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Editor's Introduction to Volume 3 of Expert Journal of Finance

Simona VINEREAN*

Sprint Investify

In this first issue of the second volume of *Expert Journal of Finance*, we have published various interesting articles exploring the capital market integration in European Union, alternative mechanisms used by Islamic banks in income smoothing, the impact of corporate governance on the banking sector performance, and the modelling of investment function at the level of the Euro zone. We are appreciative of the opportunity to publish such meaningful contributions to finance knowledge. Further, I present a short description of each article that is published in *Expert Journal of Finance*, volume 2.

Horobeț, Belașcu, and Olaru (2014), in their paper *Integration of Capital Markets from Central and Eastern Europe: Implications for EU Investors*, analyze how capital markets in three emerging markets co-move with markets in three developed countries from the European Union. The authors test if there is an increased correlation between the examined markets as an indication of the capital market integration in the region. This paper offers interesting perspectives for the capital market in the European Union and cross-market correlations.

The article entitled *Banking Sector Performance and Corporate Governance in Nigeria: A Discriminant Analytical Approach* is written by Godwin Chigozie Okpara and Eugene Iheanacho (2014) and it analyses the impact of corporate governance on the banking sector performance. The authors examine how each variant in the corporate governance structure discriminates against the performance of the banking sector and then they investigate whether the executive directors and non-executive directors are associated negatively and significantly with non-performing loans. Further, the authors propose recommendations for the Central Bank of Nigeria in liaison with the Nigerian Deposit and Insurance Corporation in relation to the extension of surveillance on the role of the directors in the banking sector.

In *Islamic Deposits and Investment Accounts in Income Smoothing in Post-Reclassification of the Islamic Financial Service Act 2013*, Mohd Yaziz Mohd Isa and Md. Zabid Hj. Abdul Rashid (2014) examine how Islamic banks use alternative mechanisms, such as Profit Equalization Reserve (PER) and Investment Risk Reserve (IRR) instead of loss provisions, are used to smooth income and absorb any future losses. Their research determines if the exercise by Islamic banks in Malaysia to reclassify Islamic deposits to investment accounts after the enacted Islamic Financial Service Act (2013), may have led to certain unintended consequences that were detrimental for investment account holders.

Alin Opreana examined the investment function at the level of the Euro zone, in his article *Investment Modelling at the Euro Area Level*. For reaching this research aim, the author approached the structural equation modeling procedure for empirical analysis and showed that at the Euro area level,

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investments are determined by taxes and interest rate. Other theoretical contributions of this article enhance finance knowledge and policy recommendations for applying the proposed model to consistently measure the aspects that influence investments at a macro level.



Integration of Capital Markets from Central and Eastern Europe: Implications for EU Investors

Alexandra HOROBET^{1*}, Lucian BELAȘCU² and Roxana Georgiana OLARU¹

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Our paper investigates the extent of capital market co-movements between three emerging markets— Czech Republic, Hungary and Poland – and three developed markets from the European Union - Austria, France and Germany. We test whether an increase in correlations between the six markets took place in recent years, as revealing higher integration of capital markets in the region. We find a statistically significant positive trend in cross-market correlations between 1999 and 2008, before the emergence of the global financial crisis. Movements in national stock markets are not fully synchronized, but increases in market volatilities lead to increases in cross-country correlations. There is a long-term relationship between some of these countries' capital markets, and information is transmitted from one market to the other. Our findings confirm previous studies and lead to the conclusion that stock markets from Central and Eastern Europe became more integrated with the developed markets in European Union.

Keywords: capital markets, co-integration, European Union

JEL classification: F36

1. Introduction

The increase in international economic integration in the past decades, fueled by the amplified trade and financial flows around the world changed the size and scope of benefits that investors may obtain from holding internationally diversified portfolios. Besides the positive effects of international financial markets' integrations, such as a better allocation of resources and improved mitigation of risks, negative effects are also present, observable at the level of increased and joint volatility of financial markets around the world. The extent of integration and its dynamics were investigated through the methods of price differences or co-movements of markets, through the responses to information arrivals, or through the fit of models of capital flows and portfolio allocations.

The classic result offered by Heston and Rouwenhorst (1994) that country factors are more important drivers of volatility and capital markets' co-movements than are industry factors seemed to raise a challenge to the asset management industry. Coupled with the widespread opinion that larger capital flows across countries and the global search of arbitrage opportunities by international investors to higher correlations of stock returns across economies, this had the potential of changing the anticipated benefits to

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be obtained from international portfolio diversification. Nevertheless, starting from the well-known paper of Longin and Solnik (1995), the literature in the field failed to provide definitive conclusions on the matter. For example, Lee (2005) finds that conditional correlations between the US, Japan, and the Hong Kong stock markets were positive and increasing, Pascual (2002) finds evidence of increasing integration of the French stock market, but not of the British and German markets, while Rangvid (2000) also identifies a rise in the degree of convergence among European stock markets in the last two decades. On the other hand, Roll (1992) argues that stronger economic integration may lead to lower correlation of asset returns if the integration process is associated with higher industrial specialization, while Heston and Rouwenhurst (1994) identify the country effects – fiscal, monetary, legal and cultural differences – as better explanatory factors for the co-movement of stock markets. Tavares (2009) analyzes the impact of economic integration on cross-country co-movements of stock returns, in a large panel of developed and emerging countries, and finds that returns' correlations are pushed up by bilateral trade intensity, while the real exchange rate volatility, the asymmetry of output growth and the export dissimilarity between countries tend to decrease them. Bekaert and Hodrick (2006) use a risk-based factor model and conclude that no evidence of an upward trend in returns' correlation across countries is observable, except in the case of European stock markets.

Central and Eastern Europe is a new stock market region among other emerging markets, as all these markets started to operate at the beginning of 1990s. The attention of international investors towards the region was fuelled by its high returns and low correlations with other developed and emerging markets, but the effective benefits of diversification received mixed results in the existing literature. Gilmore and McManus (2002) found that there is no long-term relationship between major markets in Central Europe, after conducting a co-integration test on stock returns from these markets, while the Granger causality test they employed showed that no causality is present between these markets and the US markets, but evidenced causation between Hungary and Poland. The lack of benefits for portfolio investors from holding assets in these markets is also documented by Shachmurove (2001), although his findings might be affected by the short period of time chosen. Egert and Kocenda (2007) analyze co-movements among three stock markets in Central and Eastern Europe (Hungary, Poland and Czech Republic) and the interdependence between them and Western European markets (Germany, France, and United Kingdom), using intraday price data. They find no signs of robust cointegration relationships between stock indices in a bivariate or multivariate framework, but discover short-term spillover effects both in terms of stock returns and stock price volatility. Patev et al. (2006) evaluate the degree of market integration between the US stock market and Central and Eastern European markets, through the use of cointegration, Granger causality and variance decomposition tests, by studying the long-run and short-run convergence among stock prices in Hungarian, Polish, Russian, Czech and US markets. They find that CEE markets are segmented, but during crisis times there is an increase in co-movements between markets, which leads to a sharp decrease in the diversification benefits for an American investor allocating his funds in the region's stocks. At the same time, the intensity of co-movements between markets decreased after the crisis, which restores the diversification opportunities in Central and Eastern European markets.

The current research continues previous attempts to investigate capital market linkages between Central and Eastern European countries, including Romania, and between them and Western Europe countries, developed by Horobet et al. (2006), Lupu et al. (2006), Horobet et al. (2007), and Horobet and Lupu (2009). The authors examined the significance of benefits available for international asset allocators given the higher presumed correlations between these markets and an intense process of information transmission between stock exchanges in terms of returns and volatilities. Their results indicate that the markets react rather quickly to the information included in the returns on the other markets, and that this flow of information takes place in both directions, from the developed markets to the emerging ones, and vice versa. At the same time, investors on emerging markets seem to take into account information from the other emerging markets in the region. Nevertheless, the results cannot definitely indicate whether there is a direct transmission of information from one market to another or a common reaction of all markets to some other information relevant to them, either on a European or global level.

2. Data and research methodology

2.1 Data sources and description

We employ daily logarithmic return data for stock market indices from six European Union countries – Austria, Czech Republic, France, Germany, Hungary and Poland – over ten years, starting in January 4, 1999 and ending in December 31, 2008. Of them, three are developed markets – Austria, France and Germany – and three are emerging markets – Czech Republic, Hungary and Poland. The sample of

countries was constructed in such a way as to allow the maximum number of comparative data following the introduction of the euro in 1999. All indices values were collected from Datastream and are Morgan Stanley Capital International (MSCI) indices for these countries. The indices are denominated in euro for the entire sample of countries. A brief description of the data is presented in Table 1.

Table 1. Descriptive statistics of stock market returns

	Austria	Czech Rep.	France	Germany	Hungary	Poland
Mean (%)	-0.002	0.062	-0.006	-0.009	0.008	0.012
Median (%)	0.011	0.080	0.013	0.039	0.025	0.010
Maximum (%)	12.759	16.550	13.149	11.125	17.410	10.870
Minimum (%)	-11.164	-16.350	-11.301	-8.666	-19.110	-11.850
Standard deviation	1.411	1.731	1.522	1.598	1.973	1.948
Skewness	-0.254	-0.315	0.045	0.045	-0.168	-0.221
Kurtosis	17.373	13.312	10.923	7.720	13.518	6.060
Jarque-Bera	22475.68	11599.26	6821.791	2421.35	12034.91	1038.53
Probability	0.000	0.000	0.000	0.000	0.000	0.000

Over the 1999-2008 period, all emerging markets – Czech Republic, Hungary and Poland – offered investors average daily positive returns, ranging between 0.008% for Hungary and 0.062% for Czech Republic, while all developed markets recorded average daily negative returns, ranging from -0.009% for Germany and -0.002% for Austria. At the same time, the volatility of all emerging markets, as measured by the standard deviation of daily returns, was higher as compared to the volatility of developed markets: the Hungarian market volatility was the highest (1.973%), while the Austrian market volatility was the lowest (1.411%). The returns were positively skewed for France and Germany and negatively skewed for Austria, Czech Republic, Hungary and Poland. All returns show non-normal leptokurtic distributions, as indicated by the values of kurtosis and Jarque-Bera normality test.

2.2 Research methodology

We investigate the degree of capital market integration between the emerging and developed markets in Europe, as well as its implication for international investors on three levels, from simple to advanced: (1) analysis of cross-market correlations and identification of trends in correlations; (2) analysis of the link between correlations and market volatilities; and (3) investigation of information transmission between markets.

The analysis of cross-market correlations aims at observing the evolution of average and rolling correlations with a 60-day window (approximately three months of observations) between pairs of countries and types of countries (developed against developed, emerging against emerging, and developed against emerging), as well as identifying statistically significant trends in correlations. In case of higher market integrations one should observe significant positive trends in cross-market correlations.

Several studies have focused on volatility transmission across markets and their results showed that there is a “volatility contagion” across markets. Moreover, when markets become more volatile they also tend to become more synchronized, which would be bad news for international investors, since the benefits of international diversification are needed most in times of high volatility. We conduct an econometric estimation of the link between correlations and volatilities, estimating the following model:

$$Corr_t^{C1/C2} = \alpha_t + \gamma_1 Vol_t^{C1} + \gamma_2 Vol_t^{C2} + \varepsilon_t \quad (1)$$

where $Corr_t^{C1/C2}$ denotes the correlations between country 1 (C_1) and country 2 (C_2), Vol_t^{C1} and Vol_t^{C2} indicate the volatilities of daily returns of countries 1 and 2, respectively. α_t is the constant of the regression and ε_t is the error term.

In order to estimate the parameters of this model we first apply the Solnik et al. (1996) approach, by using daily “innovations” in rolling correlations and volatilities. When working with moving averages, a 60-day moving average includes a 59-day overlap between two successive estimations in correlations and volatilities, which leads to strong autocorrelation that cannot be easily handled by standard statistical adjustment. Our approach is to use the residuals in rolling correlations and in both markets rolling volatilities, obtained through the estimation of the following model:

$$y_t = c + y_{t-1} + e_t \quad (2)$$

where y_t is the variable value at moment t , y_{t-1} is the one-day lagged value of the variable, and e_t are the residuals in the regression.

The third level of analysis uses a Granger causality test to identify the direction of information transmission from one market to the other and to determine the leading and lagging markets in EU. We test causal relations between indices based on the following vector autoregression framework (VAR):

$$Y_t = \alpha_0 + \sum_{k=1}^n \alpha_k Y_{t-k} + \sum_{k=1}^n \beta_k X_{t-k} + \varepsilon_{y,t} \quad (3)$$

$$X_t = \phi_0 + \sum_{k=1}^n \phi_k Y_{t-k} + \sum_{k=1}^n \theta_k X_{t-k} + \varepsilon_{x,t} \quad (4)$$

where α_0 and ϕ_0 are constants, α_k , β_k , ϕ_k and θ_k are parameters and $\varepsilon_{y,t}$ and $\varepsilon_{x,t}$ are uncorrelated disturbance terms with zero mean and finite variances. The null hypothesis that X_t does not Granger-cause Y_t is rejected if the α_k coefficients in equation (3) are jointly significantly different from zero using a standard joint test. Similarly, Y_t Granger-causes X_t if the coefficients α_k are jointly different from zero. The appropriate formulation of the Granger-causality analysis may need to incorporate an error correction term into the test if variables are cointegrated. Granger (1988) shows that causality tests might reach incorrect conclusions if they fail to account for a cointegration relationship. It is possible that the time series share a common stochastic trend even when all series contain a stochastic trend. For this reason, we also investigate Granger causality in the bivariate vector error correction framework (VEC):

$$\Delta Y_t = \alpha_0 + \delta EC_{t-1} + \sum_{k=1}^n \alpha_k \Delta Y_{t-k} + \sum_{k=1}^n \beta_k \Delta X_{t-k} + \varepsilon_{y,t} \quad (5)$$

$$\Delta X_t = \phi_0 + \delta EC_{t-1} + \sum_{k=1}^n \phi_k \Delta Y_{t-k} + \sum_{k=1}^n \theta_k \Delta X_{t-k} + \varepsilon_{x,t} \quad (6)$$

where EC_{t-1} is an error-correction term derived from the long-run cointegrating relationship.

3. Results

3.1 Analysis of cross-market correlations

Table 2 shows the correlations of daily returns over the 1999-2008 period between all markets. The values of correlation coefficients vary between 0.387 for Germany and Poland and 0.858 for France and Germany. Correlations are higher for developed markets and lower between developed markets and emerging markets, on one hand, and between emerging markets, on the other hand. It is interesting to observe the evolution of correlations in time, as previous research suggests that as markets become more integrated this should be observable through higher correlations between them.

Table 2. Cross-market correlations of daily returns, 1999-2008

	Austria	Czech Rep.	France	Germany	Hungary	Poland
Austria	1					
Czech Rep.	0.4467	1				
France	0.5360	0.4651	1			
Germany	0.4830	0.4085	0.8578	1		
Hungary	0.4853	0.5266	0.4816	0.4440	1	
Poland	0.4138	0.4864	0.4355	0.4068	0.5461	1

Table 3 presents the average values of cross-market correlations, calculated for pairs of all markets, but also for pairs of the three developed markets (DM to DM), for pairs of the three emerging markets (EM to EM), and for pairs of developed and emerging markets (DM to EM), for each year in the period under analysis and also for the entire 1999-2008 period. As we may observe, the average correlations are higher for developed markets as compared to correlations between emerging markets and correlations between developed and emerging markets, and they all increase between 1999 and 2008. Over the entire period, the average correlations of daily returns increase from 0.558 to 0.817 for pairs of developed markets, from 0.359 to 0.665 for pairs of emerging markets, and from 0.318 to 0.662 for pairs of developed and emerging markets. When we consider the increase in the average correlations from 1999 to 2008, the highest increase

– 108.17% – is observable in correlations between emerging markets and developed markets, followed by the increase in correlations between emerging markets – 85.23%. This may suggest a more intense process of market integration involving emerging and developed markets in Europe, fueled by these countries' accession to the European Union.

Table 3. Average annual cross-market correlations of daily returns, 1999-2008

Average correlation	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	1999-2008
All markets	0.374	0.364	0.385	0.421	0.307	0.405	0.476	0.588	0.632	0.693	0.495
DM to DM	0.558	0.446	0.498	0.542	0.401	0.646	0.648	0.746	0.833	0.817	0.626
EM to EM	0.359	0.395	0.490	0.456	0.416	0.369	0.602	0.644	0.568	0.665	0.520
DM to EM	0.318	0.326	0.312	0.369	0.239	0.336	0.377	0.515	0.587	0.662	0.443

Aiming at improving the view over the increases in correlations between markets, we analyzed monthly correlations of daily returns in all markets, also for the entire period. The first observation is that all correlations display high volatility in time, which is higher in the case of emerging countries' correlations. Second, the correlation between France and Germany is the highest over the entire period, but also the most stable, compared to all other market pairs' correlations. This finding confirms previous results that indicate more synchronization in market movements for the countries that are part of an economic convergence process. As all stock market correlations fluctuate widely over time, a stable trend is not easy to identify in any of the correlations' graphs. In order to identify the presence of a trend in the correlation series, we regressed the time series of correlations on a constant and time index using ordinary least squares. Table 4 presents the values of the time coefficients resulted from the regressions where the dependent variable is the rolling 60-day window correlation, as well as their annualized values. All coefficients are positive and statistically significant, which suggests that correlations between all market pairs increased over the period under analysis. The highest increase is observable in the correlation between Austria and Germany – an annual 5.25% increase, which represents an increase of 52.5% over the ten year period. The smallest increase takes place in the correlation between Czech Republic and Hungary, with an annualized value of 1.58% or 15.8% for the entire period. Still, one should cautiously interpret the simple trend line in correlations, though, as fitting a straight line through a moving average leads to econometric problems (auto-correlated residuals) that make the estimate of the slope subject to errors.

Table 4. Trends in rolling cross-market correlations

Correlation	Trend	Trend (annualized)	T-statistic	Correlation	Trend	Trend (annualized)	T-statistic
Austria/France	0.000208	0.0499	47.713	France/Poland	0.000148	0.0355	47.458
Austria/Germany	0.000219	0.0525	48.702	Germany/Czech Rep.	6.59E-05	0.0158	16.221
Austria/Czech Rep.	0.000210	0.0504	49.567	Germany/Hungary	7.23E-05	0.0173	13.654
Austria/Hungary	0.000179	0.0429	40.056	Germany/Poland	0.000159	0.0381	49.280
Austria/Poland	0.000210	0.0504	48.723	Czech Rep./Hungary	7.37E-05	0.0176	17.561
France/Germany	7.50E-05	0.0180	55.048	Czech Rep/Poland	0.000130	0.0312	29.738
France/Czech Rep.	7.50E-05	0.0180	55.048	Hungary/Poland	0.000157	0.0376	43.347
France/Hungary	7.45E-05	0.0178	15.286				

In order to work out the auto-correlated residuals issue, we tested for the presence of trends in monthly correlations. The results are presented in Table 5 and they confirm the trend tests performed using rolling correlations. Although only thirteen out of fifteen coefficients are statistically significant at the 5% level – we find no significant trend of the correlations between France and Czech Republic, Germany and Czech Republic and Hungary and Czech Republic –, all of them are positive, indicating that correlations between the six markets have gone up during the past ten years. The highest value of the trend coefficient is found in the case of Austria and Germany – the correlation between these two markets increased annually by an average of 5.49% (the result is similar to the one identified by using rolling correlations) – and the smallest value is found in the case of Germany and Hungary – only an annual average increase of 1.93%.

Table 5. Trends in monthly cross-market correlations

Correlation	Trend	Trend (annualized)	T-statistic	Correlation	Trend	Trend (annualized)	T-statistic
Austria/France	0.0041	0.0487	6.3101	France/Poland	0.0032	0.0381	6.2938
Austria/Germany	0.0046	0.0549	7.0137	Germany/Czech Rep.	0.0004	0.0053	0.7200
Austria/Czech Rep.	0.0032	0.0387	4.9887	Germany/Hungary	0.0016	0.0193	2.3231
Austria/Hungary	0.0034	0.0405	5.4104	Germany/Poland	0.0033	0.0400	6.6023
Austria/Poland	0.0039	0.0468	6.2212	Czech Rep./Hungary	0.0009	0.0107	1.4204
France/Germany	0.0018	0.0214	7.3581	Czech Rep/Poland	0.0021	0.0256	3.5063
France/Czech Rep.	0.0004	0.0043	0.5949	Hungary/Poland	0.0031	0.0376	5.5351
France/Hungary	0.0017	0.0203	2.5844				

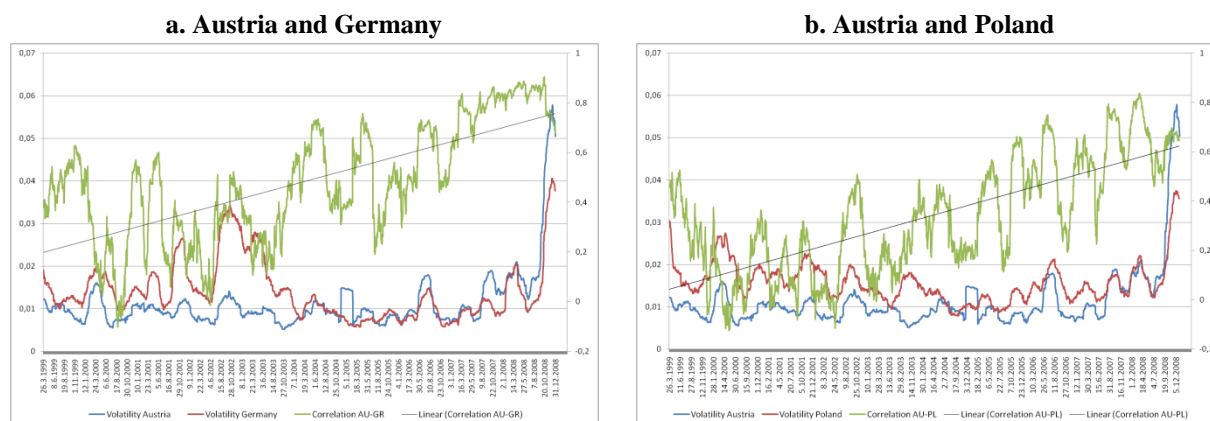
3.2 Analysis of links between volatility and correlation

The Figures 1a-c below plots the rolling correlations between daily returns and the rolling standard deviations of daily returns, for three pairs of countries. We observe that movements in national stock markets are not fully synchronized, but a short look at the graphs shows that correlations tend to be high in periods of high market volatility, as measured by the standard deviation of stock market returns. The graphs of all country pairs show that both market volatilities tend to move together and that correlation tends to follow movements in market volatility. As Solnik et al. (1996) draw attention to, if correlation remained constant over time, the covariance between two markets would increase in line with the product of the two markets' standard deviations. In our case, the correlations increase when the market volatilities increase, which means the covariance increases more than market volatilities.

Table 6 reports the results of parameter estimates from equation (1). All volatility coefficients are statistically significant, with a few exceptions: for the Austria-France correlation, the French market volatility is not significant; for the Austria-Germany correlation, the Austrian market volatility is not significant; and for the France-Germany correlation, the French market is not significant. All coefficients that are statistically significant are positive, which indicates that increases in market volatilities lead to increases in cross-country correlations. The two volatilities have some multi-colinearity, so separating their effects on correlations is difficult. Still, including only one of the volatilities in the regression significantly reduces the adjusted R².

3.3 Results of Granger causality tests

First, we test the series for stationarity using the Augmented Dickey-Fuller and the Phillips-Perron tests. The results, reported in Table 7, strongly confirm at the standard 1% significance level that the series are not stationary in levels, but are stationary in first differences. We conclude that the series are difference-stationary processes.



c. Hungary and Poland

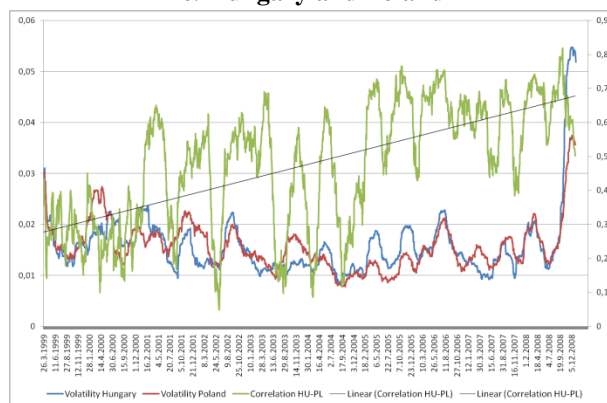


Figure 1. Rolling correlation and volatilities of daily returns, 1999-2008

Table 6. Links between correlations and volatilities, 1999-2008 – Regression results

Correlation	1 st volatility	2 nd volatility	Adjusted R ² (%)	Correlation	1 st volatility	2 nd volatility	Adjusted R ² (%)
Austria/France	8.930*	-0.603	1.968	France/Poland	9.545*	14.872*	8.646
Austria/Germany	-0.943	15.401*	4.973	Germany/Czech Rep.	17.263*	15.262*	14.847
Austria/Czech Rep.	9.604*	11.053*	6.298	Germany/Hungary	12.771*	4.702*	4.709
Austria/Hungary	10.926*	13.470*	10.697	Germany/Poland	11.198*	12.369*	6.950
Austria/Poland	7.144*	16.916*	7.824	Czech Rep./Hungary	10.833*	18.180*	16.136
France/Germany	1.042***	7.636*	12.559	Czech Rep/Poland	5.812*	19.349*	9.967
France/Czech Rep.	12.909*	14.894*	13.340	Hungary/Poland	11.141*	16.916*	15.645
France/Hungary	1.042*	7.636*	12.559				

Note: 1st volatility column indicates the coefficient for the volatility of the first country mentioned in the first column of the table, and the 2nd volatility column indicates the coefficient for the second country volatility. Namely, for the Austria-France line, 1st volatility refers to the Austrian market volatility and 2nd volatility refers to French market volatility. *, ** and *** denote statistical significance of coefficients at 1%, 5% and 10% level.

Table 7. Unit root tests results

	Log levels			
	ADF		PP	
	Constant	Trend and constant	Constant	Trend and constant
AU_IND	-0.73		1.31	-0.76
CZ_IND	-0.91		-1.33	-0.92
FR_IND	-1.49		-1.49	-1.24
GR_IND	-1.35		-1.38	-1.28
HU_IND	-1.25		-0.79	-1.28
PL_IND	-1.45		-1.04	-1.47
Δ AU_IND	-51.18 ***		-51.25 ***	-51.21 ***
Δ CZ_IND	-38.52 ***		-38.52 ***	-49.83 ***
Δ FR_IND	-53.27 ***		-53.28 ***	-53.92 ***
Δ GR_IND	-52.36 ***		-52.35 ***	-52.42 ***
Δ HU_IND	-24.23 ***		-24.25 ***	-46.26 ***
Δ PL_IND	-50.30 ***		-50.31 ***	-1.47 ***

Note: ADF and PP are Augmented Dickey-Fuller and Phillips-Perron unit root tests. Test equations include either an intercept or an intercept and a trend. The lag length is chosen using the Schwarz information criterion for the ADF test, and the Newey West kernel estimator for the PP test. *** denote the rejection of the null hypothesis at the 1% levels.

We use the multivariate Ljung-Box test based on the residuals obtained from the maximum likelihood estimation of VEC models given in equations (5) and (6) to determine the lengths of lags in the VAR model. Table 8 reports the Johansen cointegrating trace statistics.

Table 8. Results of cointegration test

		Austria	Czech Republic	France	Greece	Hungary
Austria	$r = 0$					
	$r \leq 1$					
Czech Republic	$r = 0$	32.88 ***				
	$r \leq 1$	4.78 **				
France	$r = 0$	2.30	3.36			
	$r \leq 1$	0.60	0.86			
Greece	$r = 0$	5.75	2.48	9.27		
	$r \leq 1$	1.73	0.67	1.62		
Hungary	$r = 0$	23.81 ***	13.47 *	3.17	4.93	
	$r \leq 1$	0.78	3.00 *	1.39	2.27	
Poland	$r = 0$	21.83 ***	7.30	3.72	4.90	10.36
	$r \leq 1$	1.32	1.46	1.54	1.90	1.97

Note: This table reports the results of the one-sided test of the null hypothesis that the stock indices of the countries under consideration are cointegrated. Reported critical values are Osterwald-Lenum (1992) critical values.

The results in Table 8 indicate that the null hypothesis of no cointegration is rejected for the pairs Czech Republic – Austria, Hungary – Austria, Hungary – the Czech Republic and Poland – Austria. Consequently, Granger-causality tests between the stock indices of these countries are performed in the VEC model. The remaining pairs do not incorporate cointegrating relations, therefore the Granger-causality test is performed correctly in a VAR framework.

Table 9. Pairwise Granger-causality tests

Lags	5	10	15	Lags	5	10	15
CZ_IND → AU_IND	6.85***	3.84***	2.79***	PL_IND → CZ_IND	8.72***	5.73***	4.05***
AU_IND → CZ_IND	4.80***	3.90***	4.00***	CZ_IND → PL_IND	2.24**	1.94***	1.42
FR_IND → AU_IND	2.82**	2.49***	1.82**	GR_IND → FR_IND	8.65***	6.65***	3.34***
AU_IND → FR_IND	2.55**	2.32**	1.58*	FR_IND → GR_IND	2.25**	4.29***	3.37***
GR_IND → AU_IND	4.15***	2.96***	2.01**	HU_IND → FR_IND	0.96	1.99**	1.57
AU_IND → GR_IND	2.92**	1.92**	1.70**	FR_IND → HU_IND	1.26	1.41	1.06
HU_IND → AU_IND	6.76***	4.62***	4.04***	PL_IND → FR_IND	1.17	1.21.2013	1.08
AU_IND → HU_IND	5.40***	4.78***	3.39***	FR_IND → PL_IND	5.03***	4.15***	4.04***
PL_IND → AU_IND	6.16***	3.61***	2.68***	HU_IND → GR_IND	1.41	1.33	1.37
AU_IND → PL_IND	4.65***	2.66***	2.04**	GR_IND → HU_IND	5.12***	2.25	1.70**
FR_IND → CZ_IND	1.44	1.83*	1.67**	PL_IND → GR_IND	0.86	1.11	0.87
CZ_IND → FR_IND	1.72	1.11	1.00	GR_IND → PL_IND	10.96***	5.87	4.71***
GR_IND → CZ_IND	3.27***	2.04**	1.79**	PL_IND → HU_IND	1.59	1.42	1.39*
CZ_IND → GR_IND	2.17*	1.43	1.37	HU_IND → PL_IND	5.15***	3.64	3.47***
HU_IND → CZ_IND	11.33***	6.81***	6.91***				
CZ_IND → HU_IND	4.00***	2.83***	2.62***				

Note: *, ** and *** denote statistical significance of causal links at the 10%, 5% and 1% significance levels.

The results in Table 9 suggest that Austria is integrated with all other countries under consideration, in the sense that the Austrian stock index Granger-causes and is Granger-caused by all other stock indices. Similarly, the Czech market appears to influence and be influenced by the other stock markets except France. We also observe unidirectional influences from the Hungarian, French and German indices to the Polish index and from the German index to the Hungarian index. In addition, the German and French markets exhibit reciprocal effects.

4. Conclusions

We investigate the extent of capital market co-movements between three emerging markets from the European Union – Czech Republic, Hungary and Poland – and three developed markets from the European Union, namely Austria, France and Germany. Since the general perception, also supported by empirical evidence, is that an integration process should be observable at the level of higher correlations between countries' capital markets, we test whether such an increase in correlations between the six markets above took place in the recent years. Although correlations are highly unstable and fluctuate widely in time, we find that there is an observable and statistically significant positive trend in cross-market correlations between 1999 and 2008, with an increase in correlations over the ten year period ranging from 15.8% to 52.5%. We also find that correlations between the three emerging markets and the three developed markets increased on average between 1999 and 2008, more than the increase observable in the correlations between

developed markets only and emerging markets only, which may indicate a higher integration of these capital markets.

At the same time, we observe that movements in national stock markets are not fully synchronized, but correlations tend to be high in periods of high market volatility, as measured by the standard deviation of stock market returns. Regressing the rolling correlations on markets rolling volatilities, we find that almost all coefficients are statistically significant and positive, which indicates that increases in market volatilities lead to increases in cross-country correlations during the ten years under analysis. Our findings confirm previous studies and lead to the conclusion that stock markets from Central and Eastern Europe became more integrated with the developed markets in European Union, as revealed by the evolution of correlations between these markets.

Granger causality tests offer more insight into the links between these capital markets. The hypothesis of no-cointegration, or of a no long-term relationship between markets is rejected for the pairs Czech Republic – Austria, Hungary – Austria, Hungary – Czech Republic and Poland – Austria. The remaining pairs do not incorporate cointegrating relations. The results of Granger causality tests indicate that Austria is integrated with all other countries under consideration, in the sense that the Austrian stock index Granger-causes and is Granger-caused by all other stock indices. Similarly, the Czech market appears to influence and be influenced by the other stock markets except France. We also observe unidirectional influences from the Hungarian, French and German indices to the Polish index and from the German index to the Hungarian index. In addition, the German and French markets exhibit reciprocal effects.

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Banking Sector Performance and Corporate Governance in Nigeria: A Discriminant Analytical Approach

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This paper sets out to investigate the impact of corporate governance on the banking sector performance. Precisely, it examined firstly, how each variant in the corporate governance structure discriminates against the performance of the banking sector and secondly whether the executive directors and non executive directors are associated negatively and significantly with non performing loans. To accomplish these objectives, the researchers employed discriminant analysis, correlation coefficient and the spearman rank correlation as an alternate method. The results of the analysis revealed that foreign ownership contributed about 187.77 percent of the total discriminant score for the function thereby propelling foreign ownership as the most discriminant ownership variable in banks performance and also implying that a bank's chance of belonging to the group of highly performing banks increases as its foreign ownership increases. The poor performance of the board ownership is not as severe as that of the institutional ownership and government ownership which made the poor and poorer contributions respectively. The results also show that both executive directors and non-executive directors are not significantly associated with non-performing loans. On the basis of these findings, the researchers recommend that the Central Bank of Nigeria in liaison with the Nigerian Deposit and Insurance Corporation should extend intensive surveillance on the role of the directors in the banking sector.

Keywords: Corporate Governance, Executive Directors, Non-Executive Directors, Return on Asset, non-Performing Loans, Discriminant Analysis.

JEL Classification: G21

1. Introduction

Corporate governance has been seen from several perspectives by different scholars. Jayashree (2006) defines corporate governance as a system of making directors accountable to shareholders for effective management of the companies in the best interest of the company and the shareholders along with concern for ethics and values. It is more of a way of life that necessitates taking interest in every business decisions. A key element of good corporate governance is transparency in projects through a code of good governance which incorporates a system of checks and balances between key players such as board of management, auditors and shareholders. The president of World Bank, J. Wolfensohn, sees corporate governance as promoting fairness, transparency and accountability.

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OECD (2004) defined corporate governance as involving a set of relationships between a company's management, its board, its shareholders and other stakeholders.

Demis and McConnell (2003) see corporate governance as aimed at reducing conflicts of interest, short-sightedness of writing costless perfect contracts and monitoring of controlling interest of the firm, the absence of which firm value is decreased.

Report of Cadbury committee (1992) defines corporate governance as the system by which companies are directed and controlled. While Wilson (2006) defines it as the manner in which corporations are directed, controlled and held to account with special concern for effective leadership of the corporations to ensure that they deliver on their promise as the wealth creating organ of the society in a sustainable manner.

Nworji, Adebayo and David (2011) contend that corporate governance aims to create an atmosphere whereby Nigerian banks will comply with the laid down rules and regulations without compromise. This will in the end lead to transparency in the banking institutions, proper risk management, adoption of best practices in carrying out duties, strong internal control system, restoration of public confidence, rapid economic growth and in all prevent bank distress which might eventually lead to bank failure.

Sanda, Mikailu and Garba (2005) linked corporate governance with ways in which all parties interested in the well-being of the firm (the stakeholders) attempt to ensure that managers and other insiders take measures or adopt mechanisms that safeguard the interests of the stakeholders.

We can submit that corporate governance in the banks gears towards creating a conducive environment for compliance to the laid down rules and regulations in order to actualise transparency in the banks and achieve maximum desired results that help to avert a run on banks. Good corporate governance should be one devoid of conflicts of interest, short-sightedness of writing costless perfect contracts and monitoring of controlling interest of the firm, the absence of which firm value is decreased (Demis and McConnell, 2003).

1.2. Banks and Corporate Governance in Nigeria

The importance of banks in any economy cannot be underestimated because of their involvement in money creation. Banks in most economies are the principal depositories of the public's financial savings, the nerve centre of the payment system, the vessel endowed with the ability of money creation and allocation of financial resources and conduit through which monetary and credit policies are implemented. The success of monetary policy, to a large extent, depends on the health of the banking institutions through which the policies are implemented. As a result of this central role of banks in the economy, their activities have to be kept under surveillance to ensure that they operate within the law in line with safe and sound banking practices so that the economy will not be jeopardized (Okpara, 2009).

The formal banking sector by mid 1980s had been largely static. The banking system was characterised by low capital base, high non-performing loans, insolvency and illiquidity, over dependence on public sector deposits and foreign exchange trading, poor asset quality, weak corporate governance, a system with low depositors' confidence and a banking sector that could not support the real sector of the economy at 25% of GDP compared to African average of 78% and 272% for developed countries (Ebong, 2006).

The Nigerian financial sector has experienced many changes over the last two decades which included bank distress and reforms of major financial institutions. The radical changes in financial developments in 1987 brought about by the structural adjustment programme of 1986 did not prevent bank crisis. The said innovations of the CBN in 1986 has not been able to provide enough backbone for the financial industry as reflected by the down turn in the events of late 1980s which were characterised by the unprecedented level of distress as depicted by large volume of non-performing loans, insolvency, liquidity problem and default in meeting depositors and inter-bank obligations. This poor state of the banking sector was exposed in 1989 with the government directive to withdraw the deposits of governments and other public sector institutions from banks to CBN. Thus, bank distress became obvious and increased from 7 in 1989 to a peak of 60 in 1995 while the amount required for recapitalisation of distressed banks increased from N1.1 billion in 1989 to N30.5 billion in 1995, N43.9 billion in 1996 while peaking at N98.1 billion in 2004. Non-performing loans for the distressed banks increased from N2.9 billion to N29.5 billion in 1994 and 1995, and increased further to N40.7 billion in 1997 while peaking at N149.6 billion in 2004 (Okpara, 2012).

The general institutional factors that led to distress on the banking system include insiders abuse, weak corporate governance, weak risk asset management and inadequacy of capital. The government owned banks suffered from incessant/frequent changes in board membership and many appointments were made based on political affiliation rather than expertise consideration. Consequent upon this, board members saw themselves as representative, of political parties in sharing the national cake emanating thereof and thus, ascribed their loyalty to the party members rather than the proper running of the bank itself.

On the side of the privately-owned banks, shareholders constituted a problem. According to Olufon (1992), the owner-managers regarded banking as an extension of their operations by appointing their relatives or friends to key positions instead of relying solely on professional managers. Thus, their appointees were mere loyalists who cared for the interest of their masters rather than the business itself (Okpara, 2009). Shareholders quarrels and boardroom squabbles were common among the banks that management attention deviated in favour of unnecessary squabbles

In some banks where harmony seemed to exist, another type of insider abuse took the form of the owners and directors misusing their privileged positions to obtain unsecured loans which in some cases were in excess of their banks statutory lending limits in violation of the provisions of the Banks and Other Financial Institutions Act (BOFIA) of 1991 as amended. In addition, some of these owners and directors were granted interest waivers on non performing insider-credits without obtaining the CBNs prior approval as required by BOFIA (Okpara, 2009). Many published reports on the failure of financial institutions identified poor corporate governance as a major factor. In his study, Okpara (2009) observed that 100% of the loans for the failed financial merchant bank limited was granted to the directors while 80 percent, 76 percent and 69 percent of the loans were granted to the directors in the failed Group merchant bank, credit bank Nigeria ltd and royal merchant bank ltd respectively. These loans obtained by directors were hardly paid back and were usually tagged doubtful loans or written off as bad loans.

The CBN asserted that many of the banks were still in distress and if allowed to fail woefully, the ensuing confidence crisis might lead to disintermediation, demonetization, a collapse of the payment system and a serious depression of the economy (Soludo, 2004). Thus, CBN came up in July 2004 with recapitalization policy of raising the mandatory minimum capital base of N2 billion to a new mandatory minimum of N25 billion before or on December 2005. In the light of these, the apex bank, central bank of Nigeria, came up with a corporate governance code for Nigerian banks which was to be effective from 3 April 2006. In this code Nigerian banks were mandated on corporate governance values which should be in line with the industry standard and will help to further strengthen the sector (Enobakhare, 2010).

The question of how well these banks are acting in line with the CBN corporate governance codes is called for, to ascertain whether their compliance to the laid down rules has impacted positively on the banking sector performance. This paper therefore sets out to examine firstly, the relationship between ownership structure and the performance of the banking sector; secondly to find out how executive directors and non-executive director are associated with non-performing loans.

2. Data Analysis Techniques

This study utilizes multivariate techniques of data analysis. Two major statistical tools namely discriminant analysis and correlation coefficients were used as they are suitable for the formulated hypothesis.

The discriminant analysis model classifies the banks into two mutually exclusive categories, performing and non performing firm in the area of return on asset. The classification was also done in the area of non-performing loans. The function of the variables X_1, \dots, X_n that discriminates as much as possible the two groups under investigation will be a linear combination of the X_i explanatory variables. The explicit representation of the model is

$$Z = b_1X_1 + b_2X_3 + b_3X_3 + \dots + b_nX_n$$

Where

Z are the discriminant variables performing or non performing for return on assets (ROA).

X_i are the explanatory variables which are Board ownership, Foreign Ownership, Institutional ownership and Government ownership.

b_i are the discriminant coefficients

Discriminant analysis is a multivariate technique for discriminating among groups (in this case, performing banks and non performing banks) and for classifying a set of observation into these groups.

The classification procedure is stated as follows:

If a bank's performance is strong, that is equal or more than industrial average, classify individual bank as belonging to group 1 and assign 1 value

But if banks' performance is not strong, that is does not meet the industrial average, classify the individual bank as belonging to group 2 and assign zero value.

The second and third investigation used Pearson correlation coefficient and then the Spearman rank correlation as an alternate method. The Spearman rank correlation was necessary to avoid spurious result which might arise in using correlation method if the data were not normally distributed.

The correlation coefficient is given by

$$r = \frac{N \sum XY - (\sum X)(\sum Y)}{\sqrt{\{N \sum X^2 - (\sum X)^2\} \{N \sum Y^2 - (\sum Y)^2\}}}$$

Where r = Correlation coefficient

$\sum X$ = The sum of values in X distribution

$\sum Y$ = The sum of values in Y distribution

$\sum XY$ = The sum of the product of X and Y values

$\sum X^2$ = The sum of square of X value

$\sum Y^2$ = The sum of square of Y value

N = the number of observations

While the Spearman rank correlation coefficient's estimator is given by

$$r' = 1 - \frac{6 \sum D^2}{n(n^2 - 1)}$$

Where $\sum D$ is the sum of the difference between rank X and Y.

2.2. Population of the study

Our study was drawn from a total population of 21 quoted Deposit money banks as at 2012 in Nigeria.

The authors however decided to eliminate the recently nationalized banks namely, Enterprise bank, Key stone Bank, Mainstream bank and First Inland Bank PLC that has merged with the First City Monument Bank PLC. Also filtered out in this population is Citibank Nigeria Limited for lack of complete data. Thus, our sample population becomes 16 banks out of a total of 21. These banks are shown with their returns on asset for the periods 2003 to 2012 in table 2.1.

Table 2.1. Sample Population of the Banks and Their Returns on Assets

Banks	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Access B	10.2	10.9	9.76	13.28	9.08	3.73	2.23	8.81	4.16	5.65
Diamond B	9.8	10.2	5.93	5.52	8.29	4.63	8.25	14.82	10.15	4.9
Zenith B	1.47	1.04	1.66	1.13	1.37	2.08	6.38	5.93	2.91	2.44
EcoB	15.2	18.76	16.25	3.23	9.73	39.82	39.2	16.94	4.12	3.93
FidelityB	2.5	2.11	11.62	16.72	8.12	3.02	28	11.63	4.71	3.73
FirstB	29.7	35.4	24.48	9.05	2.99	1.5	9.1	8.35	2.56	2.49
FCMB	24	25	8.6	43.7	3.29	2.83	8.77	10.08	2.75	2.9
GTB	2.4	2.8	2.11	3.37	2	1.28	11.8	6.74	3.32	2.22
UBA	3.3	3.88	3.45	12.61	4.37	3.51	13.5	14.97	3.88	2.34
StertingB	10.5	11.13	28.41	46.53	24.82	25.64	8.75	7.67	0.27	0.38
SkyeB	13.8	14.77	16.33	22.6	5.33	3.69	4.92	4.64	6.97	8.9
StandandCH	4.2	4.61	3.18	21.53	20.6	12.26	13.6	13.15	6.2	6.1
StanbicIBTC	0.18	0.27	0.08	1.34	1.06	1.54	4.42	4.64	6.97	8.9
UnityB	25.45	23.85	21.04	18.96	18.96	23.84	19.1	40.42	16.84	-
UnionB	40.71	36.2	36.44	46.64	40.2	43.11	44.3	0.12	6	5
WemaB	14.61	17.04	28.77	59.09	23.13	23	53	49.98	42.18	13.74

Source: Various annual reports of the selected 16 banks from the 21 money banks in Nigeria.

3. Analysis of Data

Data presented in the appendix were analysed using discriminant analysis, and correlation coefficients firstly to determine the effect of different ownerships on banks performance and the association between executive directors or non-executive directors on non-performing loans.

The impact of institutional ownership on banks' performance is shown in the standardized canonical discriminant function coefficients presented in table 3.1 as follows.

Table 3.1. Standardized Canonical Discriminant Function Coefficients

	Function
	1
BOwnership	.113
FOwnerhsip	.511
IOwnership	1.012
GOwnership	-.322

In table 3.1, the discriminant coefficient of institutional ownership in the banks' performance (Iownership) is 1.012, Foreign ownership discriminant coefficient (Fownership) is 0.511, the board ownership (Bownership) is 0.113 while that of Government ownership (Gownership) is -0.322. Thus, the predictive model from the discriminant analysis is stated as:

$$Z = 1.012Iown + 0.511Fown + 0.113Bown - 0.322Gown.$$

In the light of this estimated model, the researchers displayed the mean difference in table 3.2 and then the percentage contribution of individual variables to the total discriminant score in order to ascertain the actual performance contribution in table 3.3 as follows.

Table 3.2. Group means and means differences for the discriminant variables

Variables	Performance	Non performance	Mean difference
IOwnership	9.7775	11.9113	-2.1338
FOwnerhsip	26.7837	10.7188	16.0649
BOwnership	6.6625	9.7813	-3.1188
GOwnership	4.1163	0.0000	4.1163

Having shown the mean differences in the above table, the percentage contribution of individual variables to total discriminant scores is presented in table 3.3

Table 3.3. Percentage Contribution of Individual Variables to Total Discriminant Score

Variables	Coefficients	Mean difference	Product	Percentage contribution
Iownership	1.012	-2.1338	-2.15941	-49.39
Fownership	0.511	16.0649	8.20916	187.77
Bownership	0.113	-3.1188	- 0.35242	-8.06
Gownership	-0.322	4.1163	-1.3254	-30.32
Total			4.37193	100

In the table above, Foreign ownership contributed about 187.77 percent of the total discriminant score for the function, implying that a bank's chance of belonging to the group of highly performing banks (in terms of ROA) increases as its foreign ownership increases. Institutional ownership appeared to make the highest negative contribution (-49.39) to group separation of the discriminant function. The government ownership made second to the highest negative contribution with a score of -30.32 %. While board ownership made the most minimal negative contribution (-8.06%). On the basis of these results, the researchers therefore accept that foreign ownership is the most discriminant variable in banks performance in terms of return on asset. The finding therefore propels foreign ownership as the most discriminant variable in banks performance.

The group centroid of the function is presented in table 3.4 as follows:

Table 3.4. Functions at Group Centroids

	Function
Z1	1
0.00	0.457
1.00	-0.457

Unstandardized canonical discriminant functions evaluated at group means

The estimated centroid for non-performance is found to be 0.457 while that of performance is -0.457. This means that the lower the composite score of the ownership, the higher the probability that the ownership

will be classified as contributing poorly in the return on banks' assets. We also examined the extent of association between the executive directors and Non-performing loans and also between the non-executive directors and non-performing loans, and found that; the association between executive directors and non-performing loans are mutually independent. Though the two variables are negatively associated, the rate at which association exists between them is insignificant.

Table 3.5. Correlations

		NPL	EXE	NEX
NPL	Pearson Correlation	1	-.035	-.016
	Sig. (2-tailed)		.898	.953
	N	16	16	16
EXE	Pearson Correlation	-.035	1	-.224
	Sig. (2-tailed)	.898		.405
	N	16	16	16
NEX	Pearson Correlation	-.016	-.224	1
	Sig. (2-tailed)	.953	.405	
	N	16	16	16

However, the researcher employed the spearman Rank correlation in order to authenticate this result in case the distribution of the two variables is far from normal (see Oyeka, 1996). The result of the Spearman rank correlation presented in table 3.6 lent support to the result of the Peasons correlation. That is, the result still maintains that there is no significant association between the two variables.

Table 3.6. Nonparametric Correlations. Spearman's Correlations

		NPL	EXE	NEX
Spearman's rho	NPL	Correlation Coefficient	1.000	-.020
		Sig. (2-tailed)	.	.943
		N	16	16
	EXE	Correlation Coefficient	-.020	1.000
		Sig. (2-tailed)	.943	.
		N	16	16
	NEX	Correlation Coefficient	.052	-.278
		Sig. (2-tailed)	.848	.298
		N	16	16

Source: Researchers data computation

The tables (3.5 and 3.6) also examined the relationship between non-executive directors and non-performing loans and found that non-executive directors also have no significant association with non-performing loans. However, judging on relative basis, the non-executive directors seem to be more associated with non-performing loans than the executive directors. The rank correlation coefficient r' for executive directors is -0.020 while the probability is 0.943 and the correlation coefficient for non-executive is 0.052 with a probability of 0.848. The association shows a positive but insignificant relationship among non-executive directors and non-performing loans. We therefore conclude that there is no significant association between non-executive directors and non-performing loans.

4. Conclusion

Foreign ownership in corporate governance makes the highest positive contribution to the performance of the banking sector in Nigeria. It contributes most to the performance of the sector in term of return on asset (ROA). Institutional ownerships and government ownership made the poorest contributions to the return on bank asset. The poor contribution of board ownership is not as conspicuous as that of the aforementioned.

Thus, a bank's chance of belonging to the group of highly performing banks increases as foreign ownership increases.

There is no positive and significant association between executive directors and non-performing loans. This implies that the executive directors make little or no significant contribution in waging war against non-performing loans. The same thing applies to non-executive directors. Thus, on the basis of the findings, the researchers recommend that the central bank of Nigeria in liaison with the Nigerian deposit and Insurance Corporation should extend strict and intensive surveillance on the role of the directors in the banking sector in order to compel them to total compliance.

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Appendix

Ownership Structure and Average Return on Assets of Selected Banks

Banks	Bownership	Fownership	Iownership	Gownership	ROA	NPL
Access B	18.3	0	13.53	0	22.58	5.65
Diamond B	15.7	0	19.26	0	12.14	4.9
Zenith B	0.48	71	0	0	34.54	3.93
EcoB	4	0	0	0	22.38	3.73

FidelityB	3.11	0	0	0	25.42	2.49
FirstB	0	0	35.09	0	22.66	2.9
FCMB	7.14	0	10.91	0	20.43	2.22
GTB	0.05	0	17	0	36.67	2.34
UBA	22.53	14.75	18.39	0	11.28	0.38
SterlingB	2.64	81.9	0	0	-9.22	2.44
SkyeB	10	0	13.64	0	16.86	8.9
StandardCH	2.25	50.7	7.5	0	47.84	6.1
StanbicIBTC	0	100	0	0	40.33	9.07
UnityB	0.93	63.57	0	15.36	-200.05	0.2
UnionB	5.83	0	0	7.57	-86.83	5
WemaB	0.29	0	24.29	10	60.55	13.74

Source: Various Annual Reports and Accounts of Banks, Annual Reports of NDIC



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Islamic Deposits and Investment Accounts in Income Smoothing in Post-Reclassification of the Islamic Financial Service Act 2013

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This study attempts to determine the impact of the reclassification on income smoothing practices by Islamic banks in Malaysia through loss provisions. It is well acknowledged that Islamic banks set up an allowance for loss provisions in order to absorb any future losses. However, alternative mechanisms, such as Profit Equalization Reserve (PER) and Investment Risk Reserve (IRR) instead of loss provisions, are used to smooth income. This study determines whether the exercise by Islamic banks in Malaysia to reclassify Islamic deposits to investment accounts after the enacted Islamic Financial Service Act (2013), may have caused unintended consequences in less profit payout to investment account holders. The results do not indicate any unintended consequences of less profit payout to investment account holders from the present exercise by the Islamic banks in Malaysia to distinguish Islamic deposits from investment accounts.

Keywords: *Islamic banks, Islamic deposits, investment accounts, Profit Equalization Reserves, Investment Risk Reserves*

JEL classification: *G21, G32*

1. Introduction

The enacted new rules governing the Malaysian's Islamic finance sector, the Islamic Financial Service Act (2013) is a way of enforcing a closer adherence to shariah. It gives regulators greater oversight over Islamic scholars whose duties and functions are for advising to assure that Islamic financial products are in compliance with shariah. In the rules, one provision is that it requires Islamic banks to distinguish deposits made for saving - where the principal is guarantee from those made for investments - where the principal is not guarantee. The Islamic banks in Malaysia are given a two year transition period until 30 June 2015 to comply with the reclassification process. It involves engaging their customers to provide information and clarification on the differences between Islamic deposits and investment accounts.

This study attempts to determine the impact of the reclassification on income smoothing practices (*income smoothing practice is considered a violation of internationally accepted accounting standards - IAS39 or IFRS*) by Islamic banks through loss provisions. It is well acknowledged that Islamic banks set up an allowance for loss provisions in order to absorb any future losses. However, in a recent study, Taktak, Zouari and Boudriga (2010) observe that alternative mechanisms, such as *Profit Equalization Reserve (PER)* and *Investment Risk Reserve*

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(*IRR*) instead of loss provisions, are used to smooth income. This study extends their findings to determine whether the exercise by Islamic banks in Malaysia to reclassify Islamic deposits to investment accounts may have cause in unintended consequences in less profit payout to investment account holders.

This study is different from a previous study by Zoubi and Khazali (2007) on income smoothing practices of Islamic banks in the Gulf Cooperation Council (GCC) not only it analyzes the impact from the reclassification exercise by Islamic banks from one country, Malaysia; but also, it extends to determine whether the reclassification may have cause in unintended consequences in less profit payout to investment account holders. Further, unlike the study by Zoubi and Khazali that analyzes the Islamic banks from different countries such as Bahrain, Kuwait, Oman and Qatar that may be subject to different regulatory changes thus their approach may complicate their findings; this study limits its scopes to one country.

This study adds to the Islamic finance literature in at least two important ways. First, by revealing evidence on how the impact of reclassifying from Islamic deposits to investment accounts on income smoothing by Islamic banks through loss provisions that is widely practiced. Because if Islamic banks rely more on investment reserves to smooth their income instead of loss provisions, it may have reduced the profit payout to investment account holders. As a consequence, this practice might jeopardize the position of Islamic banks.

Second, notwithstanding any changes in the impact of the reclassification, the study determines whether declined reliance on loss provisions has caused it to become any less informative. Thus the study reinforces the notion that the efficiency of a given regulatory measure should not be assessed on a standalone basis without giving due consideration to any unintended consequences. The remainder of this paper is as follows: Section 2 is a review of literature on income smoothing by Islamic banks. Section 3 is on data methodology, hypothesis development as well as variable definitions. Section 4 is discussion on results obtained of regression equations for pre-reclassification years and post-reclassification years in using E-views and Stata software, and section 5 concludes the paper.

2. Literature review

When Islamic banks smooth their income through loss provisions, that will reduce excessive profits which rises during economic growth by means of increased loss provisioning, and vice versa. With prefect income smoothing, their earnings are either not affected or less affected by fluctuations in credit losses over the cycle. Whilst smoothened incomes through loss provisions are a natural practice by Islamic banks just as that is widely practiced by their conventional counterparts, in a recent study on loss provisions for earnings management purposes by Islamic banks in various countries, Taktak, Zouari and Boudriga (2010) disputed they are used for earnings management. Instead, they discovered the banks use alternative mechanisms such as, *Profit Equalization Reserve (PER)* and *Investment Risk Reserve (IRR)*. The authors warn this may have resulted in less profit payout to investment account holders.

In several previous studies in Islamic finance literature, the two investment reserve accounts are actively used by Islamic banks to reduce the volatility of rates of return on investment accounts. (Sundararajan, 2005; Khan and Ahmed, 2001; Archer and Karim, 2006; and Archer et al., 2010). Also, Taktak et al. (2010) infer the calculations of the two mechanisms are based on discretion by the banks.

In a study on effects of smoothing income of conventional banks but extended to examine the enhancing of outside investors' and regulators' ability in monitoring and disciplining the banks' risk-taking behavior, Bushman and Williams (2012) discovered that smoothing earnings resulted in unintended consequences. From examining 55,236 bank-year observations over 27 countries than spans 1995-2006, the authors highlight that whilst smoothing income reduces pro-cyclicality in earnings, it dampens discipline over risk-taking behavior of the banks in their sample. The result is consistent with diminished transparency inhibiting outside monitoring.

In their reference to writings by V. Sundararajan on issues in managing *Profit Equalization Reserve (PER)* and *Investment Risk Reserves (IRR)*, Ahmed and Kohli (2011) indicate that the former as an amount that is appropriated out of gross income in order to maintain a certain level of returns to investment account holders so that a desired level of returns can be provided in face of volatility in assets return, thereby to help to manage displaced commercial risks. The latter reserves are attributable entirely to investment accounts, but maintained specifically to absorb periodic losses, as the authors indicate further.

Subsequently, in extending the study on smoothing returns by the reserves, Taktak, (2011) attributes the majority of the banks' smoothing practices due to the nature of the Islamic financial products rather than intentional

smoothing. The author concludes the banks did not exercise their discretions to smooth their results. In the study, he provides empirical evidences that shariah-based products exhibited higher variability than shariah-compliant revenues to conclude that the banks did not exercise their discretions to smooth their results.

According to Kanagaretnam, Krishnan and Lobo (2008), bank managers use loss provisions for communicating private, inside information and for opportunistic purposes. The latter include for income smoothing, as signaling tool, and for capital management. Further, the authors from their study on market valuation of bank's loss provisions add that auditors act to mitigate information asymmetry associated with the loss provisions.

In another study, the information on bank's financial is more valuable and relevant according to Dechow, Ge and Schrand (2010) in a specific decision setting by a specific decision-maker. The authors imply that the information can only be defined in the context of the specific decision setting. In this study, that specific decision setting is where the information on loss provisions is used. For instance, in a study by Vyas (2011) that measures timeliness of financial information, he finds that investors respond to information about the loss exposure of risky assets faster for financial firms with timelier write-downs. In another instance, Huizinga and Laeven (2009) document that banks used discretion to overstate distressed asset valuations, and banks with large exposures to mortgage-backed securities provisioned less for bad loans.

3. Methodology

3.1. Data

In order to focus on the impact of the reclassification occurring around the publication of the Malaysia's Islamic Financial Service Act (2013) on 22 March 2013, the pre-reclassification data is restricted to reporting figures for fiscal years prior to 2013 (that is, 2009, 2010, 2011 and 2012).

And, the post-reclassification data to reporting figures for fiscal years 2013 and 2014. (Note: for the fiscal year 2014, where interim and unaudited data is available, it is included in the analysis).

Detailed information on the observed periods is as per Table 3.1.1 below. All Islamic banks in Malaysia are included where the necessary data are available for the pre-reclassification period for fiscal years 2009, 2010, 2011 and 2012 (including the Islamic banking operations of foreign-owned banks).

And for the post-reclassification period, for fiscal years 2013 and 2014 are included (where for the fiscal year 2014 where interim and unaudited data is available, it is included). These requirements result in a total sample of 107 bank-year observations.

Table 3.1.1. Observation years included in the analysis

No.	Islamic Banks	Pre-reclassification years	Post-reclassification years	
		2009, 2010, 2011 & 2012	2013	2014
1.	Affin Islamic	√	√	√ -Financial quarter 30/6/2014
2.	Alliance Islamic	√	√	√ -1 st quarter 30/6/2014
3.	AmIslamic	√	√	√ -Financial year ended 31/3/2014
4.	Bank Islam	√	√	√ -Half-yearly ended 30/6/2014
5.	Bank Muamalat	√	√	√ -Audited Financial Report as at 31/3/2014
6.	Agrobank	√	√	×
7.	CIMB Islamic	√	√	√ -Interim 2 nd quarter 30/6/2014
8.	HongLeong Islamic	√	√	√ -Unaudited as at 30/6/2014
9.	Maybank Islamic	√	√	√ -Half-year ended 30/6/2014
10.	MBSB	√	√	×
11.	Public Islamic	√	√	√ -Interim unaudited 30/9/2014
12.	RHB Islamic	√	√	×
13.	Bank Rakyat	√	√	×
14.	BSN	√	√	×
15.	AlRajhi Malaysia	√	√	√ -Interim financial quarter ended 31/3/2014
16.	Asian Finance	√	√	√ -Interim for 6 months ended 30/6/2014

17.	BNP Paribas Najmah	×	×	×
18.	Citibank	√	√	√ -Unaudited as at 30/6/2014
19.	HSBC Amanah	√	√	√ -Interim half-year ended 30/6/2014
20.	Kuwait Finance	√	√	√ -Interim as at 30/6/2014
21.	OCBC AlAmin	√	√	√ -Unaudited up to 30/6/2014
22.	Standard Chartered Saadiq	√	√	√ -Half-year ended 30/6/2014
23.	AlKhair	×	×	×
24.	Elaf Bank	×	×	×
25.	PT Mandiri Bank	×	×	×
26.	BOT Mitsubishi-UFJ (Malaysia)	×	×	×

Note: “√” - included in the analysis; “×” - excluded from the analysis.

Sources: Banks Annual/Interim Reports

3.2. Hypothesis development

The new provision in the Islamic Financial Service Act 2013 in Malaysia that requires Islamic banks to reclassify Islamic deposits to Investment accounts may have an impact on income smoothing through loss provisions as is widely practiced by Islamic banks, and further, the declined reliance on loss provisions may cause it to become less informative.

Accordingly, the hypothesis posits that Islamic banks following the post-reclassification exercise are likely to rely less on loss provisions for smoothing income. In other words, the hypothesis posits a greater association between discretionary *Loss Provisions (LP)* and *Profit before Zakat & Taxation (PZT)*. This indicates suggestive evidence that following the post-reclassification exercise they rely more on *Profit Equalization Reserve (PER)* and *Investment Risk Reserve (IRR)* to smooth their income. This may cause in unintended less profit payout to investment account holders.

Because the disclosure of information on the practices of *Profit Equalization Reserve (PER)* and *Investment Risk Reserve (IRR)* is still limited whether in pre and post reclassification years, henceforth it is not possible to directly assess the extent of these reserve accounts for all banks in the sample to examine on the extent that they may have used the reserves to achieve their smoothing objectives. However, banks have significant discretion in timing and recognition of the reserves appropriated out of their gross distributable income, henceforth *Profit before Zakat & Taxation (PZT)* is used as a proxy for the reserves account. Thus, higher coefficient of the *Loss Provisions (LP)* with the *Profit before Zakat & Taxation (PZT)* in the post-reclassification years reflects smoothing practices via the reserve accounts (after the post-reclassification years).

3.2.1. Variable definitions:

The following regression model is estimated separately for pre-reclassification period (fiscal years 2009, 2010, 2011 and 2012) and post-reclassification period (fiscal years 2013 and 2014) to test this hypothesis.

$$LP_{it} = \alpha_0 + B_1 Pre_t + B_2 LP_{it-1} + B_3 NonPerformFin_{it} + B_4 PZT_{it} + B_5 Pre_t * PZT_{it} + B_6 TotalAsset_{it} + \varepsilon_{it}$$

where LP = loss provisions scaled by total assets

Pre = an indicator variable that equals 1 if the observation belongs to the pre- reclassification period, and 0 otherwise

$NonPerformFin$ = Non Performing Finance scaled by total assets

PZT = Profit before Zakat & Taxation scaled by total assets

$TotalAsset$ = Total assets

ε_{it} = stochastic or random error term

The subscript “t” denotes time, subscript “i” denotes an individual Islamic bank. The lags of LP (i.e. LP_{it-1}) is included in the explanatory variable in the same manner as applied by Frait and Komarkova (2013) in their study to analyze loss provisioning behavior in selected European banks; it is to capture the effects of omitted explanatory variables and the persistence of loss provisions.

Further, in the regression equation above, the coefficient on the interaction term, $Post_t * PZT_{it}$ represents the difference in income-smoothing coefficients (that is driven by the effect of the reclassification) between post and pre-reclassification years.

The hypothesis as stated above predicts an incremental smoothing effect is higher in the post-reclassification than pre-reclassification. In other words, Islamic banks rely more on the reserves for smoothing income in the post-reclassification years than in the pre-reclassification years.

4. Results and Discussion

The descriptive statistics for pre-reclassification years (2009, 2010, 2011 and 2012) and for post-reclassification years (2013 and 2014) are tabulated in table 4.1 and table 4.2, respectively.

Table 4.1. Descriptive statistics: Pre-reclassification years (Stata)

Variable	Obs	Mean	Std. Dev	Min	Max
LP	67	-98288.85	169366.6	-757216	57000
LP _{t-1}	67	-105208.1	158439.1	-757216	57000
NonPerformFin	67	513655.3	873556.9	0	5192415
PZT	67	291414.8	445608.6	-626095	2113883
TA	67	1.93e+07	2.01e+07	28005	9.14e+07

Table 4.2. Descriptive statistics: Post-reclassification years (Stata)

Variable	Obs	Mean	Std. Dev	Min	Max
LP	40	-52545.47	129203.4	-749128	93163
LP _{t-1}	40	-52166.07	112110.3	-633862	93163
NonPerformFin	40	292486.4	376602.6	0	1932532
PZT	40	276195.5	413946.8	-784	2125418
TA	40	2.41e+07	2.99e+07	0	1.32e+08

The coefficients of independent variables for pre-reclassification years and for post-reclassification years are tabulated in table 4.3 and table 4.4, respectively.

Table 4.3. Pre-reclassification years (E-views)

Variable	Coefficient	Std. Error	t-Statistics	Prob.
Constant	-5892.536	4272.141	-1.379293	0.1680
LP _{t-1}	0.539368	0.024735	21.80616	0.0000
NonPerformFin	-0.034066	0.003578	-9.519968	0.0000
PZT	-0.087595	0.012831	-6.827026	0.0000
TA	0.000382	0.000268	1.426194	0.1540
R-squared		0.530007		
Adjusted R-squared		0.528834		

Table 4.4. Post-reclassification years (E-views)

Variable	Coefficient	Std. Error	t-Statistics	Prob.
Constant	9950.396	1768.851	5.625346	0.0000
LP _{t-1}	0.894612	0.018689	47.86917	0.0000
NonPerformFin	0.005743	0.004791	1.198780	0.2309
PZT	-0.087354	0.008178	-10.68216	0.0000
TA	0.000275	7.85E-05	3.499691	0.0005
R-squared		0.911960		
Adjusted R-squared		0.911575		

The results indicate less smoothing effect in the post-reclassification years using the reserves account. This is as the coefficient of *Profit before Zakat & Taxation (PZT)* in the post-reclassification years is - 0.087354, a difference of 0.000241 from the coefficient of - 0.087595 in the pre-reclassification years. This provides

suggestive evidence that the Islamic banks rely less on the reserve accounts for smoothing their income in the post-reclassification years than in the pre-reclassification years.

The Random-effects GLS regression and Fixed-effects (within) regression for pre-reclassification years and for post-reclassification years are tabulated below in table 4.5, table 4.6, table 4.7 and table 4.8.

Table 4.5. Pre-reclassification years: Random-effects GLS regression (Stata)

Random-effects GLS regression			Number of obs = 67			
Group variable: Islamic banks			Number of groups = 23			
R-sq: within = 0.1533 between = 0.9180 overall = 0.5300			Obs per group: min = 1 avg = 2.9 max = 3			
corr(u_i, X) = 0 (assumed)			Wald chi2(4) = 69.92 Prob > chi2 = 0.0000			
LP	Coef.	Std Err.	z	Prob> [z]	(95% Conf. Interval)	
LP _{t-1}	.5393681	.12577	4.29	0.000	.2928635	.7858727
NonPerformFin	-.0340665	.0181954	-1.87	0.061	-.0697288	.0015959
PZT	-.0875953	.065241	-1.34	0.179	-.2154652	.0402746
TA	.0003823	.001363	0.28	0.779	-.0022891	.0030536
_cons	-5892.536	21722.83	-0.27	0.786	-48468.51	36683.44
sigma_u						
0						
sigma_e						
75949.834						
rho						
0 (fraction of variance due to u_i						

Table 4.6. Pre-reclassification years: Fixed-effects (within) regression (Stata)

Fixed-effects (within) regression			Number of obs = 67			
Group variable: Islamic banks			Number of groups = 23			
R-sq: within = 0.4614 between = 0.6775 overall = 0.4109			Obs per group: min = 1 avg = 2.9 max = 3			
corr(u_i, Xb) = -0.9561			F(4,40) = 8.57 Prob > F = 0.0000			
LP	Coef.	Std Err.	t	Prob> [t]	(95% Conf. Interval)	
LP _{t-1}	-.1881759	.1358022	-1.39	0.174	-.4626423	.0862905
NonPerformFin	.0641291	.0550267	1.17	0.251	-.0470841	.1753422
PZT	.4834681	.1265916	3.82	0.000	.2276169	.7393193
TA	.0005863	.0022678	0.26	0.797	-.003997	.0051697
_cons	-303227	57457.87	-5.28	0.000	-419353.7	-187100.3
sigma_u						
398403.81						
sigma_e						
75949.834						
rho						
.96493259 (fraction of variance due to u_i						

F test that all u_i=0:

F (22, 40) = 5.19

Prob > F = 0.0000

Table 4.7. Post-reclassification years: Random-effects GLS regression (Stata)

Random-effects GLS regression			Number of obs = 40			
Group variable: Islamic banks			Number of groups = 23			
R-sq: within = 0.2001 between = 0.9640 overall = 0.9100			Obs per group: min = 1 avg = 1.7 max = 2			
corr(u_i, X) = 0 (assumed)			Wald chi2(4) = 195.19 Prob > chi2 = 0.0000			
LP	Coef.	Std Err.	z	Prob> [z]	(95% Conf. Interval)	

LP _{t-1}	.8309241	.1157224	7.18	0.000	.6041124	1.057736
NonPerformFin	-.007573	.032986	-0.23	0.818	-.0722244	.0570784
PZT	-.0799082	.0416285	-1.92	0.055	-.1614985	.0016822
TA	.0001344	.0005016	0.27	0.789	-.0008487	.0011174
_cons	11670.53	13936.51	0.84	0.402	-15644.52	38985.57
sigma_u	27085.441					
sigma_e	23352.522					
rho	.57360691 (fraction of variance due to u_i)					

Table 4.8. Post-reclassification years: Fixed-effects (within) regression (Stata)

Fixed-effects (within) regression			Number of obs = 40			
Group variable: Islamic banks			Number of groups = 23			
R-sq: within = 0.3314			Obs per group: min = 1			
between = 0.1585			avg = 1.7			
overall = 0.1059			max = 2			
corr(u_i, Xb) = -0.9303			F(4,13) = 1.61			
			Prob > F = 0.2305			
LP	Coef.	Std Err.	t	Prob> [t]	(95% Conf. Interval)	
LP _{t-1}	-0.3786645	.2542033	-1.49	0.160	-.9278372	.1705083
NonPerformFin	-0.0142258	.1853578	-0.08	0.940	-.4146669	.3862153
PZT	-0.0678055	.0731687	-0.93	0.371	-.225877	.090266
TA	-0.0112858	.0070933	-1.59	0.136	-.0266101	.0040384
_cons	222406.2	194212.7	1.15	0.273	-197164.9	641977.3
sigma_u	316226.47					
sigma_e	23352.522					
rho	.99457613 (fraction of variance due to u_i)					

F test that all u_i=0:

F (22, 13) = 4.19

Prob > F = 0.0052

The results indicate the Random-effects GLS regression explains better differences in the errors variance components across the banks, and over the observed years. Further, differences between the banks varied more in the post-reclassification years as its *R-square (between)* is higher at 0.9640 than the *R-square (between)* in the pre-reclassification years of 0.9180.

In conclusion, the results do not indicate any unintended consequences of less profit payout to investment account holders from the present exercise by the Islamic banks in Malaysia to distinguish Islamic deposits from investment accounts.

5. Conclusion

The model to study income smoothing by managing loss provisions by Islamic banks may be extended in future studies to capture additional influence of development of Islamic financial system. As observed by Fonseca and Gonzalez (2008) in their study on income smoothing behaviour among conventional banks across 40 countries; the authors suggest there is more incentive to smoothen income with development of financial system. The relationship between financial system and bank income smoothing may be attributed to same root causes (La Porta et al., (1999); La Porta et al., (2002)). More widely dispersed ownership in a financially developed Islamic financial system such as in Malaysia - whose Islamic finance system has thus far achieves a remarkable growth path, may boost more incentives to smooth earnings. The reason is that the greater the number of users of financial statement makes the statements to become more important such that, bank managers have greater reasons to want to influences external perception about their bank's solvency. The previous empirical literatures indicate that developed market-oriented financial systems are more likely to represent high-quality financial institutional environments with strong investor protection and good enforceability (La Porta et al., 1998).

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Investment Modelling at the Euro Area Level

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The aim of this research is to model the investment function at the level of the Euro zone. To achieve this main objective, we use and implement the structural equation modeling procedure for empirical analysis. Using this technique, the causal relationships established between investment and influencing factors are estimated and tested. Also, in the process of modeling structural equations, we examine empirical data sets related to the Euro area's Member States.

Keywords: investment, interest rate, taxes, gross domestic product, Euro Area

JEL Classification: E22

1. Introduction

This paper started from the Keynes's statement (1936, p.199) that defined the function of investment demand as a function meant to link the rate of aggregate investment with the marginal efficiency of the capital determined to the level of the aggregate investment rate.

According to Keynesian theory, the investment depends on what he called "marginal efficiency of capital" - that is, the expected rate of return for the acquisition cost of the capital goods. This is compared with the market interest rate. If the marginal efficiency of the capital is higher than the interest rate, the investment will increase, and if it is lower, the investment will decrease. Keynes (1936) stated that "the investment rate will increase to the point where the marginal efficiency of capital in general is equal to the market interest rate". Thus, given the "propensity to consume" and "incentive to invest" (determined jointly by the marginal efficiency of capital and the market interest rate), the employment rate is uniquely determined.

In this paper, we will eliminate the limitation according to which the investment function is a function dependent on interest rate and we will introduce in the analysis the aspect related to fiscal pressure that European economies are experiencing. Starting from this aspect, this work seeks to model the investment function at the Euro area level and to identify the causal relationships that are established in this model.

2. Literature Review

The analysis of investment represents the research objective of many researchers who approach, on the one hand, investments at a macroeconomic level and their relationships with consumption, and on the other hand, investments on financial markets. Therefore, the analysis presented in this article falls into the following research framework.

Eslamloueyan and Jafari (2014, pp.209-220) used the correlated effects mean group (CCEMG) technique to a set of balanced panel error correction model and they studied the repercussions of the 1997's

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Asian financial crisis and of 2008's global financial crisis on the savings and investing behavior in East Asian countries. Eslamloueyan and Jafari (2014, pp.209-220) found that the rates of both savings and investments are highly dependent across countries of East Asia.

García-Belenguer and Santos (2013, pp.150-169) explored a simple version of the neoclassical growth model and studied empirically the main determinants of aggregate investment across countries. In their work, the neoclassical growth model predicts that aggregate investment may be influenced by income growth, capital income share, relative price of capital, taxes, and other market distortions (García-Belenguer and Santos, 2013, pp.150-169).

Using a fully general specification for the instantaneous utility function, Furlanetto and Seneca (2014, pp.111-126) presented that the size of the wealth effect on labor supply is largely inconsequential for macroeconomic dynamics.

Lim (2014, pp.160-177) analyzed 129 developed and developing economies in terms of their institutional and structural factors related to their investment activity. The author introduced these institutional and structural factors to a standard neoclassical investment function for open economies and found that financial development and institutional quality tend to be determinants of cross-country capital formation. Nonetheless, institutional quality seemed to show a higher level of stability in its sign and significance of its coefficient.

Rieger (2012, pp.239-240) developed and proved a formula for the computation of optimal financial investments in an expected utility framework with arbitrary (not necessarily concave) utility functions.

Moreover, Di Corato, Moretto, Vergalli (2014: 80-89) introduced an analytical approximation of the short-run investment rule and presented how such an approximation can be used in order to derive the corresponding: i) steady-state distribution of the optimal stock of capital, and ii) the long-run average rate of capital accumulation.

Zhao, Shen and Wei (2014, pp.824-835) considered the consumption–investment problem with a general discount function and a logarithmic utility function in a non-Markovian framework. Their model's coefficients follow the assumption of adapted stochastic processes, including the coefficients of the interest rate, appreciation rate, and volatility of the stock. The work of Zhao, Shen and Wei (2014, pp.824-835) demonstrate that a time-consistent equilibrium consumption–investment strategy of the original problem consists of a deterministic function and the ratio of the market price of risk to the volatility. Nonetheless, the corresponding equilibrium value function can be described by the unique solution of a family of BSDEs parameterized by a time variable.

3. Research Methodology

To achieve the purpose of the research, we will use the econometric technique of structural equation modelling. A structural equation model is a set of assumptions about how the variables in an analysis are generated and related to each other (Hu and Bentler, 1999). Using this modeling econometric technique, we will estimate and test the causal relationships within the model, using a combination of empirical data series and quantitative causal hypotheses.

This methodology will be applied by using the SPSS AMOS software on empirical data to achieve the purpose of the research and examine the hypotheses. In this respect, we will use time series from 2001q1-2014q3 for macroeconomic variables that characterize the 18 Member States of the Euro area, plus the time series for the Lithuania's variables, namely a state will be a full member of the Euro zone starting January 1 2015. Lithuania's decision to be integrated in the Euro Area has already been adopted by The Council of the European Union on July 23, 2014, so it is appropriate to include the Baltic state in this empirical analysis. In this analysis, we will use the following variables: investment (EA19_I), gross domestic product (EA19_Y), interest rate (EA19_R), and taxes (EA19_T). It should be mentioned that the sources of the empirical data are Eurostat, European Commission and European Central Bank.

4. Analysis and Results

Next, in this upcoming paper and research, the investments' function will be achieved, and also factors determining the investments will be identified. Following the proposed model, it results in a form of the model according to the type of Euro Area and the influence of interest rates and taxes.

To determine and test the investment model at the level of the Euro area, following hypotheses were identified:

H1: GDP influences interest rates in the Euro area

H2: Interest rates influence the investment in the Euro area

H3: Taxes affect investment in the Euro area

H4: Taxes and GDP influence each other in the Euro area

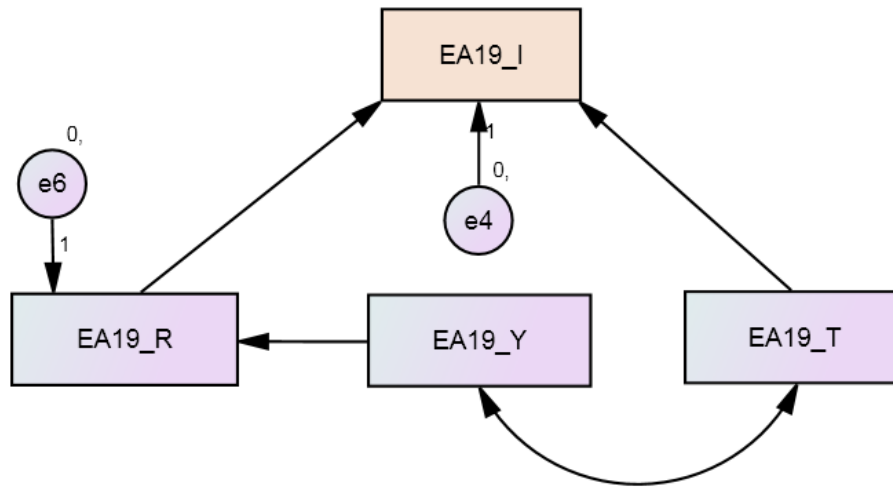


Figure 1. Investment model proposed for the Euro Area

Table 1. Model accuracy

Indicator	Model	Recommended values
χ^2	8.124 (p=0.017)	$p \leq 0.05$
χ^2/df	4.062	≤ 5
NFI	0.972	≥ 0.90
RFI	0.916	≥ 0.90
CFI	0.978	≥ 0.90
RMSEA	0.238	≤ 0.10

Note: χ^2 =Chi-square, χ^2/df = ratio of Chi-square and degrees of freedom, NFI = Normed fit index, RFI = Relative fit index, CFI = Comparative fit index, RMSEA = Root mean square error of approximation.

The results that study the relevancy of the model have met for the most part the recommended criteria (Table 1), but the root mean square error of approximation recorded a score of 0.238 which is slightly above the 0.10 level. This limitation of the study is related to the number of 55 observations introduced in the model and the operating premises of AMOS software which requires at least 100 observations. However, overall it can be stated that the proposed model, according to the included variables, is relevant.

Structural equation modeling was used to test the hypotheses for the proposed model. The results of this econometric technique are shown in Table 2 and Figure 2.

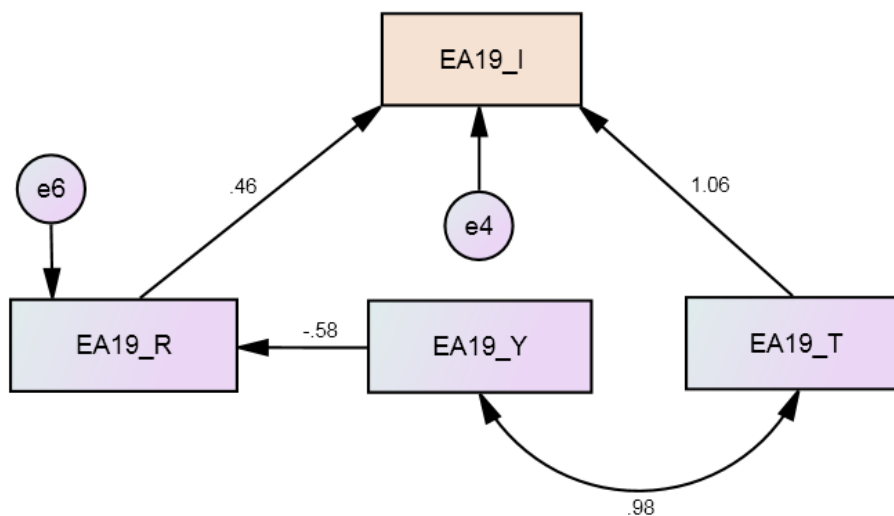


Figure 2. Standardized results of the structural equations model

Table 2. Structural equation modelling results for the investment model proposed for the Euro area

Hypotheses	Standardized Regression Weights	Standard Error	Significance	Hypothesis Result
H1: EA19_Y → EA19_R	-0.576	0.000	***	Confirmed
H2: EA19_R → EA19_I	0.458	5356.791	***	Confirmed
H3: EA19_T → EA19_I	1.057	0.154	***	Confirmed
H4: EA19_T ↔ EA19_Y	0.985		***	Confirmed

*** Significant at a 0.001 level (Two-tailed)

The proposed investment in the Euro area meets the prerequisites of a relevant model as it we can observed from the results calculated in Tables 1 and 2, following the recommendations of Hu and Bentler (1999, p.27). The probability value associated with the null hypothesis that the test is zero is displayed in the column marked 'Significance'. All regression coefficients of this model are significantly different from zero beyond the level of 0.001.

5. Conclusions

From table 2 and figure 2, we can note that at the Euro area level, investments are determined by taxes and interest rate. Following this present research, a new model regarding the investment function was identified. The results obtained confirm the three proposed hypotheses, namely:

- H1: GDP influences interest rates in the Euro area
- H2: Interest rates influence the investment in the Euro area
- H3: Taxes affect investment in the Euro area
- H4: Taxes and GDP influence each other in the Euro area

Regarding the limits of this research it should be mentioned that the RMSEA value in Table 1 shows that the new model of investments needs a development by using a time series that should surpass 100 observations.

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