondents is currently living in cities. A quantitative research method was used for data collecting. The method of data collection was based on questionnaire by e-mail. The final response rate of students was 77.5 percent.

The questionnaire was designed primarily using a range of established scales from previous studies. The introduction letter, reminder, and draft questionnaire were developed for purpose of the research. The guidelines were used in order to give the questionnaire a good look and feel, and to ensure that respondents could progress quickly through it. All questionnaires carried a stamped number in order to be able to add factual students' data. The data were collected using a structured questionnaire administered by e-mail survey with the use of closed answers (questions with multiple-choice answers). Considering the brand image dimension of brand equity and following the categorisation discussed earlier, the independent variables were:

- *Service attributes used by consumers to evaluate a service.* These relate to attributes such as the perceived quality of the education service (Kurz, Scannell, and Veeder 2008; Chen 2008), range of courses, study method and quality management. Scales for attributes were selected from existing studies while scales for the last two attributes were developed from exploratory research.
- *Symbolic attributes* were defined as social image, market position and personality (Lovelock 1991; De Chernatony 2001) and these were measured using a set of established scales.
- *Finance attributes.* This covers the relationship between services quality and price and financial stability of the faculty.

In terms of the brand awareness dimension, the activities that were identified as important were promotion activities (Aaker 1991; 2003). Given the context-specific nature of these activities, exploratory work was used to support the development of appropriate scale items. Finally, consumer attributes were separated from the image and awareness dimension and included age, experience with the service provided, gender and level/type of education. The dependent variable, brand equity was measured using a five-item Likert scale (1 = not at all agree, 2 = somewhat agree, 3 = agree, 4 = very agree and 5 = extremely agree).

Research Results

By the latter, the quantitative methods were used to determine how strong and the manner in which (indirect and direct correlation) individual factors in the model of the brand name equity are connected among them. The conceptual model and correlations in the model were tested by a linear structural equation modelling. By doing so, conformity of the theoretical conceptual model with the empirical data was tested. For the latter a statistical program LISREL was used. It was studied, which factors have an impact on the brand equity and how strong these impacts are. The reliability of the latent variables was tested by the structural modelling, using the Fornell-Larcker rule that together with the composite or the converging reliability of latent variables respectively also measures a discriminatory validity of latent variables by using average variance extracted (AVE). In the continuation the calculations for the statistical analyses are presented (table 1), but it must be emphasized that the converging reliability of the latent variable is larger than 0.6 and the average of the eliminated variances is larger than 0.5. The estimated statistics are larger than the recommended values, so it can be concluded that the measuring instrument used for the latent variables measuring is reliable, convergent and discriminatory valid.

Based on the calculations presented in the table 1 it can be concluded that the structural model is reliable regarding the presented statistical criteria (in the case of multiple measuring) and valid (regarding the theory or regarding which indicators measure the selected latent variables, respectively).

In the continuation, we have calculated the correlation coefficients between the latent variables (table 2).

Most of the correlation coefficients are greater than 0.3, which confirms the presence of correlations between the factors. Brand equity largely cor-

TABLE 1 Reliability and Discriminate Validity of the Latent Variables for the Proposed Model of Brand Equity in HE

Latent variables	(1)	(2)	(3)	(4)
Brand equity	0.92	0.78	4.53	0.53
Service attributes	0.88	0.78	4.56	0.63
Symbolic attributes	0.93	0.87	4.51	0.75
Finance attributes	0.82	0.69	4.48	0.81
Promotion activities	0.84	0.73	4.41	0.76
Consumer attributes	0.94	0.78	4.38	0.61

NOTES Column headings are as follows: (1) converging reliability of the latent variable (composite reliability), (2) discriminate validity: the average of the extracted variances AVE – average variance extracted, (3) median, (4) standard deviation.

TABLE 2 The Correlation between the Latent Variables (Factors)

Factors	(1)	(2)	(3)	(4)	(5)	(6)
(1) Brand equity	1.00	0.30*	0.61*	0,47*	0.54*	0.59*
(2) Consumer attributes	0.30*	1.00	0.23*	0.27*	0.14*	0.29*
(3) Service attributes	0.61*	0.23*	1.00	0.38*	0.40*	0.57*
(4) Promotion activities	0.47*	0.27*	0.38*	1.00	0.46*	0.50*
(5) Finance attributes	0.54*	0.14*	0.40*	0.46*	1.00	0.49*
(6) Symbolic attributes	0.59*	0.29*	0.57*	0.50*	0.49*	1.00

NOTES * Statistically significant at $p \leq 0.05$.

relates with the service attributes (the correlation coefficient is 0.61) (table 2). It is important to note that more than correlation coefficients significant regression coefficients and coefficients of the structural model, which is presented below the paper. The correlation indicates that there is only this, the extent to which variables are related (the extent to which the points are concentrated on the line), while the regression coefficients and coefficients of the structural model indicate the degree of relationship (slope of the line). With the help of the latter coefficients are presented below, it is possible to determine how much we can increase the brand equity, in the event that increases the value of the independent variables, such as consumer attributes. In addition, it should be noted that the bivariate correlations, are calculated in pairs, while the structural multivariate models, which means that all variables and indicators analysed at the same time or simultaneously, which is much more objective and closer to reality.

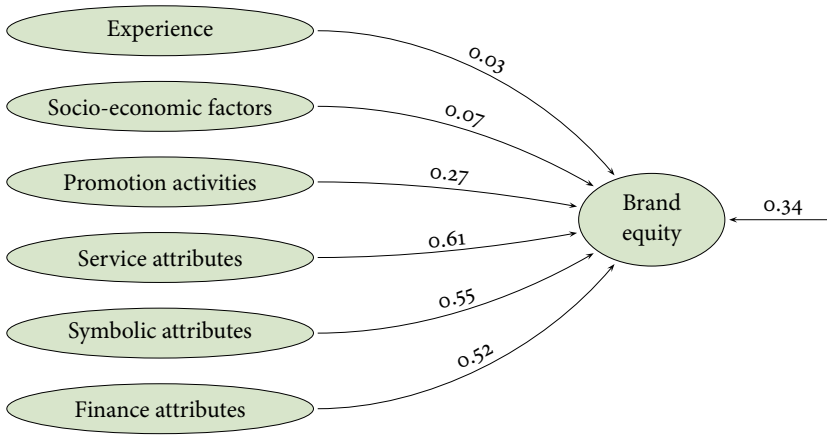

FIGURE 2 The Structural Model for Brand Equity in HE

In the continuation, relations in the structural model for the brand equity in HE are presented (figure 2).

The correlation strength is presented by arrows between the dependent variable and independent variables. An exception is a number on the far right end with a value of 0.34, which does not show relation strength, but an unexplained variance of the variables of the perceived brand name equity. This is a part of the variance of the perceived brand equity, which cannot be explained by the variables on the left side of the figure 2. The independent latent variables experience, socio-economic factors, promotion activities, service, symbolic and finance attributes explain 66% of the variability of the brand equity. Beside by evaluation with explained variance, the structural models can also be evaluated with respect of some other statistical criteria RMSEA (Root Mean Square Error of Approximation), NFI (Normed Fix Index), CN (Critical N), RMR (Root Mean Square Residual), GFI (Goodness of Fit Index). There are many evaluation criteria, but it is hard to say which one is the best or the most suitable. Therefore, in the continuation the selected criteria are presented, where based on the all presented criteria, it is possible to determine that the model fits the data relatively well. That is to say: RMSEA = 0.077 (if < 0, 080, the model is relatively good), NFI = 0.97 (if it is close to 1, then the model fits the data), CN = 186 (this value should be above 200 to fit well, but it is relatively close to 200), std. RMR = 0.039 (it should be below 0.050 to fit well), GFI = 0.93 (it should be above 0.90 to fit well). Because the presented structural model fit the data well, a content of the

TABLE 3 The Presentation of the Statistical Calculations of the *t*-Test

Correlation	*t*-statistics
Experience → brand equity	0.66
Socio-economic factors → brand equity	0.72
Promotion → brand equity	2.27*
Service attributes → brand equity	6.73*
Symbolic attributes → brand equity	2.45*
Finance attributes → brand equity	4.72*

NOTES * If $|t| > 1.65$, then the correlation is statistically significant.

structural model or relations between the latent variables can also be analysed. Our calculations show that the elements of the brand equity are very connected among themselves. The smallest connection strength is 0.34. The right part of the structural model shows that image-related determinants, like service attributes (0.61), symbolic attributes (0.55) and finance attributes (0.52) have the largest impact on the brand equity. Consumer attributes, like experience (0.03) and socio-economic factors (0.07) had no strong impact on ratings of brand equity. The promotion activities (0.27) have a smaller impact on brand equity. All the conclusions are based upon the presented structural model from the figure 2 and upon the statistical significance of the *t*-test, presented in table 3, which in all the made conclusions has a value of $|t| > 1.65$. The latter shows more than 95% certainty of the conclusions made for population based on the sample.

Conclusions

This paper presents the results of an analysis of the determinants of service brand equity in the context of a relatively high-credence service – HE. The findings of this empirical research suggest that the brand is a significant influence on the selection of a university. By implication, creating and managing strong universities' brands can have an important role to play in the HE market (Chen 2008). The results provided partial support for the proposed model; using the whole sample suggested that image-related determinants (like service, symbolic and finance attributes) were the major drivers of brand equity. Consumer attributes had no significant impact on ratings of brand equity. As a result, focusing on developing and maintaining the determinants of brand equity will help managers and marketers in positioning their service in the market and hence influenc-

ing the consumer choice. This is supported by Keller (2008) who noted that 'brand equity can help marketers focus, giving them a way to interpret their past marketing performance and design their future marketing programs.'

The research was limited to the sample and country. Only students from one faculty and one country were chosen to the sample. In the future students from other Slovenian faculty and other European countries should be included in the research. This would enable a generalization of results on the entire market in the region. In spite of limitations in the research, we are convinced that we helped the brand equity will be understood more deeply. The findings of this research provided evidence that the customer-based brand equity model can be applied to the HE context as an element of competitive advantage and used to guide marketing activities for Universities internationally.

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Z režimom pogojeni odnosi med delniškimi trgi v Frankfurtu, na Dunaju in v Varšavi
Henryk Gurgul in Artur Machno

Razprava analizira kratkoročno povezavo med nemškimi, avstrijskimi in poljskimi borznimi indeksi na podlagi vektorskega avtoregresijskega modela Markovove spremembe režima (MSVAR). Glavno orodje je funkcija impulznega odziva in kaže na dve fazi borze. Rezultati so uporabni za vlagatelje. Odzivi na motnje so zapleteni in odvisni od faze trga ter obravnavanega para spremenljivk. Obstaja tudi teoretična analiza MSVAR modela. Teoretične brezpogojne značilnosti procesa, obravnavane z modelom MSVAR, so predstavljene skupaj s tehnikami izračuna, ki lahko veljajo tudi za druge modele.

Ključne besede: MSVAR, z režimom pogojeni impulzni odziv, delniški trg, dinamična zveza
Klasifikacija JEL: F36, G15
Managing Global Transitions 13 (1): 3–25

Modeliranje nestanovitnosti delniškega trga: dokazi iz Indije
Karunanithy Banumathy in Ramachandran Azhagaiah

Študija empirično preučuje vzorec nestavitnosti indijskega delniškega trga na podlagi analize časovnih vrst o dnevnih končnih cenah indeksa S&P CNX Nifty za obdobje desetih let od 1. januarja 2003 do 31. decembra 2012. Analiza je potekala na podlagi simetričnih in asimetričnih modelov posplošene avtoregresivne pogojne heteroskedastičnosti (GARCH). Študija na podlagi Akaikejevega informacijskega kriterija (AIC) in Schwarzovega informacijskega kriterija (SIC) dokazuje, da so se ocene GARCH (1,1) in TGARCH (1,1) izkazale kot najprimernejši model za zajemanje simetrične in nesimetrične nestanovitnosti v tem zaporedju. Študija podaja tudi dokaze o obstoju pozitivne in zanemarljive premije za tveganje na podlagi modela GARCH-M (1,1). Asimetrični učinek vzvoda, zajet s parametrom modelov EGARCH (1,1) in TGARCH (1,1), kaže na to, da negativni šoki močno vplivajo na pogojno varianco.

Ključne besede: asimetrična nestanovitnost, pogojna nestanovitnost, GARCH modeli in učinek vzvoda
Klasifikacija JEL: C32, C53
Managing Global Transitions 13 (1): 27–41

Neposredne tuje naložbe, gospodarska svoboda in storilnost v podsaharski Afriki

Kazeem Bello AJIDE *in Perekunah Bright Eregha*

Zaradi polemike o tem, ali je neposredni vpliv neposredne tuje naložbe (FDI) na rast odvisen od določenih vmesnih členov ali ne, je preučevanje verjetnih posrednih členov na področju rasti FDI postalo pogosta tema pogovora. Medtem ko se je na eni strani izkazalo, da ima pomembnost ustanove ključno vlogo, pa so na drugi strani kot dobrega nadomestnega kandidata izbrali gospodarsko svobodo. Raziskava na podlagi tega preučuje vpliv priliva FDI na gospodarsko storilnost v podsaharski Afriki in v ospredje postavlja gospodarsko svobodo. Rezultati podpirajo vidik, da gospodarska svoboda vpliva na gospodarsko storilnost cele regije, njen vpliv na različne storilnosti sektorjev pa je zanemarljiv. Priporočljivo je, da ima v regiji prednost gospodarska svoboda in da FDI pritegnejo tudi drugi sektorji, ne samo primarni sektor, kot se to dogaja.

Ključne besede: FDI priliv, gospodarska svoboda, gospodarska storilnost, analiza panelne ankete
Klasifikacija JEL: C33, H7, H30, F21
Managing Global Transitions 13 (1): 43–57

Revščina in gospodarska rast v Svaziju: empirična raziskava

Angelique G. Nindi in Nicholas M. Odhiambo

Razprava obravnava naključno povezavo med zmanjševanjem revščine in gospodarsko rastjo v Svaziju v obdobju 1980–2011. Trenutna študija, za razliko od nekaterih predhodnih študij, omenjeno povezavo obravnava na podlagi novega pristopa h kointegraciji s testiranjem na podlagi avtoregresijskega modela z razporejenimi odlogi in Grangerjevo metodo vzročnosti, ki temelji na modelu popravljanja napak (ECM). Raziskava vključuje tudi finančni razvoj, ki vpliva tako na zmanjševanje revščine kot na gospodarsko rast, in s tem vzpostavlja model s tremi spremenljivkami. Rezultati študije so pokazali, da gospodarska rast po Grangerjevi metodi ne povzroča zmanjševanja revščine v Svaziju, ne na kratki ne na dolgi rok. Študija namreč kaže na naključno prehajanje od zmanjševanja revščine h gospodarski rasti na kratki rok. Te ugotovitve zaradi visoke stopnje dohodkovne neenakosti v Svaziju niso presenetljive. Raziskave so pokazale, da v primeru previsoke stopnje dohodkovne neenakosti gospodarska rast ne vodi nujno v zmanjšanje revščine.

Ključne besede: revščina, gospodarska rast, Svazi
Klasifikacija JEL: C320, I320, O550
Managing Global Transitions 13 (1): 59–74

Upravljanje modela vrednosti blagovne znamke v visokošolskem izobraževanju

Tina Vukasović

Namen študije je s testiranjem konceptualnega modela povezav med elementi vrednosti blagovne znamke izboljšati razumevanje koncepta vrednosti blagovne znamke v visokošolskem izobraževanju. Za testiranje konceptualnega modela smo uporabili kvantitativne podatke, zbrane z metodo osebnega anketiranja. Raziskava je potekala v Sloveniji, v kateri delujejo tako javne kot zasebne visokošolske institucije. Testirani konceptualni model temelji na elementih ugleda in zavedanja vrednosti blagovne znamke. Model je mogoče uporabiti v visokem šolstvu kot element konkurenčne prednosti za izgradnjo pozicije in percepcije blagovne znamke, tako v Sloveniji kot tudi v mednarodnem prostoru.

Ključne besede: percepcija blagovne znamke, vrednost blagovne znamke, visokošolsko izobraževanje, marketing storitev, Evropska unija, Slovenija

Klasifikacija JEL: A10, C30, M30, M31

Managing Global Transitions 13 (1): 75–90