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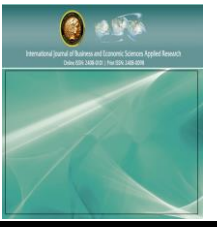

The Effects of Oil Price Shocks on Turkish Business Cycle: A Markov Switching Approach

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Abstract

Purpose - *The purpose of this study is to investigate the relationship between oil price changes and the output growth in Turkey.*

Design/methodology/approach - *The data were taken from International Financial Statistics databases, consisting of monthly data for the period 1986:01-2014:09. Different univariate Markov-switching regime autoregressive models are specified and estimated. Among them we selected univariate MSIH(3)-AR(2) model for output and extended it to verify if the inclusion of various asymmetric oil price shocks as an exogenous variable improves the ability of the Markov switching model. Four different oil price shocks are considered.*

Findings - *We find that amongvarious oil price shocks, onlynet oil price increases have negative effects on output growth and mitigate the magnitude of thesome recessionary periods in Turkey. However, it doesn't strongly explain the behavior of business cycle in Turkey.*

Research limitations/implications - *Our results suggest that the inclusion of other fundamental financial factors in the bivariate Markov switching modelof aggregate economic activity and oil price changes becomes important to explicitly detect the negative impact of oil price shocks on output in Turkey.*

Originality/value - *Our results support the existence of a negative relationship between oil price increases and output growth mentioned in the literature and empirical studies on Turkey.*

Keywords: *business cycle, output, Markov switching regime, oil shocks*

JEL Classification: *E32, E44, Q41*

1. Introduction

There is a wide belief that oil price shocks have important effects on both economic activity and economic policy of all countries. These effects emerge from huge and sudden changes in oil prices. In an early seminal study, Hamilton (1983) finds a strong negative correlation between oil price changes and GNP growth using a multivariate vector autoregression (VAR) system. Further, he provides evidence that oil prices were both significant determinants of U.S. economic activity and exogenous to it throughout the post-war.

Mork (1989) investigates asymmetric response of output to oil price changes by specifying real oil price increases and decreases and concludes that real oil price increases generates large negative effect on output while decrease in oil prices would not confer a positive effect on output. Hence, Mork (1989) proposes an asymmetric relation in which oil variable is given by the oil price change when oil prices go up but equal to zero when oil prices decline.

Hamilton (1996) argues that oil shocks affect the macroeconomy primarily by depressing demand for consumption and investment goods. Therefore, in order to measure the effect of oil price change on spending decisions of consumers and firms, it is appropriate to compare the current price of oil with where it has been over the previous year rather than during the previous quarter alone. Thus, Hamilton (1996) states that Mork (1989)'s proposal is not satisfactory and proposes a net real oil price increase variable that is defined as the percentage change in the current price of oil from the maximum value at some point during the previous year.

On the other hand, Lee, Ni and Ratti (1995) argue that an oil shock is likely to have greater impact on economic activity in an environment where oil prices have been stable than in an environment where oil price movements have been frequent and erratic because price changes in a volatile environment are likely to be soon reversed. A significant relationship between oil and economic activity implies that a certain oil price increase will cause a decrease in economic activity, while a price increase in a period of high volatility is less likely to cause it.

In order to investigate an empirical relationship between business cycle dynamics and oil price changes, one must address movements in business cycle. Hamilton (1989) has proposed a Markov switching (MS) model to investigate asymmetries in business cycle dynamics. Following Hamilton (1989), a number of studies have employed MS autoregressive models to investigate non-linearities and asymmetries in business cycle for various countries (among them see, Engel and Hamilton, 1990; Filardo, 1994; Boldin, 1996; Raymond and Rich, 1997; Krolzig, 1997; Krolzig and Toro, 2000; Clements and Krolzig, 2002; Holmes and Wang, 2003; Cologni and Manera, 2006; 2009).

In recent years, the literature on Turkish business cycle dynamics has been growing. Yilmazkuday and Akay (2008) investigate business cycles of the Turkish economy for the period 1987-2002. Using a three-state univariate MS model (MSMH(3)-AR(2)) they decompose business cycle into recessionary, high-growth and low-growth regimes. They find important asymmetries in the business cycle. Their model captures all the recessionary periods the Turkish economy went through in the sample period. According to their results, the recessionary regime lasts more than the sum of the low- and high-growth regime durations.

Yılmazkuday (2009) investigates productivity cycles of public and private manufacturing sectors in Turkey by using two-state MS model applied through the Bayesian multimove Gibbs-sampling approach over the period 1988-2006. He finds that the productivity in public sector is procyclical in periods of real shocks, such as stagnation or earthquakes, while the productivity in private sector is procyclical in periods of financial crises.

Çatık and Önder (2011) investigate inflationary effects of oil prices in Turkey for the period 1996-2007. Using MSIAH-ARX model among various specifications, they find evidence for the increasing effect of oil on inflation in high inflation regime. Their result stresses that the low-inflation environment plays an important role in the absorption of oil shocks to some extent.

Oil is one of the most important import items for Turkey. Approximately 90 percent of Turkey's crude oil is imported. The oil dependent structure of Turkey makes oil prices a significant variable for Turkish economy. There are some studies on the oil price-macroeconomy relationship for Turkey. Alper and Torul (2008) investigate the response of output growth to oil price increases for Turkey using bivariate VAR and SVAR model separately. They find that when the global liquidity conditions are included, the response of real output to oil price innovations is statistically significant especially for the post-2000 period. Özlale and Pekkurnaz (2010), analyzes the impact of oil prices on the current account balances for the Turkish economy using a structural vector autoregression model where other determinants of current account is considered as well. The results indicate a significant effect of oil price shocks in the short-run. Aydın and Acar (2011) analyze long-term effects of oil price shocks on macroeconomic variables, including GDP, CPI, indirect tax revenues, trade balance, and carbon emissions by a dynamic multi-sectoral general equilibrium model (TurGEM-D) for Turkey. Their simulation results show that oil prices have significant effects on macro indicators and carbon emissions in the Turkish economy. Kapoor (2011) investigates effects of oil price shocks on economic activity of emerging economies. Using the F-test, He finds significant relationship between net oil price increases and the real GDP growth at 10% significance level for Turkey for the period 2000-2009. Finally, Güney and Hasanov (2013) investigate the effects of oil price changes on output and inflation in Turkey for the period 1990-2012. Using ARDL model and Granger causality tests they find that while oil price increases have clear negative effects on output growth, the impact of oil price decline is insignificant.

In this paper we analyze the relationship between oil price shocks and business cycle fluctuations in Turkey by incorporating various oil price increases in a univariate MS model of output and examine the capabilities of these variables to generate shifts in the growth rate of GDP. We use the criteria suggested by Cologni and Manera (2009) to select the optimal MS model among various univariate MS models and then we extend the selected model to investigate asymmetric effects of oil price shocks on business cycle fluctuations. We conclude that although net oil price increases have negative effect on output growth and mitigate the magnitude of the some recessionary periods, it doesn't strongly explain the behavior of Turkish business cycle.

The paper is structured as follows. Section 2 discusses MS model specifications for business cycle, section 3 presents data and various modeling techniques for the effects of oil price changes. Section 4 discusses the empirical results and Section 5 concludes the study.

2. **MS model Specifications for Business Cycle**

According to the Hamilton (1989), the MS model of real GDP can be described as follows:

$$\Delta y_t - \mu(s_t) = \sum_{i=1}^{p} \alpha_i (\Delta y_{t-i} - \mu(s_{t-i})) + \varepsilon_t ,$$

$$\varepsilon_t \sim N(0, \sigma^2) \qquad (1)$$

Where Δy_t is the growth rate of the real GDP, μ is the mean of the process and depends on the discrete random variable s_t that reflects unobserved state of the economy. This dependence implies that different regimes are associated with different conditional distributions of the growth rate of the GDP. In case of two regimes, the unobserved state represents "rising" and "falling" states in the GDP. If s_t takes on M different values, model (1) represents a mixture of M different autoregressive models. The autoregressive parameters of model (1) can be functions of the unobserved state s_t. In this case, MS model of real GDP can be described as follows:

$$\Delta y_t = c(s_t) + \sum_{i=1}^{p} a_i(s_t) \Delta y_{t-i} + \varepsilon_t \qquad (2)$$

Where, the parameters of the autoregressive model depend on a regime or unobserved state. The unobserved state itself is described as the outcome of the unobserved Markov chain. Transitions between states are defined by transition probabilities which follow first-order Markov process:

$$p_{ij} = P[s_t = i \mid s_{t-1} = j], \qquad \sum_{i=1}^{M} p_{ij} = 1$$

More generally, it is assumed that S_t follows an ergodic M-state Markov process with an irreducible transition matrix:

$$P = \begin{bmatrix} p_{11} & p_{12} & \cdots & p_{1M} \\ p_{21} & p_{22} & \cdots & p_{2M} \\ \vdots & \vdots & \ddots & \vdots \\ p_{M1} & p_{M2} & \cdots & p_{MM} \end{bmatrix}$$

where $p_{1i} + p_{2i} + ... + p_{Mi} = 1$ for $i = 1, 2, ..., M$ and the probability of a regime switching is assumed to be constant.

There can be asymmetry in the persistence of regimes. For example, in case of two-regime GDP growth model (1), if μ_1 is negative and large in absolute value and p_{11} is small, downward movements in the GDP are short but sharp. On the other hand, if μ_2 is positive and small and p_{22} is large, upward movements in the GDP are gradual and weak. Another possibility is the long swings hypothesis as described by Engel and Hamilton (1990): if μ_1 and μ_2 are opposite in sign and that the values of both p_{11} and p_{22} are large, there are long swings in the business cycle.

Following Psaradakis and Spagnolo (2003), we use the Akaike Information Criterion (AIC) to determine the correct number of regimes in models (1) and (2). They suggest AIC test to select the number of regimes, provided that the sample size and parameter changes are not too small. Further, we use both AIC and likelihood ratio(LR) tests to determine the number of autoregressive terms in models (1) and (2). Following Cologni and Manera (2009), in the final stage, we compare the different types of selected models. The comparison is based on the following criteria: i) model fit, as summarized by the standard error of the residuals; ii) value of the log-likelihood function; iii) values of means and/or intercepts estimated in the different economic regimes; iv) relation between the probability of regime switching and the macroeconomic fundamentals. This last criterion emphasizes that the probability of a low growth state should be smaller than the probability of high growth, since recessions are recognized to be more short-lived than expansions[1].From the estimated transition probabilities we measure the persistence of the different economic phases.

[1] With this criterion we differ from Yilmazkuday and Akay (2008) analysis. Their result indicates that the recessionary regime lasts even more than the sum of the low- and high-growth regime durations.

3. Data and Model Specifications for the Effects of Oil Price Shocks

In this study, we use monthly data of seasonally adjusted total industrial production index (IP) for Turkey and real oil price for the period 1986:1-2014:9. Both data are taken from the International Financial Statistics databases (IFS). The real oil price is obtained by multiplying the nominal oil price expressed in U.S. Dollars by the nominal exchange rate and deflating it by consumer price index (CPI). Thus, the real oil price reflects exchange rate fluctuations and inflation variations as well. The data for IP and oil price are obtained from the IFS. The logarithmic first difference of IP is referred to as the output growth rate.

In order to account for the asymmetric effects of oil shocks, we introduce four different definitions of oil shocks. The first is the logarithmic first differences of the real oil price, i.e. $\Delta roil_t$, t=1,…,T.

$$\Delta roil_t = \ln roil_t - \ln roil_{t-1}$$

The second variable is defined as the positive change in the logarithm of the real oil price suggested by Mork 1989.

$$\Delta roil_t^{+} = \begin{cases} \Delta roil_t, & if \quad \Delta roil_t > 0 \\ 0, & if \quad \Delta roil_t \le 0 \end{cases}$$

The third definition is the net oil price increases ($NOPI_t$) suggested by Hamilton (1996). The $NOPI_t$ is defined as the positive percentage change in the current price of oil from the maximum value at some point during the previous year:

$$NOPI_t = \begin{cases} \ln roil_t - \max(\ln roil_{t-1},...,\ln roil_{t-12}), & if \ln roil_t > \max(\ln roil_{t-1},...,\ln roil_{t-12}) \\ 0 & otherwise \end{cases}$$

Following Lee, Ni and Ratti (1995), the fourth oil shock variable is aimed at capturing the volatility in the oil price market. Lee, Ni and Ratti (1995) normalize the oil price changes with their GARCH volatility. Following them, the resulting normalized or standardized oil price increases ($SOPI_t$) are calculated according to the following model[2]:

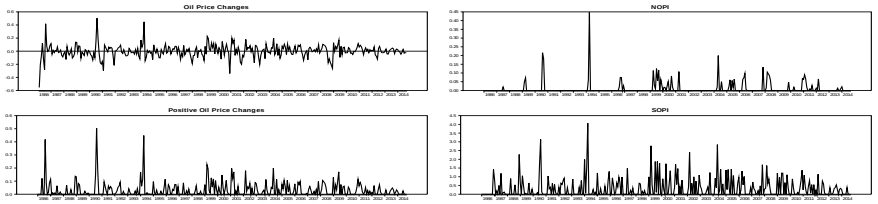
$$\Delta roil_t = \alpha_0 + \sum_{i=1}^{p} \alpha_i \Delta roil_{t-i} + \varepsilon_t \,, \quad \varepsilon_t \sim N(0, h_t)$$

$$h_t = \gamma_0 + \gamma_1 \varepsilon_{t-1}^2 + \gamma_2 h_{t-1}$$

$$SOPI_t = \begin{cases} \dfrac{\hat{\varepsilon}_t}{\sqrt{h_t}}, & if \quad \dfrac{\hat{\varepsilon}_t}{\sqrt{h_t}} > 0 \\ 0, & if \quad \dfrac{\hat{\varepsilon}_t}{\sqrt{h_t}} \le 0 \end{cases}$$

Figure 1 presents alternative measures of oil price shocks discussed so far in this section.

Figure 1. Alternative Measures of Oil Price Shocks



Using the data described above, we explore whether realization of oil price shocks alone generates cyclical asymmetries in output principally in the MS framework. By incorporating real oil price shocks in a MS model of output we investigate whether real oil price shocks generate shifts in the growth rate of output in Turkey.

[2] We estimated AR(8)-GARCH(1,1) model with t -distributed innovations. AIC and SBC are used to determine the optimal number of lags for oil price change ($p = 8$).

The first model to investigate the relationship between real oil price shocks and business cycle fluctuation sis the extension of (1), known as the MS-mean (MSM) model[3]:

$$\Delta y_t - \mu(s_t) = \sum_{i=1}^{p} \alpha_i (\Delta y_{t-i} - \mu(s_{t-i})) + \sum_{i=1}^{q} \beta_i oil_{t-i} + \varepsilon_t \quad (3)$$

$$\varepsilon_t \sim N(0, \sigma^2) \quad (4)$$

where oil_t represents one of four alternative specifications of oil price shocks (namely, $\Delta roil_t$, $\Delta roil_t^+$, $NOPI_t$, $SOPI_t$) described in Section 2.

If we consider a once-and-for-all jump in the real GDP series, the MSM model (3)-(4) turns tothe MS-intercept (MSI) model:

$$\Delta y_t = c(s_t) + \sum_{i=1}^{p} \alpha_i \Delta y_{t-1} + \sum_{j=1}^{q} \beta_j oil_{t-j} + \varepsilon_t \quad (5)$$

Equations (3)-(4) and (5)-(4) can be generalized in two directions. Since output volatility in recessions is generally different from the volatility in expansions, equation (3) can incorporate a regime-varying variance of the disturbance terms:

$$\varepsilon_t \sim N(0, \sigma^2(s_t)) \quad (6)$$

Equations (3) and (6) define MSM – heteroskedastic (MSMH) model, while equations (5) and (6) define MSI – heteroskedastic (MSIH) model. On the other hand, if the parameters of the autoregressive part of the MSI model are allowed to become functions of the state variable S_t, resulting MSI-autoregressive (MSIA) model is written as:

$$\Delta y_t = c(s_t) + \sum_{i=1}^{p} \alpha_i (s_t) \Delta y_{t-i} + \sum_{j=1}^{q} \beta_j (s_t) oil_{t-j} + \varepsilon_t \quad (7)$$

Combining model (7) with (6) obtains MSI-autoregressive-heteroskedastic (MSIAH) model[4].

4. Empirical Results

The Expectation-Maximization (EM) algorithm is used to estimate univariate and bivariate models. The analysis is started by examining various univariate MS(m)-AR(p) models for monthly IP growth rate over the period 1986:01-2014:09.Then, we compare m-state univariate MSM, MSMH, MSI, MSIH, MSIA and MSIAH models with each other in order to select the optimal model by using the criteria suggested by Cologni and Manera (2009) described in section 2. AIC and LR tests are used to determine optimal lag length of autoregressive terms in MS models. As a result, the univariate MSIH(3)-AR(2) model, namely a MSIH model with three regimes and a two-lag autoregressive component is selected as most appropriate model to detect the business cycle feature of Turkey.

The estimation results of MSIH(3)-AR(2) model are reported in Table 1. All coefficients are statistically significant. Estimated regime dependent intercept terms point out that in regime 1 the economy experiences a moderate growth, in regime 2 the economy experiences high economic growth and in regime 3 the economy experiences recession. Regime 1 and regime 2 each tend to last approximately 4 months, while regime 3 is less persistent which tends to lasts 2 months. According to the regime 3, the periods 1990:07, 1990:12-1991:01, 1991:06, 1994:02-1994:06, 1995:03-1995:04, 1996:02, 1998:04, 1999:08, 2000:03, 2000:12, 2001:02-2001:04, 2003:02, 2006:01, 2007:12, 2008:09-2009:01, 2013:08 are characterized as recessionary[5]. Figure 2 reveals smoothed probability of the recession periods in univariate model. As seen from the

[3] In the empirical section, a univariate MS model is denoted by MS(m)-AR(p), while a bivariate MS model with exogenous oil variable is denoted by MS(m)-ARX(p).

[4] In equations (3) and (4) we assume that oil price shocks are independent of the unobserved state variable for output, while in equation (7) the effect of oil price shocks on economic growth is regime dependent.

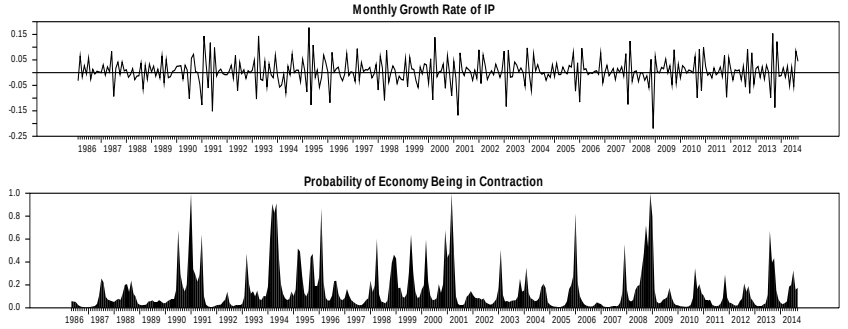
[5] We assign the t-th observation of the IP to the third regime if $\Pr(s_t = 3 \mid \Delta y_t > 0.50)$.

Table 1. Selected Univariate MSIH(3)-AR(2) Model and Bivariate MSIH(3)-ARX(2) model with various exogenous oil prices

Parameter	Univariate Model	Bivariate Models			
	MSIH(3)-AR(2)	$\Delta roil_t$	$\Delta roil_t^+$	$NOPI_t$	$SOPI_t$
c_1	0.00852***	0.00830***	0.00741***	0.01025***	0.00653***
	(0.0022)	(0.0021)	(0.0022)	(0.0020)	(0.0020)
c_2	0.01495***	0.01492***	0.01407***	0.01253***	0.01087***
	(0.0035)	(0.0034)	(0.0034)	(0.0035)	(0.0032)
c_3	-0.02630**	-0.03006***	-0.03193**	-0.01842	-0.04853***
	(0.0123)	(0.0139)	(0.0136)	(0.0164)	(0.0179)
α_1	-0.67036***	-0.68519***	-0.68060***	-0.66171***	-0.71306***
	(0.0392)	(0.0382)	(0.0386)	(0.0390)	(0.0369)
α_2	-0.19636***	-0.20994***	-0.20338***	-0.18929***	-0.23217***
	(0.0376)	(0.0367)	(0.0373)	(0.0349)	(0.0348)
β_1		0.02225	0.02165	-0.06201	0.00271
		(0.0176)	(0.0252)	(0.0457)	(0.0026)
β_2		0.01344	0.01182	-0.07159	0.00587**
		(0.0177)	(0.0257)	(0.0470)	(0.0026)
$\sigma_{\varepsilon 1}$	0.00021***	0.00020***	0.00021***	0.00021***	0.00018***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$\sigma_{\varepsilon 2}$	0.00157***	0.00158***	0.00156***	0.00180***	0.00166***
	(0.0003)	(0.0003)	(0.0003)	(0.0003)	(0.0002)
$\sigma_{\varepsilon 3}$	0.00418***	0.00419***	0.00418***	0.00520***	0.00417***
	(0.0010)	(0.0011)	(0.0011)	(0.0017)	(0.0015)
Transition Matrix					
	*regime*1 *regime* 2 *regime* 3	*regime*1 *regime* 2 *regime* 3	*regime*1 *regime* 2 *regime* 3	*regime*1 *regime* 2 *regime* 3	*regime*1 *regime* 2 *regime* 3
Regime 1	0.73 0.13 0.07	0.73 0.11 0.12	0.73 0.12 0.08	0.73 0.11 0.19	0.73 0.09 0.16
Regime 2	0.27 0.73 0.48	0.27 0.76 0.44	0.27 0.75 0.48	0.27 0.82 0.17	0.27 0.83 0.36
Regime 3	0.00 0.14 0.45	0.00 0.13 0.44	0.00 0.13 0.44	0.00 0.07 0.64	0.00 0.08 0.48
Duration					
Regime 1	3.69	3.74	3.68	3.75	3.75
Regime 2	3.73	4.23	3.98	5.53	5.79
Regime 3	1.83	1.79	1.78	2.77	1.90
Log-L	627.9323	628.8452	628.3739	629.0239	629.86494
AIC	-3.60078	-3.59440	-3.59164	-3.59545	-3.60038
LR test	-	1.8259	0.8832	2.1834	3.8654

Figure 2, the regime 3 shows the recessionary effects of crises occurred in Turkish economy in past years, namely 1990-1991 oil crisis due to Iraq's invasion of Kuwait, 1994 financial crisis, destructive effects of August 1999 earthquake on the economy, 2000-2001 financial sector crisis and 2008-2009 global financial crisis on output. However, the recessionary effect of 1998 Russian stock market crisis on the economy remains a bit less than 50%. Regime 3 well approximates the dates of recessionary periods reported by the OECD (see Table 2).

Figure 2. Smoothed Probability of Recession Periods in Univariate MSIH(3)-AR(2) Model



The transition probabilities in the univariate model (p_{11}=0.73, p_{22}=0.73 and p_{11}=0.45) describe the presence of asymmetries in the business cycle. Moderate growth and high growth regimes both are found to be the more persistent, while recessionary regime is less persistent, which are also confirmed by the average duration of each regime. According to the calculated transition probabilities, while the moderate growth regime has no probability to be followed by the recessionary regime, it has high probability to be followed by a high growth regime ($p_{21} = 0.27$). Further, the recessionary regime has high probability to be followed by high growth regime, while it has low probability (0.07) to be followed by moderate growth regime. Recessionary regime shows the highest variability of standard errors, which reflects the view that recessions are less stable than expansions. On the other hand, high growth regime is characterized by relatively smaller residual standard errors and moderate growth regime is characterized by the smallest residual standard errors.

Table 2. Business Cycle Dates For Turkey[6]

Peak	1987M11	1993M8	1998M1	2000M8	2006M7	2011M5
Trough	1989M5	1994M7	1999M8	2001M10	2009M3	2012M11

[6] The dates are obtained from the webpage of the OECD that publishes the OECD Composite Leading Indicators: Turning Points of Reference Series and Component Series, http://www.oecd.org/std/leading-indicators/oecdcompositeleadingindicatorsreferenceturningpointsandcomponentseries.htm

In order to investigate whether oil price shocks are able to increase the accuracy of MS regression models, we have estimated various MSIH models with three regimes. The optimal lag length of the autoregressive terms and the exogenous oil shocks are determined by using AIC, BIC and LR test. According to the test results, MSIH(3)-ARX(2,2) specification for various exogenous oil shocks is preferred to be the best specification. Our aim is to verify if the introduction of oil shock variables can improve the identification of the different business cycle phases.

For various oil price changes, we are able to describe the first regime as a moderate growth regime, second regime as a high growth regime and third regime as the recessionary regime as in the case of the univariate MS model. As seen from the Table 1, all coefficients of oil shock variables in various bivariate models are statistically insignificant, except for the second coefficient of the $SOPI_t$ which is significant and positive near zero value. The coefficients of $\Delta roil_t$ and $\Delta roil_t^+$ variables are positive and insignificant. On the other hand, both coefficients on the $NOPI_t$ are negative but statistically insignificant at 10% significance level[7]. These results indicate that, when compared with the $NOPI_t$, $\Delta roil_t$, $\Delta roil_t^+$ and $SOPI_t$ are not good regressors to measure the negative effect of oil shocks on output. Further, all the bivariate models don't lead to any significant increase in the likelihood function when compared with the univariate model. Therefore, the LR test, which is distributed as χ^2 with 2 degrees of freedom, doesn't reject the univariate model against all other bivariate models. These findings suggest that oil prices don't significantly affect the Turkish business cycle.

Figure 3 presents smoothed probabilities of recession, moderate growth and high growth periods in univariate model and bivariate model with exogenous $NOPI_t$[8]. As seen from the figure, although addition of the $NOPI_t$ to the univariate model mitigated the magnitude of the some recessionary periods, namely 1994:02-1994:06, 1998:04, 1999:08, 2000:03, 2003:02, 2006:01, 2007:12 and 2013:08 periods, net oil price increases don't have a strong direct effect on the behavior of business cycle in Turkey. However, oil price shocks can also affect an economy indirectly. As mentioned by Aydın and Acar (2011), rising oil prices increases import costs for non-energy products globally which causes unsustainable current account deficits, exchange rate depreciations and high inflation rate in emerging economies like Turkey. Further, rising oil prices can affect global financial conditions by influencing oil importing large emerging economies and developed countries which have high debt burdens. Rising oil prices will make it difficult for these countries to pay-off their deficits which cause disturbances in international financial markets. These disturbances in turn affect small emerging economies like Turkey by causing large capital outflows, exchange rate depreciations, interest rate increases on loans and large current account deficits. Alper and Torul (2008) find that when financial and global liquidity conditions are not considered, the response of real output to oil price increases is found to be insignificant. However, when these conditions are considered, real economic activity in Turkey is negatively affected by oil price increases. Hence, the inclusion of other fundamental

[7] The probability values of the null hypothesis for the coefficients of $NOPI_t$ are 0.17 and 0.13 respectively.

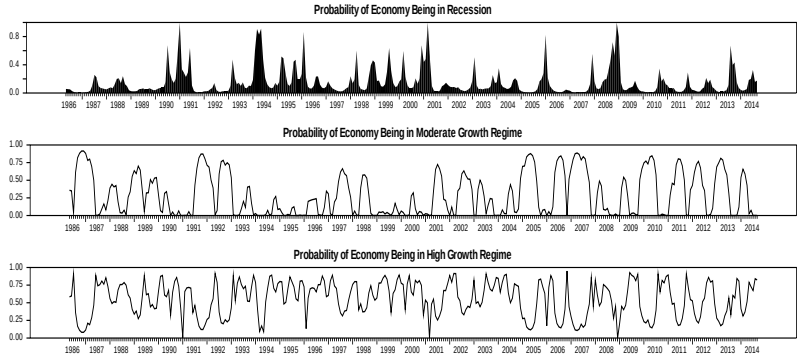
[8] Since the behavior of Turkish business cycle is not significantly affected by other real oil price shocks, business cycle features of bivariate models with other real oil price shocks are very similar to that of the univariate model. To save space, we don't report the graphs of these bivariate models, which are available upon request.

financial conditions in the relation between aggregate economic activity and oil price changes is important to explicitly detect the negative impact of oil price shocks on output for Turkey.

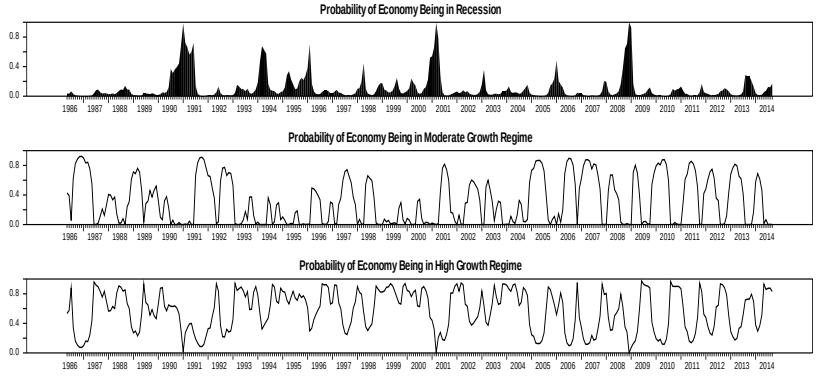
Another result from our analysis is that the regime transitions are not strongly affected by extending the model to include various exogenous oil price variables. According to the univariate and bivariate models, a moderate growth regime tends to be followed by a high growth regime while moderate growth regime has no probability to be followed by recessionary regime in the economy. Further, recessionary phase tends to be followed by high growth phase more often rather than a phase of moderate growth except for the bivariate model with the $NOPI_t$.

Figure 3.Smoothed Probabilities of Recession, Moderate Growth and High Growth Periods in Univariate and Bivariate Models

a) MSIH(3)-AR(2) model



b) MSIH(3)-ARX(2) Model with exogenous $NOPI_t$ variable



5. Conclusions

This paper investigates business cycle dynamics in Turkey by incorporating real oil price changes in a MS model of output and examining the capabilities of this variable to generate shifts in the business cycles. The main consideration is that if real oil price increases have explanatory content for the recessionary phases of output, then the addition of this variable to a univariate MS

model for output can mitigate the magnitude of the shifts in these phases. Evaluation of the contribution of oil prices hocks to the recessionary phases of output permits an identification of those periods that can be principally explained by real oil price increases.

First of all, according to the estimation results of various univariate MS models, the three-regime MS models typically outperform the corresponding two-regime specifications in describing the business cycle features for Turkey. In particular, univariate MSIH(3)-AR(2) model well approximates the dates of recessionary periods reported by the OECD. Then, we have considered four different definitions of oil shocks. In particular, oil price changes, positive oil price changes, net oil price increases and standardized oil price increases are used in order to proxy oil shocks.

According to our model selection strategy, among different types of oil shocks, only net oil price increases have negative effect on output growth and mitigates the magnitude of the some recessionary periods. However it doesn't strongly influence the behavior of Turkish business cycle. Oil price shocks can also affect the economy through other variables. In this respect, we recommend that future studies tend to investigate a detailed analysis of Turkish business cycle by incorporating other fundamental financial factors such as exchange rate, unit cost of import, budget deficits, current account, capital inflow, international reserves etc., in the bivariate MS model so as to measure indirect effects of oil price shocks.

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The Impact of Corporate Governance and the Cost of Capital in Shipping

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Abstract

Purpose - *The main aim of this paper is to analyze the impact of corporate governance and the cost of capital in shipping industry. The present study grasps on a doctoral thesis aiming to analyze the above developments in the shipping industry in general and mostly in the Greek owed shipping companies and how these developments have been evaluated by the top executives based on a market research we have conducted.*

Design/methodology/approach - *The main idea for the consolidation of the results of the regression methodology used is to analyze research hypotheses related to effects of Corporate Governance in the shipping industry, emerged in a previous article by Zampeta (2011) and Thalassinos and Zampeta (2012). The research hypotheses will be explored with econometric methodology to be confirmed or rejected depending on the statistical significance of the coefficients of the factors-variables selected and express their respective cases. The specific way of analyzing the answers from the questionnaires used sufficiently cover the concept of triangulation (triangulation) because they use primary research data (sample analysis questionnaires), with acceptable bibliography concerning the impact of globalization and the evolution international trade financing cost of shipping enterprises. There is a need to exploit the results of the factorial analysis used by Zampeta (2011), Thalassinos and Zampeta (2012) and Thalassinos and Zampeta (2015) to the methodology of regression to analyze research hypotheses related to the Factor of the Cost of Capital and the Factor of Corporate Governance and their impacts in the Shipping Industry.*

Findings - *The results of the subject research confirm the views of the top executives that specific explanatory variables are forming the factors referring to corporate governance and the cost of capital in the shipping industry. In addition, they have influenced the decision of the shipping companies to adopt the Corporate Governance structure in order to exploit the benefits of international integration of capital markets. Based on this result, more and more maritime firms have adopted the principles of Corporate Governance as an effective tool to deal with globalization and the cost of capital in the subject industry.*

Research limitations/implications - *Lack of statistical data with respect to financial indexes in addition to the small number of companies indexed in stock exchanges. The structure of the questionnaire has some limitations with respect to the total number of sub-questions describing the exact nature of the financial system followed by each company. Very limited bibliography on the issue.*

Originality/value - *The approach followed in this study gives a particular interest in the results and create originality because it combines different methodologies aimed at similar research hypotheses as presented in the paper.*

Key words: corporate governance, corporate restructuring, shipping industry

JEL classification: G3, F3, M2

1. Introduction

The main idea for the consolidation of the results of the regression methodology used is to analyze research hypotheses related to effects of Corporate Governance in the shipping industry, emerged in a previous article by Zampeta (2011) and Thalassinos and Zampeta (2012). More specifically, by analyzing the findings from the factorial processing of 56 questionnaires collected from top executives of the shipping industry with some questions relative to the impact of Corporate Governance in shipping.

Corporate Governance has been analyzed based on the results of globalization in administrative structures adopted by multinational global corporations, among them ocean shipping companies. These companies have adopted policies to manage strong global competition, very competitive international capital markets, high cost of financing, huge flows of international trade and the impact of the recent financial and debt crisis, particularly in the Eurozone region.

As defined by the Organization for Economic Cooperation and Development (OECD) in 2004, Corporate Governance principles were developed mainly for the protection of minority rights and minority shareholders in companies and include 6 modules as described in the relevant manual of the Organization as following:

1. The guaranteed standards to achieve an effective corporate governance framework as set out in the relevant section:

"The corporate governance framework should promote transparent and efficient functioning of markets, be consistent with applicable law and determines the obligations of the various supervisory and regulatory authorities."

2. The rights of shareholders and their basic obligations as defined in the OECD manual with the following paragraph:

"The corporate governance framework should protect and facilitate the rights of shareholders."

3. The equitable treatment of shareholders, minority rights with subsection:

"The corporate governance framework should ensure the equitable treatment of all shareholders, including minority and foreign shareholders. All shareholders should be able to denounce the violation of their rights and be compensated if necessary. "

4. The role of shareholders in corporate governance, participation in committees and responsibilities of each committee with subsection:

"The corporate governance framework should recognize the rights of shareholders arising from both legislation and private agreements, and to promote cooperation between the company and shareholders to create capital, jobs and the maintenance and function of healthy bodies."

5. Transparency and disclosure to the full information and ensure transparency among shareholders in the following paragraph:

"The corporate governance framework should ensure the timely and accurate disclosure of all matters related to the financial situation, performance, ownership and governance of the company."

6. Obligations of the Board towards third parties, to shareholders and employees to paragraph below:

"The corporate governance framework should ensure the strategic management of

the company, effective control of the administration by the Board and the responsibilities of the Board towards its shareholders."

Such an importance of Corporate Governance was given by the OECD at the global level in order to safeguard the rights of shareholders, to address the problems of lack of transparency and irregularities in businesses which led to integrate Corporate Governance in the research objectives of this study. Particularly, the limited use of this concept by the shipping industry has created the need for scientific research to determine the possible impact attributed to CG to shipping companies either administratively or financially.

2. Literature Review

Thalassinos and Zampeta (2012) refer to the main objectives and the new ways in which enterprises face the current economic crisis. They also refer to developments in international trade from 2011 to 2015 due to globalization. At the same time, they have proposed a model of administrative structure for the shipping companies with the integration of the main principles of corporate governance. The introduction of elements of corporate governance can generate positive prospects for the development of the shipping companies.

The study is based on market research using a questionnaire where the views of top executives reflected on questions and answers on specific issues, for example, the penetration elements of corporate governance in the shipping companies, the use of modern models of administrative and operational structure, the effect of the world financial system etc., in the performance of the shipping companies.

The study suggests that in shipping management systems are constantly being developed in two respects. First, using modern methods of design programs and measure performance and results and, secondly, the adoption of the main factors of corporate governance. The basic principles of corporate governance are a key tool for improving the legal, institutional and regulatory framework of corporate governance and focus not only on economic issues but also on issues of organization and management of companies listed in international stock exchanges including the shipping companies.

Globalization has affected the shipping industry in a great extent, due to new developments in international trade. These developments have changed the structure of the shipping industry, particularly during the recession and due to the fact that global production has been decreased.

Toudas and Bellas (2014) have focused on the relationship between corporate governance and historical and expected returns. The authors constructed a corporate governance index (CGQL) measuring the implementation of the quality of corporate governance of listed companies in the Athens Stock Exchange separating businesses in democratic and dictatorial nature.

The purpose of the survey is the issues of corporate governance and their role in final decisions of investors. Thus, the authors tried to observe whether corporate governance is a benchmark of a company producing agent and modification of abnormal returns or risk factor, which can be a 'substitute' for the market risk (beta coefficient), using single and multi-diversified analyses. The findings lead to the creation of doubt with respect to the usefulness of corporate governance regarding the attractiveness of the company.

Arthus and Alvarez (2013) define Corporate Social Responsibility (CSR) as the active and voluntary business contribution to strengthening social welfare to concrete actions. In fact, they consider it as an intangible asset that generates competitive advantage and promotes sustainable development. The aim of this work is that businesses understand the importance of CSR as a corporate strategy that enhances the value of the business to become conscious that helps efficiency and effectiveness.

The authors are trying to prove that the improvement achieved in the intellectual capital of enterprises is associated with better

CSR actions. They argue that among other elements, a company consisting of a group of people that are installed in series to achieve a goal, a financial success. Achieving this goal requires the management of human, material and organizational resources under the rules of CSR.

As stated in the article, CSR creates a voluntary commitment from the companies to the society for economic development and environment protection, with responsible behavior by all parties that interact with each other. The idea, according to the authors in which CSR is based on that companies and society are not far from each other, however they are interrelated. The society has certain expectations of stable behavior by companies and their impact on society. The authors consider that the joint demands of the interested parties must be:

- Transparency of information;
- Improving confidence of society;
- The participation of both parties to the dialogue to achieve a beneficial relationship;
- Reciprocal concessions consist of thoughts that can develop and improve the economic, social and environmental environment in a balanced and sustainable way.

When the business works with a responsible attitude in the search of the needs of the parties concerned generates more confidence and reduce the risk associated with opportunistic behavior from them due to asymmetric information they have provide to the society.

The authors conclude that firms create more and more conscious communication with other parties with whom they interact in the market, creating positive and negative effects on performance, either of environmental or of social sphere. Every company has some basic goals that create value, improve efficiency and competitiveness. The application of ethical and corporate social responsibility in strategic management decisions should not jeopardize the achievement of these objectives.

Havlíček, Břečková and Zampeta (2013) explored the latest trends in management and quality in service especially in SME's. The authors classified quality as a subset of effective marketing management that is known in the modern market by the term Customer Relationship Management (CRM). The original idea of quality control based on product quality will be gradually replaced by the integrated quality management on the desires, needs and expectations of the customers.

Increased competition means that it is possible to consider quality perspective of the transaction, but the so-called relational perspective is even more common in management. This is attributed through the creation of permanent links between the two parties, the company on one side and the costumer on the other. Regarding the entire process of an effective management model, the authors have proposed a system emphasizing the strategic management and the operational control of quality with the use of an entire management quality structure of continuous processes. The proposed model has been designed based on data from a number of SME's from the Czech Republic.

Black, Kim, Jang and Park (2008) have examined whether and how the capitalization of a company from the application of the elements of corporate governance has been affected. Previous research in emerging markets using elements supporting the association of corporate governance has been proved to affect the performance and the capitalization of the associated companies. The authors have developed an index of corporate governance, consisting of five individual indicators including the structure of the Board, the shareholder structure, the transparency, the shareholders' rights and the procedures followed by the Board.

The main problems encountered in this study were the possibility of reversing the effects of variables, the lack of certain data, the degree of effective adoption of principles of corporate governance and the risk of failure of an important parameter. The investigation confirmed the existence of significant correlation between the level of corporate governance and market capitalization of the sample consisting of listed Korean companies for the period 1998-2004, while it has been

proved that companies with high corporate governance index exhibit a higher index Tobin's q. This item is influenced mainly by the structure of the Board, the shareholder structure and the transparency in decision making. Less important indicators have been proved the rights of shareholders and the Board procedures.

For companies with a high corporate governance index, the study has noted the following: The corporate performance is influenced by fluctuations in the overall profitability of the industry. The volume of investment is lower but more influenced by the profitability and the growth potential of the company. The increase in sales is lower. The efficiency is significantly influenced by the growth opportunities. The structure of the Board affects the profitability of the company. The dividend yield is higher and significantly influenced by the profitability.

La Rocca (2007) examined the relationship between corporate governance in the financial structure and capitalization of the companies, emphasizing the complexity of the object due to the interaction between these elements. His research showed that the corporate governance mechanisms can create corporate value if they are used internally in a proper way.

Corporate Governance defines the system according to which the responsibility for taking decisions is distributed within a company in order to represent all shareholders as required (Lazzari, 2001; Zingales and Rajan, 1998) as well as regulations and practices used to protect shareholders from any opportunistic behavior of the administration as it is supported by Shleifer and Vishny (1997). Giannakopoulou, Thalassinos and Stamatopoulos (2015), have an article with a detailed literature review on the issue of corporate governance.

Weiss and Steiner (2006) argued that corporate governance generally refers to the overall control of the activities of a company that includes the formation of corporate objectives, strategies and plans and the appropriate management structure to operate responsibly for the internal (employees, creditors , suppliers) and external groups (environment, society, customers).

Since the 1990s, the term corporate governance has become a business idiom worldwide as it is pointed out by Bradbury, Mak and Tan (2006). The existing literature on the theory of stakeholders indicates that companies should move beyond the traditional approach to protecting the interests of shareholders and respond more to the demands of other stakeholders (Clement, 2004; Preble, 2005). After the collapse of Enron discussions on corporate governance have focused on issues concerning the separation of ownership and control, and the alignment of the ownership interest with other bodies involved in the management of the company (Marnet, 2005). The rules and factors that lead to effective practices in corporate governance include formulating and independence of the board (Cornelius, 2005) and the audit committee (Cotter and Silvester, 2003; Constantinides, Harris & Stulz (2003). Tersigni and Lemoine, 2006), the disclosure of information and transparency (Chiang, 2005), accounting standards (Agrawal and Chadha, 2005) and the structure of corporate ownership (Defond, M. L., & Hung, M. 2004; Thomsen, 2004).

Bhagat and Black (2001), Klein (2002), and Peasnell, Pope and Young (2005) in parallel studies have shown that the high level of corporate governance largely depends upon the independence of the board and the impartiality of the audit committee. According to them, the independence and the impartiality of the audit committee contribute to the accuracy and integrity of the financial statements thereby reducing sprawl and inefficient monitoring of corporate accounting processes that can lead to high corporate value unnecessarily and weak rights abuse issues response system shareholders.

The huge levels and areas of corporate power is concentrated in the hands of large multinational companies will lead to the belief that business should assume responsibility towards the stakeholders for more transparency and openness (Egri & Ralston, 2008).

In today's competitive business environment, corporate governance and social responsibility have become the focus of regulators, shareholders and various other stakeholders worldwide (Chau and Leung, 2006). Some argued that the family business is not the best form of government because it provides dominant position to shareholders and members of their families by providing the opportunity to expropriate the interests of other shareholders through high compensation, linked transactions, high dividends and risk avoidance (Bartholomeusz and Tanewski, 2006). This study supports that family businesses can adopt sound practices of corporate governance and social responsibility that will lead to the maximization of shareholders' interests and to sustainable development.

Several studies (Cheffins, 2009; Grosse, 2012; Kirkpatrick, 2009) showed that corporate governance was a major cause of the current financial crisis, because it failed to protect against excessive risk taking by the Boards of companies. Even the proponents of corporate governance argue that various deficiencies related to the procedures and laws governing the framework for corporate governance to the global economic crisis, combined with other factors that have not been accurately determined are likely to play a role in global economic crises (Yeoh, 2010).

Other scholars (Walls, Berrone and Phan, 2012; Poole, 2010) have argued that the crisis was a result of failure across the financial system due to the lack of transparency and accountability standards. They argued that corporate governance has not played a central role in the current economic crisis. For this conclusion Mülbert (2009) argued that even if the researchers could show many examples of bad practices of corporate governance, before and during the crisis, their examples do not support the claim that the failures of corporate governance was a major cause of the crisis.

Mülbert (2009) noted that while the actions of corporate governance may have failed in the financial crisis, there was enough evidence to suggest that inappropriate structures of corporate governance were at the roots of the financial crisis US. The executive pay was a hot topic in the debate on the financial crisis because of the form of incentives used in the effort of companies to successful business strategy.

Applying the principles of corporate governance, as described above, by including them in the questionnaire, a market research has been conducted addressed to top executives from the shipping industry. The answers of the executives who participated in the survey have been analyzed with the method of Factor Analysis offering useful conclusions regarding the relevance and the effectiveness of the implementation of the principles of corporate governance in the administrative structure of the shipping companies.

2.1 Empirical Evidence

The issue of Corporate Governance has been included in this study into the questionnaires and has been described by two questions with eight sub-questions. The analysis of these questions arose two factors. The strongest factor appears as VAR02 in the models below which has selected four sub-questions describing essentially the concept and the definition of Corporate Governance. The research hypotheses discussed in this study, which are based on this factor are the following:

1. *The modern form of the strategy applied in the shipping industry has lead shipping companies to adopt the Corporate Governance system.*
2. *The intense competition that developed as a result of globalization has lead shipping companies to adopt the Corporate Governance system.*
3. *Modern financial systems developed because of globalization have lead shipping companies to adopt the Corporate Governance system.*
4. *The development of the capital market and the consolidation of stock markets because of the globalization have leaded shipping companies to adopt the Corporate Governance system.*
5. *The integration of stock markets because of the globalization creates conditions to adopt the system of Corporate Governance by shipping companies.*
6. *Borrowing methods developed in the global financial system because of globalization have lead*

shipping companies to the decision to adopt the system of Corporate Governance.

The above research hypotheses will be explored with econometric methodology to be confirmed or rejected depending on the statistical significance of the coefficients of the factors-variables selected and express their respective cases. This method of analysis of the responses derived from the questionnaires used sufficiently cover the concept of triangulation because they use primary research data (sample analysis questionnaires), with acceptable bibliography concerning the importance of corporate governance in the conduct of the administrative structure of shipping business while confirms similar studies in shipping (Syriopoulos, 2007). Other studies have concluded that Corporate Governance in the shipping industry improves the administrative structure and the financial performance of the shipping companies (Syriopoulos and Theotokas, 2007; Syriopoulos, Merika and Vozikis, 2007).

The approach followed in this study gives a particular interest in the results and create originality because it combines different methodologies aimed at similar research hypotheses as presented below.

3.1 The Factor of Corporate Governance and its Impact in the Shipping Industry

Research Hypothesis 1 (Model 1: Corporate Governance and Business Strategy):

[The modern form of the strategy applied in the shipping industry has leaded shipping companies to adopt the Corporate Governance System].

The econometric analysis of Model 1, shown in Table 1 below is considered as dependent variable the factor that describes Corporate Governance of the questionnaire (VAR02), and as independent variables four factors VAR26, VAR27, VAR28 and VAR29 coming from different questions of the questionnaire related with business strategy.

The coefficients of Model 1 (Beta, Standardized Coefficients) 0.216, 0.315, 0.225 and 0.217 for variables VAR26, VAR27, VAR28 and VAR29 respectively, are shown with a positive sign and are statistically significant at 1% significance level, 5% and 10%. The coefficient of multiple determination (Adjusted R Square) is high, 0.447, for this type of analysis as the statistical F. The results suggest that these factors are related to the developments that have been occurred in shipping mentioned by the executives in the market research involved in this work. This confirms the Research Hypothesis 1 with respect to the existence of a causal relationship between the business strategies followed or will be followed by the shipping companies and recent developments in the area of Corporate Governance.

Research Hypothesis 2 (Model 2: Corporate Governance, Globalization and Competition):

[The strong competition developed due to globalization has leaded shipping companies to adopt the Corporate Governance System].

The econometric analysis of Model 2, shown in Table 1 below, is considered as dependent variable the factor that describes Corporate Governance of the questionnaire (VAR02), and as independent variables three factors VAR15, VAR17 and VAR19 coming from different questions of the questionnaire that referred to globalization and competition.

The coefficients of Model 2 (Beta, Standardized Coefficients) 0.195, 0.464 and 0.271 for variables VAR15, VAR17 and VAR19 respectively, are shown with a positive sign and are statistically significant at 1% significance level, 5% and 10%. The coefficient of multiple determination (Adjusted R Square) is high, 0.530, for this type of analysis as the statistical F. The results suggest that these factors are related to the developments that have been occurred in shipping mentioned by the executives in the market research involved in this work. This confirms the Research Hypothesis 2 with respect to the existence of a causal relationship between globalization and competition created by the developments in Corporate Governance in the shipping industry.

Research Hypothesis 3 (Model 3: Corporate Governance, Globalization and Financing Cost):

[Modern financial systems developed due to globalization have lead shipping companies to adopt the Corporate Governance System].

The econometric analysis of Model 3, shown in Table 1 below, considers as dependent variable the factor that describes the Corporate Governance of the questionnaire (VAR02), and as independent variables four factors, VAR07, VAR08, VAR17 and VAR19 coming from different questions of the questionnaire that referred to globalization and the financing costs of the shipping companies.

The coefficients of Model 3 (Beta, Standardized Coefficients) 0.196, 0.503, 0.224 and 0.269 for variables VAR07, VAR08, VAR17 and VAR19 respectively, are shown with a positive sign and are statistically significant at 1% and 5% significance level. The coefficient of multiple determination (Adjusted R Square) is high, 0.710, for this type of analysis as the statistical F. The results suggest that these factors are related to the developments that have been occurred in shipping mentioned by the executives in the market research involved in this work. This confirms the Research Hypothesis 3 concerning the existence of a causal relationship between globalization and the financing costs of shipping companies leading them to adopt the Corporate Governance system.

Research Hypothesis 4 (Model 4: Corporate Governance, Globalization and External Debt):

[The development of capital markets and the integration of stock markets due to the globalization have leaded shipping companies to adopt the Corporate Governance System].

The econometric analysis of Model 4, shown in Table 1 below, considers as dependent variable the same as in the previous three cases (VAR02), and as independent variables four factors VAR07, VAR08, VAR19 and VAR21 that refer to globalization, financing costs and the factors influencing the decision of executives to raise borrowed funds abroad.

The coefficients of Model 4 (Beta, Standardized Coefficients) 0.120, 0.448, 0.237 and 0.349 for the variables VAR07, VAR08, VAR19 and VAR02 respectively, are shown with a positive sign and are statistically significant at 1% and 10% significance level. The coefficient of multiple determination (Adjusted R Square) is high, 0.751, for this type of analysis as the statistical F. The results suggest that these factors are related to the developments mentioned by the executives in the market research involved in this study. This confirms the Research Hypothesis 4 for the existence of a causal relationship between globalization financing costs and raising capital from abroad have lead shipping companies to the adoption of the Corporate Governance system.

Research Hypothesis 5 (Model 5: Corporate Governance and Stock Markets):

[The integration of stock markets due to the globalization creates conditions to adopt the system of Corporate Governance by shipping companies].

Similarly the econometric analysis of Model 5, shown in Table 1 below, with the same dependent variable (VAR02), suggests that the corresponding factors in Model 5 are related to the developments reported by the executives in this market research. This confirms the Research Hypothesis 5 with respect to the existence of a causal relationship between the stock markets and the implementation of the Corporate Governance system in shipping companies.

Research Hypothesis 6 (Model 6: Corporate Governance and External Debt):

[Methods of lending that have been developed in the global financial system because of globalization have leaded the shipping companies to adopt the system of Corporate Governance].

Finally, Research Hypothesis 6, with the same dependent variable (VAR02) and the corresponding factors in this model have been also confirmed as shown in Table 1 below. The results suggest that these factors are related to the developments mentioned by the executives in the market research involved in this study. This confirms the Research Hypothesis 6 for the existence of a causal relationship between globalization, borrowing costs and the implementation of the Corporate Governance system in shipping companies.

Table 1: Corporate Governance (Question 7, Factor VAR02)

	Mod: 1	Mod: 2	Mod: 3	Mod: 4	Mod: 5	Mod: 6	
Constant		0.413					
t-stat		0.882					
VAR07			0.196***	0.120*			Model: 3, 4
t-stat			2,607	1,733			
VAR08			0.503***	0.448***			Model: 3, 4
t-stat			4,785	4,957			
VAR09					0.320***		Model: 5
t-stat					3,727		
VAR10					0.425***		Model: 5
t-stat					3,727		
VAR14						0.162*	Model: 6
t-stat						1,839	
VAR15		0.195*				0.210**	Model: 2, 6
t-stat		1,778				2,937	
VAR17		0.464***	0.224**				Model: 2, 3
t-stat		4,091	2,059				
VAR19		0.271***	0.269***	0.237***			Model: 2, 3, 4
t-stat		2,653	3,376	3,201			
VAR20						0.151*	Model: 6
t-stat						1,809	
VAR21				0.349***		0.648***	Model: 4, 6
t-stat				3,644		6,479	
VAR26	0.216*						Model: 1
t-stat	1,728						
VAR27	0.315**						Model: 1
t-stat	2,513						
VAR28	0.225**						Model: 1
t-stat	2,159						
VAR29	0.217*						Model: 1
t-stat	1,829						
Adj R squa	0.447	0.530	0.710	0.751	0.312	0.626	

Sign F	0.00	0.00	0.00	0.00	0.00	0.00	

VAR019 appears to be statistically significant in 3 of the 6 Models (Models 2, 3 and 4) that have been selected by the processing of the survey data concerning corporate governance in the management systems of the shipping industry.

VAR07 and VAR08 appear to be statistically significant in 2 out of 6 Models (Models 3 and 4) that have been selected by the processing of the survey data concerning corporate governance of shipping, while VAR15 is statistically significant in Models 2 and 6, VAR17 in Models 2 and 3 and VAR21 in Models 4 and 6.

Between the 6 Models selected Model 3 has four dependent variables, all statistically significant at 1% level and a considerably high coefficient of multiple determination (Adjusted R Square), 0.710. Model 4 is also considered of high importance with four independent variables and a high coefficient of multiple determination (Adjusted R Square), 0.751, however one of the independent variables is significant at 10% significance level.

3.2 The Factor of the Cost of Capital and its Impacts in the Shipping Industry

In addition to Corporate Governance discussed in section 3.1, primary research through questionnaires revealed a second important factor that has been considered by the top executives participated in the market research as a key issue in the formation of the modern administrative structure in the shipping industry. This factor is the cost of capital described in question….of the questionnaire. Therefore there is a need to exploit the results of the factorial analysis used by Zampeta (2011), Thalassinos and Zampeta (2012) and Thalassinos and Zampeta (2015) to the methodology of regression to analyze research hypotheses related to the second issue of the present study. More specifically the impact of the cost of capital in the shipping industry is presented in this section in a similar way as in section 3.1 above.

The cost of capital in shipping finance will be analyzed based on the results of globalization in administrative systems adopted by multinational global corporations, the global competition in the industry and the latest developments in stock markets and capital markets.

The concept of the cost of capital in shipping finance has been included in this study into the questionnaires and has been described in two questions, question 11 and question 13. The factorial analysis of these two questions arose two factors in each one of them. The strongest factor appears as VAR08 in the Models below which has selected four sub-questions describing essentially alternative ship financing solutions. The research hypotheses discussed in this section are based on this factor are the following:

7. The modern form of the strategy undertaken in the shipping industry leads to an increase in funding costs for the shipping companies.

8. The development of the capital market and the consolidation of stock markets due to the globalization lead to increased financial costs for the shipping companies.

9. The strong competition and the business strategy developed as a result of globalization leads to increased financial costs for the shipping companies.

10. The intense competition, business strategy and Corporate Governance developed because of globalization leads to increased financial costs for the shipping companies.

The above research hypotheses will be explored with econometric methodology to be confirmed or rejected depending on the statistical significance of the coefficients of the factors-variables selected and express their respective cases. As mentioned above, the specific way of analyzing the answers from the questionnaires used sufficiently cover the concept of triangulation (triangulation) because they use primary research data (sample analysis questionnaires), with acceptable bibliography concerning the impact of globalization and the evolution international trade financing cost of shipping enterprises while simultaneously confirms

similar studies in shipping (Syriopoulos, 2007; Syriopoulos and Theotokas 2007).

This approach, as stated in section 3.1, gives a particular interest in the results and creates originality in this study as it combines different methodologies aimed at similar research hypotheses as presented below.

Research Hypothesis 7 (Model 7: Financing Costs and Business Strategy):

[The modern form of the strategy undertaken in the shipping industry leads to an increase in funding costs for the shipping companies].

The econometric analysis of Model 7, shown in Table 2 below considers as the dependent variable the factor that describes the cost of capital of the questionnaire (VAR08), and as independent variables three factors VAR26, VAR27 and VAR28 coming from different questions of the questionnaire related with business strategy.

The coefficients of Model 7 (Beta, Standardized Coefficients) are 0.300, 0.322, and 0.295 for variables VAR26, VAR27 and VAR28 respectively. All coefficients are shown with a positive sign and are statistically significant at 1% and 5% level. The coefficient of multiple determination (Adjusted R Square) is acceptable, 0.425, for this type of analysis as well as the statistical F. The results suggest that these factors are related to the developments mentioned by the executives in the market research involved in this study. This confirms the Research Hypothesis 7 with respect to the existence of a causal relationship between the cost of capital of the shipping companies and the business strategy they have adopted.

Research Hypothesis 8 (Model 8: Financing Cost, Globalization and Stock Markets):

[The development of capital market and the integration of stock markets because of the globalization lead to increased financing costs for shipping companies].

The econometric analysis of Model 8, shown in Table 2 below, considers as the dependent variable the factor that describes the cost of capital given in question number 11 of the questionnaire as VAR08 and as independent variables three factors VAR09, VAR10 and VAR15 coming from question number 12 (VAR09, VAR10) and question number 4 (VAR00015) related to the developments on the stock markets and globalization.

The coefficients of Model 8 (Beta, Standardized Coefficients) are 0.206, 0.275, and 0.572 for variables VAR09, VAR10 and VAR15 respectively. All coefficients are shown with a positive sign and are statistically significant at 1% and 5% level. The coefficient of multiple determination (Adjusted R Square) is high, 0.594, for this type of analysis as well as the statistical F. The results suggest that these factors are related to the developments mentioned by the executives in the market research involved in this study. This confirms the Research Hypothesis 8 with respect to the existence of a causal relationship between the cost of capital of the shipping companies and the developments regarding globalization and stock markets.

Research Hypothesis 9 (Model 9: Financing Cost, Competition and Business Strategy):

[Strong competition and the strategy developed due to globalization leads to increased financing costs of shipping companies].

The econometric analysis of Model 9, shown in Table 2 below, considers as the dependent variable the factor that describes the cost of capital as in hypotheses 7 and 8 (VAR08), and as independent variables four factors VAR16, VAR17, VAR26 and VAR28, coming from the questions 9 of the questionnaire (VAR16, VAR17), 19 (VAR26) and 20 (VAR28) related to the developments associated with competition and business strategy.

The coefficients of Model 9 (Beta, Standardized Coefficients) are -0.234, 0.421, 0.287 and 0.263 for variables VAR16, VAR17, VAR26 and VAR28 respectively. Apart from the factor corresponding to variable VAR16 displayed with a negative sign, the other factors appeared with a positive sign and are statistically significant at 1% and 5% level of significance. The coefficient of multiple determination (Adjusted R Square) is high,

0.596, for this type of analysis as well as the statistical F. The results suggest that these factors are related to the developments mentioned by the executives in the market research involved in this study. This confirms the Research Hypothesis 9 with respect to the existence of a causal relationship between the cost of capital of the shipping companies and the developments regarding competition and business strategy followed by the shipping companies in the period of study.

Research Hypothesis 10 (Model 10: Financing Costs, Competition, Business Strategy and Corporate Governance):

[Strong competition, business strategy and Corporate Governance developed because globalization leads to increased financing costs of shipping companies].

The econometric analysis of Model 10 that follows in Table 2, considers as the dependent variable the same factor as in Models 7, 8 and 9 (VAR08) and as independent variables three factors VAR02, VAR17 and VAR28 coming from questions 4 (VAR02), 9 (VAR17) and 20 (VAR28) associated with developments in competition, business strategy and corporate governance.

The coefficients of Model 10 (Beta, Standardized Coefficients) are 0.476, 0.343, and 0.168 for variables VAR02, VAR17 and VAR28 respectively. All coefficients are shown with a positive sign and are statistically significant at 1% and 5% level. The coefficient of multiple determination (Adjusted R Square) is high, 0.958, for this type of analysis as well as the statistical F. The results suggest that the independent variables are related to the developments in the dependent variable as it has been mentioned by the executives in the market research involved in this study. This confirms the Research Hypothesis 10 with respect to the existence of a causal relationship between the cost of capital of the shipping companies and the developments in competition, in business strategy and in the implementation of corporate governance by the shipping companies.

Table 2: Cost of Capital (Question 11, Factor VAR08)

	Model: 7	Model: 8	Model: 9	Model: 10	
Constant	-2.748***	-0.580	-0.346	-0.386	
t-stat	-2.644	-0.998	-0.471	-0.724	
VAR02				0.476***	Model: 10
t-stat				4.243	
VAR09		0.206**			Model: 8
t-stat		2.339			
VAR10		0.275***			Model: 8
t-stat		2.932			
VAR14					
t-stat					
VAR15		0.572***			Model: 8
t-stat		6.172			
VAR16			0.234**		Model: 9
t-stat			2.385		
VAR17			0.421***	0.343***	Model: 9, 10

t-stat			3.578	3.202	
VAR19					
t-stat					
VAR20					
t-stat					
VAR21					
t-stat					
VAR26	0.300**		0.287**		Model: 7, 9
t-stat	2.425		2.464		
VAR27	0.322***				
t-stat	2.657				
VAR28	0.295***		0.263***	0.168**	Model: 7, 9, 10
t-stat	2.799		2.955	1.985	
Adjusted R squar	0.425	0.594	0.596	0.658	
Sign F	0.00	0.00	0.00	0.00	

VAR28 appears to be statistically significant in 3 out of the 4 Models (Models 7, 9 and 10) that have been selected by the processing of the survey data concerning the cost of capital in the shipping industry.

VAR26 appears to be statistically significant in 2 out of 4 Models (Models 7 and 9) that have been selected, while VAR17 in two Models (Models 9 and 10).

All the Models in Table 2 have selected a constant term coefficient statistically significant in Model 7 only (-2.748***) with a negative sign in all the cases.

Between the 4 Models selected Model 9 has four independent variables, all statistically significant at 1% and 5% level and a considerably high coefficient of multiple determination (Adjusted R Square), 0.596. Model 10 is also considered of high importance with three independent variables and a high coefficient of multiple determination (Adjusted R Square), 0.658, however the coefficient of the constant term is not significant.

4. Conclusions

It is important to stress the importance of each one of these factors as explanatory variables of the two super-factors referred to corporate governance and the cost of capital in the shipping industry as it has been approved by the 10 Models selected in the above Tables 1 and 2. The results confirm the views of the top executives participated in the market research that specific explanatory variables forming the factors in this study and they have influenced the decision of the shipping companies to adopt the Corporate Governance structure in this industry. There is a causal relationship between the evolution of the administrative model of shipping enterprises with the adoption of the rules of corporate governance (Models 1-6) and changes in the cost of capital for the shipping companies (Models 7-10). In all cases, the coefficients are statistically significant with a high coefficient of multiple determination for this kind of analysis. Based on these results, it is possible that the principles of Corporate Governance will be adopted by the shipping

industry as an effective tool to deal with globalization and the cost of capital in the near future in the subject industry.

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Managerial optimism and the impact of cash flow sensitivity on corporate investment: The case of Greece

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Abstract

Purpose-The existence of optimism as a personal psychological characteristic of managers is a necessity in contemporary economy and decision making, although the phenomenon of over-optimism may lead to unfavourable outcomes. The purpose of this study is to examine the optimism bias and its impact on the firms' future performance. Especially regarding the recent years where Greece faces increased economic depression, high percentages of unemployment and lack of budgetary discipline, the goal is therefore, to find whether managerial optimism has an impact on corporate investment of Greek firms.

Design/methodology/approach-The investment of firms with optimistic managers is more sensitive to cash flow than the investment of firms with managers who are not optimistic. To test the research question a number of fixed effect panel regressions of capital expenditures (capital expenditures divided by lagged assets is the dependent variable) is run. In all regressions we analyse cash flow divided by lagged assets and lagged Tobin's Q as the independent variables, for firms whose managers are classified as optimistic and not optimistic. This classification is based on the optimism "dummy" variable, which is equal to 1 when members of the Executive Board and the Supervisory Board (ALL), only the Executive Board (EB), and only CEO are classified as optimistic. The concept of this study is tested for firms which are listed in the Athens Stock Exchange. A total of 243 firms are recorded, for the time period between 2007 and 2012, including firms from 11 different industries; basic materials, chemicals, consumer goods, consumer services, health care, industrials, financials, oil and gas, technology, telecommunications, and utilities. Based on the literature and on related methodology aspects, financial firms are excluded.

Findings-It was revealed that managerial optimism affects corporate investment in firms with high degree of closely held shares. Moreover, managerial optimism is never linked to corporate investment regarding firms which belong to middle degree of closely held shares. Additionally it is proved that decisions for acquisitions are not affected by the manager's optimism regarding the prospects of his / her firm. This result it is not consistent with results of previous literature like Malmendier and Tate (2008) and Glaser et al. (2008) who have been found that cash flow, Tobin's Q and firm size mainly drive the probability of an acquisition. Finally, it is confirmed that investment of firms with optimistic managers was found to be more sensitive to cash flow than the investment of firms with managers who are not optimistic. Optimism was proved to be extremely effective concerning investment.
Research limitations/implications-A possible proposal for further research could be the testing of each year separately. In this study we have run the regressions for the whole of the 6-year period of 2007 to 2012. However, testing each year individually could provide researchers with the ability to compare different results, to find out whether there was anything special statistically for each specific year and maybe test the period after the year 2010 when the Greek crisis had started to come up on the horizon. The impact of the Greek financial crisis on managerial behaviour and on the personal characteristics of managers like optimism could constitute a field for further research.
Originality/value-Since research on this specific field of finance is quite limited; this study aims to add value on the existing knowledge on the Greek case. The investigation of managerial optimism as a personal, psychological and mental characteristic encloses the effort of Greek managers to come out of the economic crisis and consequently achieve greater outcomes for their firms.

Key words: Managerial optimism, optimism measures, corporate investment

JEL classification: D80, D81, G31, G32

1. Introduction

Recently, economists have increasingly implemented psychology to their research. One of the most frequently used personal characteristics of human behaviour is the presence of optimism and overconfidence in corporate investment decision making. According to Langer and Roth (1975), Miller and Ross (1975) and Nisbett and Ross (1980) individuals tend to account their success basically on their own personal abilities and characteristics due to the presence of optimism, whilst success mainly is in fact accounted due to random events.

Analysing a number of important studies of the related contemporary literature (Malmendier and Tate, 2005a, 2005b; Lin et al., 2005; Martin, 2008; Glaser et al., 2008; Michel, 2009) it is found that research regarding the case of Greece is somehow limited. Actually, this study is the first to address the field of managerial optimism and its impact on firm performance. Trying to fill this research gap, this study aims to investigate managerial optimism and its impact on corporate investment in Greece. Evidently, there is a need of more work to be done on this field. The Greek case is definitely worth of being concerned with, since it provides possible researchers with unexplored fields of research.

Historically, managers of Greek companies are used to be facing difficult situations due to the tough conditions that Greek economy faces in the passage of time. Years of great depression, post-war effects on political stability, social justice, as well as hard financial conditions were often the implications Greece had to cope with across the years. According to Bloom and Van Reenen (2010) variations in management practice is a reason for the existence of large differences in productivity between firms and countries. Across the seventeen countries they investigate, Greece is at the bottom, having the lowest management scores along with developing countries, like India, Brazil, and China.

Additionally, during the last years, Greece still faces extremely difficult situations due to the lack of budgetary discipline, increased depression, and high percentages of unemployment. According to Kouretas and Vlamis (2010) the financial crisis in Greece in 2008 has caused a significant increase of public debt. The current situation of Greece seems to be due to the existence of a weak political system along with the weakness of financial markets to predict the 2007 sub-prime mortgage loan crisis. Therefore, the role of managers in Greece is extremely aggravated with the responsibility of coping with these difficult situations as well as the eagerness to succeed in their role; the development of Greek companies, the improvement of their performance, and the maximisation of shareholders' wealth.

2. Theoretical Background

2.1 Overconfidence and optimism

Since the seminal work of Modigliani and Miller (1958) much research effort has been directed at understanding firms' capital structure and investment decisions, and the corresponding effects on firm value. Until recently, the standard approach was to assume rationality of managers and investors. A large part of research examines the role of signalling regarding informational asymmetries in a rational framework (Leland and Pyle 1977; Ross, 1977; Fried, 2000). Another large part of research explores the use of capital structure to mitigate agency problems (Jensen and Meckling 1976; Jensen 1986; Fairchild 2003). This approach assumes a principal-agent problem based on selfish managerial rationality and overconfidence.

The cognitive psychology literature argues that most people usually display optimistic expectations about the future. On one hand, individuals are more optimistic when they believe that they control positive outcomes and when they are highly committed to them (Weinstein, 1980). Managers on the other hand are more optimistic when they control their firm's performance and they feel committed to this good performance because their personal wealth, employability as well as reputation are highly dependent on it (March and Shapira, 1987; Gilson, 1989). Given their leadership positions and managerial compensation, managers are likely to have an important impact on their firms' success (Kaplan et al., 2012).

The notion that specific managers may be overconfident regarding their own abilities to manage, the selection of upper investment projects and the precision of their knowledge are encouraged by psychological studies of judgement. The most significant finding in this area of study is the phenomenon of overconfidence (Tversky and Kahneman, 1986). They simply argue that overconfidence consists of factors such as the illusion of control, insensitivity to predictive accuracy, self-enhancement tendencies and finally misunderstanding of chance processes. All the above mentioned causes of overconfidence apply to the managerial decision making of mergers. Griffin and Brenner (2004) argue that all concepts that characterise overconfidence are linked.

Malmendier and Tate (2008) prove that managers who are affected by hubris are more prone in engaging in acquisitions and realise the consequences of the worse performance than do managers who are not

affected by hubris. It is important, therefore, to underline the importance of the opinion that Baker, Ruback and Wurgler (2006) have earlier expressed that the phenomenon of the irrational manager and the phenomenon of the irrational investor will always exist together. Rosen (2006) on the other hand suggests that managers and investors may be affected by the same *hubris*, and therefore managers usually tend to overestimate the possible benefits from the merger, which probably will influence the outcome of the deal in a negative way. On the contrary, non-overconfident managers may enhance shareholders' wealth due to the fact that they carefully negotiate and conduct their deals.

Glaser et al. (2008) argue that there are two important and necessary conditions for a positive relationship between managerial optimism and risk-taking, pure chance related risk and imprecise probabilities. Apparently, this means that there is no relationship between optimism and risk-taking. However, in decision process it is difficult to relate optimism and the level of risk tolerance regarding tasks where risk is skill-related. According to Kahneman and Tversky (1979a, 1979b) managers tend to be risk-averse in domains of gains while risk-loving in domains of losses, a result that looks compatible to Prospect Theory, where loss aversion refers to individuals' tendency to strongly prefer avoiding losses to acquiring gains. However, recent studies have questioned the existence of loss aversion (Erev, Ert and Yechiam, 2008; Ert and Erev, 2008; Nicolau, 2012).

Finally, regarding firm investment and optimistic managers, Glaser et al. (2008) underline the fact that managerial optimism gives an explanation for corporate investment even when other variables are controlled for.

2.2 Managerial optimism and corporate investment: Past methodologies and findings

Heaton (2002) applies a simple three date-two period model aiming to come up with two dominant features of corporate finance with excessively optimistic managers as long as efficient capital markets are considered. These features consist of the notion that optimistic managers' undervaluation and overvaluation of their own corporate projects can lead to declining or investing in negative net present value projects even though when managers are faithful to shareholders. Heaton's (2002) approach stems from the standard assumption of managerial rationality in corporate finance. Despite the little work made in corporate finance, the assumption was dropped regarding managerial full rationality. However there are exceptions like Roll (1986), DeMeza and Southey (1996) and Boehmer and Netter (1997). Roll (1986) addresses the significance of the hubris hypothesis serving as a null hypothesis of corporate takeovers.

Malmendier and Tate (2008) try to explain merger decision making using managerial overconfidence and their overestimation of their own ability to generate returns. They use a simple model to show that overconfident managers overpay for target companies and undertake value-destroying mergers. In order to isolate the significance of overconfidence they assume a market with symmetric information between managers and external investors and common interests between managers and shareholders.

Lin, Hu and Chen (2005) examine the relation between managerial optimism and corporate investment decisions. They base their work on the hypothesis that in constrained firms, the investment cash-flow sensitivity is larger regarding optimistic managers than non-optimistic managers. In the Heaton (2002) model as it was mentioned above, optimistic managers overestimate both investment projects and eventually firms. As a result optimistic managers tend to invest more than non-optimistic ones do with internal funds.

Consistent with the view of Bertrand and Schoar (2003) and Malmendier and Tate (2005a), Ben-David et al. (2007) stress the importance of the association of

overconfidence with both personal traits and firm culture. They find that overconfidence is related to personal traits and characteristics of managers such as skill, experience and educational level. Overconfidence of managers is correlated with market-wide and firm-specific factors which could affect any other executives in the firm as well as with corporate decisions like investments which are shared with other executives.

Martin (2008) investigates if and to which extend managerial behaviour and behavioural biases can influence the possible underperformance of firms, including behavioural explanations as well as rational theories. Their sample consists of initial public offerings (IPOs) and seasoned equity offerings (SEOs) recorded by the Security Data Company (SDC) during the years from 1990 to 2001. For each firm in their sample they collect the insider trading data and they examine all open market transactions. They consider two distinct time periods to analyse the trading behaviour of insiders, trading before (six months before the equity issuance) and trading after (beginning from the end of the look-up period for three months).

Finally, Graham, Harvey and Puri (2012) try to provide evidence based on psychometric tests on CEOs regarding personal or behavioural traits like managerial risk aversion, optimism and time preference all related to corporate financial policies. They create an initial survey instrument which is based on existing theoretical and empirical research. They survey both CEOs and CFOs. The largest group of CEOs was around 10,000 executives who subscribe to Chief Executive Magazine. In total they surveyed approximately 10,700 CEOs.

3. Methodology

3.1 Research question

The investment of firms with optimistic managers is more sensitive to cash flow than the investment of firms with managers who are not optimistic. To test research question a number of fixed effect panel regressions of capital expenditures (capital expenditures divided by lagged assets is the dependent variable) is run. In all regressions we analyse cash flow divided by lagged assets and lagged Tobin's Q as the independent variables, for firms whose managers are classified as optimistic and not optimistic. This classification is based on the optimism "dummy" variable, which is equal to 1 when members of the Executive Board and the Supervisory Board (ALL), only the Executive Board (EB), and only CEO are classified as optimistic.

3.2 Sample

The concept of this study is tested for firms which are listed in the ASE. A total of 243 firms are recorded, for the time period between 2007 and 2012, including firms from 11 different industries; basic materials, chemicals, consumer goods, consumer services, health care, industrials, financials, oil and gas, technology, telecommunications, and utilities. Based on the literature and on related methodology aspects, the decision made was to exclude financial firms (Malmendier and Tate, 2005a, Lin *et al.,* 2005; Glaser *et al.,* 2008). Financial firms compile their annual reports in different ways and based on different standards compared to the other firms.

Therefore, financial firms are excluded in order to avoid differentiations which may conclude to vague and not precise results. Compared to companies of other industries financial firms come up with a different analytical problem. In order to analyse a financial firm's financial statement there is a need of a different approach which mainly has to capture the particularity of financial firms' unique risks (http://www.investopedia.com/articles/stocks/07/bankfinancials.asp). Overall, this work gathers data on 184 non-financial firms.

The sample is unique regarding this area of investigation. It is the first study examining the Greek case. Optimism as a managerial bias in Greece has never been the subject of research. This was initially the

motive for us to engage with this specific area of study. Since corporate behavioural finance research is limited in Greece the decision was to extend the study in order to come up with useful results. Greece during the recent years leading to this study faces serious financial problems. The generalised European crisis which seriously affected Greece has also spread its effects on the rest of European countries.

The unique sample of Greek non-financial firms listed in the ASE was tested in order to produce useful results. These results may be extremely important for managers of Greek companies in order to overcome the difficulties they face. The narrow bounds for investment and rising of firms, the general financial crisis of public as well as private sectors, make the role of Greek managers much more difficult. Therefore, the firm sample is multi-faceted. It consists of firms from 11 different industries and sectors in order to incorporate the whole substance of optimism. The process is to exclude financial firms due to the differences in the way they compile their annual reports. Thus, the 184 non-financial sample firms will be the starting point for the research, in order to produce significant results and add to the existing knowledge on this subject.

3.3 Stock market and balance sheet data

Data is gathered from the stock market as well as from balance sheets and cash flow statements for all firms of the sample. Focus is placed on every firm's annual report in order to gather all necessary data for the methodology. The next step is to classify stock prices on an everyday basis for all firms for the years from 2007 to 2012. Data is accessed from the ASE and is accumulated for every sample firm. Balance sheet data is necessary in order to formulate the basic variables that will be used in regression analysis. Balance sheet data is gathered from the web pages of all firms and is accumulated on an annual basis.

Basic regressions are run from 2005 to 2012 in order to have an analysis of the effects of managerial optimism on subsequent corporate investment, aiming to see if there is something special about the period of interest in terms of investing conditions. The main data source for stock price data is the ASE. ASE is the primary data source of studies that analyse corporate decisions in Greece.

The main balance sheet items that are used is cash flow, capital expenditures (CAPEX), CAPEX over lagged assets and Tobin's Q. Tobin's Q is calculated the same way as in Baker, Stein and Wurgler (2003). Tobin's Q is the number of shares outstanding multiplied by the share price, plus assets, minus the book value of equity over the assets. Q is calculated at the beginning of a firm's fiscal year as in Kaplan and Zingales (1997). CAPEX is used because they clearly may indicate some major financial decisions for a company since CAPEX are expenditures that create future benefits, that is to acquire or upgrade physical assets like property, buildings, equipment etc. This work's variables are calculated for all the years from 2007 to 2012 for each firm of the sample.

The main elements of firms' annual reports that are used are: total assets, lagged Tobin's Q, cash flow, CAPEX, EBITDA, firm age, sales growth, cash, pay-out ratio, pay-out ratio in, excess value, leverage ratio, capital, industry sales growth, debt ratio, dividend payment, dividends per share, and cash holdings.

3.4 Directors' dealings data

As already mentioned, in order to construct the optimism measures, data on the transactions of the Executive and Supervisory Board of Greek firms on their personal accounts is needed. Directors' dealings often attract more attention because of the insider knowledge directors and managers may have about the firm's prospects. However, this work is not concerned with insider trading. Managers of course can assess the company's value from the inside more easily than others but this is not an indication that the transaction will be absolutely successful.

Directors' dealings data is obtained from Directors Deals – Global Data & Analysis, a specialised global data market company which analyses and monitors all share transactions made by directors in the shares of their own company. Therefore, this work uses all the available data regarding the Greek case for the period of 6 years (2007 to 2012). During this period a total of 18,575 directors' dealings are reported. Due to the fact that this study focuses on the transaction behaviour of individuals, all transactions that were executed by legal entities are excluded. The procedure is to maintain only the transactions that are described as buys or sells and exclude awards, contract buys, transfer ins and outs, transfers, div re, exercise, sale-post exercise, given away and subscribe.

3.5 Optimism measures

Based on the transactions described above, four measures of optimism will be constructed as Glaser *et al.* (2008) have earlier done it. The starting point is assigning the directors' dealings to each company. For each year and company we assess the number of purchases, the number of sales, the volume of purchases and the volume of sales accordingly. This has as a result to accumulate on an annual basis the number of purchases and sales and the volume of purchases and sales. The result, therefore, is an annual "number" and "volume" variable. As discussed previously, these variables include insider action of members of both Boards Executive and Supervisory. The explanation for incorporating the research insider action of the Supervisory Board too, is pretty straightforward. Usually, former Executive Officers become members of the Supervisory Board. Thus, they influence important decisions regarding investments and corporate actions.

3.6 Regression models

3.6.1 Managerial optimism and Corporate Investment

A multiple regression equation is used in order to examine the relationship between managerial optimism and corporate investment. As dependent variable capital expenditures divided by lagged assets is used. As independent variables the choice was to take cash flow divided by lagged assets, lagged Tobin's Q, leverage ratio, the natural logarithm of total assets, sales growth, and managerial optimism.

For the dependent variable CAPEX/lagged assets (dependent or criterion) and the independent variables (independent or predictors) that were mentioned above, the regression equation that arises with the use of the least square methods has the next form:

$$\text{CAPEX/lagged assets} = \beta_0 + \beta_1 \text{CF/lagged assets} + \beta_2 Q + \beta_3 \text{Leverage} + \beta_4 \ln(\text{total assets}) + \beta_5 \text{Sales Growth} + \beta_6 \text{Opt} + \varepsilon$$

CAPEX/lagged assets= the values of the dependent variable
CF = cash flow
Q = lagged Tobin's Q
Leverage = leverage ratio
Opt = managerial optimism measure
β_0 = constant
β_1, β_2, ..., β_6 = coefficients
ε = the error term

3.6.2 Managerial optimism and Corporate Investment: Dependence on firm size

A multiple regression equation is also used in order to examine the relationship between managerial optimism and corporate investment with dependence on firm size. As dependent variable, capital expenditures divided by lagged assets are used Independent variables considered are cash flow divided by lagged assets, lagged Tobin's Q and managerial optimism. The categorisation of the sample firms into large and small is done as follows: large firms have above median total asset values, while small firms have below median total asset values.

For the dependent variable CAPEX/lagged assets (dependent or criterion) and the independent variables (independent or predictors) that were mentioned above, the regression equation

that arises with the use of the least square methods has the next form:

CAPEX/lagged assets = β_0 + β_1CF/lagged assets + β_2Q + β_3Opt+ ε

CAPEX/lagged assets= the values of the dependent variable

CF = cash flow

Q = lagged Tobin's Q

Opt = managerial optimism measure

β_0 = constant

β_1, β_2, ..., β_6 = coefficients

ε = the error term

3.6.3 Managerial optimism and Corporate Investment: Dependence on Ownership Structure

The ownership structure is defined by the distribution of equity based on votes and capital but also on the identity of the owners of equity in the firm. As a proxy for ownership structure this work classifies the sample firms accordingly to their varying degrees of closely held shares (in per cent of shares outstanding). This variable stands for shares that are held by insiders. It consists of, not restricted though, shares held by officers, directors and their immediate families, shares held in trust, shares of the firms held by any other corporation, or shares held by individuals who hold 5 per cent or more of the outstanding shares. The regression equation that arises with the use of the least square methods has the next form:

[CAPEX/lagged assets or (CAPEX-Industry CAPEX)/Industry CAPEX]= β_0 + β_1CF/lagged assets + β_2Q + β_3Opt+ ε (12)

[CAPEX/lagged assets or (CAPEX-Industry CAPEX)/Industry CAPEX] = the values of the dependent variable

CF = cash flow / lagged assets

Q = lagged Tobin's Q

Opt = managerial optimism measure

β_0 = constant

β_1, β_2, ..., β_6 = coefficients

ε = the error term

3.6.4 Optimism and acquisitions

Acquisitions constitute an aspect of corporate strategy and corporate finance when one observes the buying and selling of different firms that can lead a firm to rapidly evolve and grow. The accounting value of assets from acquisitions is taken from the cash flow statements of the sample firms on an annual basis. The dependent variable equals to 1 if the "assets from acquisitions" variable is positive in a given year. On the contrary, when the "assets from acquisitions" variable is not positive in a given year, the dependent variable equals to 0.

The independent variables of the model are cash flow/lagged assets, lagged Tobin's Q, lagged ln(total assets), and managerial optimism. Therefore, for the dependent variable Assets from Acquisitions (dependent or criterion) and the independent variables (independent or predictors) cash flow/lagged assets, lagged Tobin's Q, lagged ln(total assets), and managerial optimism, the regression equation that arises with the use of the least square methods has the next form:

Assets from Acquisitions = β_0 + β_1CF/lagged assets + β_2Q + β_3Lagged ln(total assets) + β_4Opt+ ε (13)

Assets from Acquisitions = the values of the dependent variable

CF = cash flow / lagged assets

Q = lagged Tobin's Q

ln(total assets) = the natural logarithm of total assets

Opt = managerial optimism measure

β_0 = constant

β_1, β_2, ..., β_6 = coefficients

ε = the error term

3.6.5 Optimistic versus rational managers

Fixed effects panel regression was used again in order to compare the behaviour of optimistic managers to the behaviour of non optimistic managers. It postulates that investment of firms with optimistic managers is more sensitive to cash flow than the investment of firms with managers who are not optimistic. When a manager voluntarily buys additional stock of their own firm, is classified as optimistic. Managers are classified as optimistic based

on the optimism "dummy" variable. The "dummy" variable is equal to 1 when members of the Executive Board and the Supervisory Board (ALL), only the Executive Board (EB), or only CEO are classified as optimistic in a given year.

For the dependent variable CAPEX/lagged assets (dependent or criterion) and the independent variables (independent or predictors) cash flow/lagged assets and lagged Tobin's Q the regression equation that arises with the use of the least square methods has the next form:

$$\text{CAPEX/lagged assets} = \beta_0 + \beta_1 \text{CF/lagged assets} + \beta_2 Q + \varepsilon \quad (14)$$

CAPEX/lagged assets = the values of the dependent variable

CF = cash flow

Q = lagged Tobin's Q

β_0 = constant

β_1, β_2, ..., β_6 = coefficients

ε = the error term

4. RESULTS

4.1 Findings on managerial optimism and corporate investment

In order to examine the relationship of managerial optimism and corporate investment, the focus is on how a firm should spend its money (investment decisions) and how best a firm can obtain money to make these financing decisions. One can easily see (Table 1) that investment as expressed by capital expenditures divided by lagged assets, is positively related to cash flow and Tobin's Q, with robust p-values significant at the 1 per cent level.

Compared to the results of Glaser et al. (2008) this work finds that managerial optimism is positively and significantly related to investment for all categories of managers at the 1 per cent level. On the contrary, Glaser et al. (2008) find that managerial optimism is statistically significant only regarding CEOs. Thus, the first result is that firms with optimistic managers tend to invest more.

This work also finds that the stronger results regarding managerial optimism are found for the group of CEOs since they display the highest coefficient values of all three groups of managers. However, statistical significance in our results is found for EB managers at the 10 per cent level. Therefore, the conclusion drawn is that firms with optimistic managers indeed invest more even when other variables are controlled for.

4.2 Findings on managerial optimism and corporate investment: dependence on firm size

In order to separate the sample into firms according to their size the process is to simply record their total asset value. Total assets display the combined value of a firm's assets. Large firms have above median total assets value, while small firms have below median total assets value (Table 2).

As a general result of this regression one can observe that the effects of managerial optimism on corporate investment are basically driven by smaller firms. This result is consistent with Glaser et al. (2008). However, the model, especially regarding small firms shows much higher adjusted R-squared values than in Glaser et al. (2008). This shows that this work's model fits the data better. For the Executive Board (EB) members along with the managerial optimism coefficients, the R-squared values are higher too. Probably this can be explained because the Executive Board members usually make the decisions within a firm and reasonably they seem to be more optimistic than the Supervisory Board managers for example.

Table 1:Basic regression results of the relation between managerial optimism and corporate investment

Dependent Variable	CAPEX/Lagged Assets	CAPEX/Lagged Assets			CAPEX/Lagged Assets			(CAPEX-Industry CAPEX)/Industry CAPEX		
Time period	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012
Optimism based on		All	EB	CEO	All	EB	CEO	All	EB	CEO
	1	2	3	4	5	6	7	8	9	10
Cash flow/lagged assets	0.030	0.024	0.024	0.024	0.012	0.012	0.018	0.016	0.018	0.106
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Lagged Tobin's Q	0.032	0.026	0.026	0.026	0.015	0.024	0.012	0.017	0.021	0.081
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Leverage Ratio					0.010	0.017	0.009	0.000	0.000	-0.070
					(0.003***)	(0.001***)	(0.008***)	0.647	0.647	0.655
Ln (total assets)					0.000	0.000	0.000	-0.060	-0.070	-0.004
					0.269	0.226	0.253	0.253	0.247	0.286
Sales growth					0.119	0.112	0.117	0.112	0.093	0.798
					(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Managerial optimism		0.007	0.007	0.009	0.004	0.004	0.007	0.004	0.003	0.026
		(0.000***)	(0.000***)	(0.000***)	(0.328)	(0.055*)	(0.485)	(0.078*)	(0.053*)	(0.218)
Constant	0.138	0.013	0.013	0.015	0.013	0.015	0.013	0.540	0.570	0.740
	(0.013**)	(0.000***)	(0.000***)	(0.000***)	0.265	0.234	0.245	(0.000***)	(0.000***)	(0.000***)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Cases	3634	3634	3634	3634	3631	3631	3628	3631	3633	3584
Adjusted R-squared	0.582	0.601	0.555	0.468	0.621	0.578	0.529	0.263	0.258	0.247

This table displays fixed effects panel regression results of capital expenditures on several control variables. The dependent variable is capital expenditures divided by lagged assets in regressions 1 to 7 and (capex-industry capex)/industry capex in regressions 8 to 10. In all regressions we analyse cash flow divided by lagged assets and lagged Tobin's Q as control variables. In regressions 5 to 10 we also include leverage ratio, the natural logarithm of total assets and sales growth as explanatory variables. We include our optimism "dummy" variable in regressions 2 to 10. The "dummy" variable is equal to 1 when members of the EB and SB (ALL), only the EB, or only CEOs are classified as optimistic in given year. All regressions include firm and year fixed effects. Time period is 2007-2012. All variables are winsorised at the 1 per cent level. Robust p-values are in parentheses. *** indicates significance at 1 per cent, ** indicates significance at 5 per cent and * indicates significance at 10 per cent.

4.3 Findings on managerial optimism and corporate investment: dependence on ownership structure

In order to categorise the sample firms the approach is to divide them into three terciles. The first consists of firms with a low degree of closely held shares, the second consists of firms with a middle degree of closely held shares, and the third consists of firms with a high degree of closely held shares. A closely held firm is a firm in which more than half of its shares are held by fewer than 5 individuals.

Consistent with Glaser et al. (2008) managerial optimism is never linked to corporate investment for firms that belong to the second tercile of middle degree of closely held shares. On the contrary, this study finds that managerial optimism mainly affects corporate investment in firms with high degree of closely held shares. This can be explained due to the limited executive members who are responsible for the decision making within these firms. The existence of optimism within such firms may obviously constitute of a great influence for the firm's corporate investment (Table 3).

4.4 Findings on managerial optimism and acquisitions

The first step is to examine the "assets from acquisitions" for the firms of the sample. The choice made is to test acquisitions separately as they are an aspect of corporate strategy, finance and management, having great impact on a firm's corporate investment decision making. The dependent variable is equal to 1 if the "assets from acquisitions" variable is positive in a given year and vice versa. Therefore, the acquisitions "dummy" variable is created on several control variables, like cash flow divided by lagged assets, lagged Tobin's Q and the natural logarithm of total assets.

Consistent with Boehmer and Netter (1997) the optimism variable is negatively correlated with the probability of an acquisition, and regarding the Executive Board decisions it shows up significantly. Therefore, a very interesting result can be observed. Biased managers who are optimistic do not significantly affect the probability of an acquisition although one could say that optimistic managers tend to undertake risky projects and as seen already seen they voluntarily increase the company's specific risk (Table 4).

4.5 Optimistic versus non-optimistic managers: Findings

The next step is to classify managers as optimistic based on the optimism "dummy" variable. Investment of firms with optimistic managers is more sensitive to cash flow compared to the investment of firms with managers who are not optimistic. The managers in the sample are separated to optimistic and not optimistic, based on the positive or negative value of the described optimism variables. Therefore, a positive value of these variables indicates an optimistic expectation of the Board members, so managers are classified as optimistic.

Moreover, for both the Executive Board and Supervisory Board members, the number of purchases is higher than the number of sales, something that advocates the fact that there are many cases in which managers increase their exposure to firm specific risk voluntarily.

Consistent with Glaser et al. (2008), Malmendier and Tate (2005a, 2005b) and Lin et al. (2005), this work indicates that the investment of firms with optimistic managers is more sensitive to cash flow than the investment of firms with managers who are not optimistic (Table 5).

Table 2: Relation between managerial optimism and corporate investment: dependence on firm size

Dependent Variable	CAPEX/Lagged Assets	CAPEX/Lagged Assets			CAPEX/Lagged Assets			(CAPEX-Industry CAPEX)/Industry CAPEX		
Time period	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012	2007-2012
Optimism based on		All	EB	CEO	All	EB	CEO	All	EB	CEO
	1	2	3	4	5	6	7	8	9	10
Cash flow/lagged assets	0.030	0.024	0.024	0.024	0.012	0.012	0.018	0.016	0.018	0.106
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Lagged Tobin's Q	0.032	0.026	0.026	0.026	0.015	0.024	0.012	0.017	0.021	0.081
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Leverage Ratio					0.010	0.017	0.009	0.000	0.000	-0.070
					(0.003***)	(0.001***)	(0.008***)	0.647	0.647	0.655
Ln (total assets)					0.000	0.000	0.000	-0.060	-0.070	-0.004
					0.269	0.226	0.253	0.253	0.247	0.286
Sales growth					0.119	0.112	0.117	0.112	0.093	0.798
					(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Managerial optimism		0.007	0.007	0.009	0.004	0.004	0.007	0.004	0.003	0.026
		(0.000***)	(0.000***)	(0.000***)	(0.328)	(0.055*)	(0.485)	(0.078*)	(0.053*)	(0.218)
Constant	0.138	0.013	0.013	0.015	0.013	0.015	0.013	0.540	0.570	0.740
	(0.013**)	(0.000***)	(0.000***)	(0.000***)	0.265	0.234	0.245	(0.000***)	(0.000***)	(0.000***)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Cases	3634	3634	3634	3634	3631	3631	3628	3631	3633	3584
Adjusted R-squared	0.582	0.601	0.555	0.468	0.621	0.578	0.529	0.263	0.258	0.247

This table displays fixed effects panel regression results of capital expenditures on several control variables for large firms (regressions 1 to 6) and small firms (regressions 7 to 12). Large firms have above median total asset values and small firms have below median total asset values. The dependent variable is capital expenditures divided by lagged assets in regressions 1 to 3 and 7 to 9 and (capex-industry capex)/industry capex in regressions 4 to 6 and 10 to 12.. In all regressions we analyse cash flow divided by lagged assets and lagged Tobin's Q as control variables. Furthermore, we include our optimism "dummy" variable in all regressions. The "dummy" variable is equal to 1 when members of the EB and SB (ALL), only the EB, or only CEOs are classified as optimistic in given year. All regressions include firm and year fixed effects. Time period is 2007-2012. All variables are winsorised at the 1 per cent level. Robust p-values are in parentheses. *** indicates significance at 1 per cent, ** indicates significance at 5 per cent and * indicates significance at 10 per cent.

Table 3: Relation between managerial optimism and corporate investment: dependence on ownership structure

Optimism based on	All	All	All	EB	EB	EB	CEO	CEO	CEO
Closely held shares	1st tercile (low)	2nd tercile (middle)	3rd tercile (high)	1st tercile (low)	2nd tercile (middle)	3rd tercile (high)	1st tercile (low)	2nd tercile (middle)	3rd tercile (high)
	23	24	25	26	27	28	29	30	31
Cash flow/lagged assets	0.024	0.030	0.024	0.011	0.033	0.023	-0.014	-0.020	0.024
	(0.000***)	0.450	(0.000***)	0.131	0.234	0.118	0.490	0.490	(0.004***)
Lagged Tobin's Q	0.023	0.002	0.016	0.021	0.001	0.010	-0.001	-0.001	0.023
	(0.002***)	(0.031**)	(0.001***)	0.579	0.240	(0.003***)	0.358	0.358	(0.002***)
Managerial optimism	0.010	0.003	0.009	0.001	0.001	0.007	0.001	0.001	0.010
	(0.009***)	0.737	(0.001***)	0.264	0.806	(0.045**)	0.237	0.237	(0.009***)
Constant	0.050	0.058	0.062	0.002	0.059	0.073	0.026	0.026	0.050
	(0.004***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes	yes
Cases	108	101	95	108	101	95	108	101	95
Firms	28	31	37	28	31	37	28	31	37
Adjusted R-squared	0.114	0.188	0.201	0.122	0.144	0.121	0.144	0.145	0.185

This table displays fixed effects panel regression results of capital expenditures divided by lagged assets on several control variables for firms with varying degrees of closely held shares (in per cent of shares outstanding) as proxy for ownership structure. This variable represents shares held by insiders. It includes but is not restricted to shares held by officers, directors, and their immediate families, shares held in trust, shares of the company held by any other corporation, or shares held by individuals who hold 5 per cent or more of the outstanding shares. In all regressions we analyse cash flow divided by lagged assets and lagged Tobin's Q as control variables. Furthermore, we include our optimism "dummy" variable in all regressions. The "dummy" variable is equal to 1 when members of the EB and SB (ALL), only the EB, or only CEOs are classified as optimistic in given year. All regressions include firm and year fixed effects. Time period is 2007-2012. All variables are winsorised at the 1 per cent level. Robust p-values are in parentheses. *** indicates significance at 1 per cent, ** indicates significance at 5 per cent and * indicates significance at 10 per cent.

Table 4: Optimism and acquisitions: Basic regressions

Time period	**2005-2012**	**2005-2012**	**2005-2012**	**2005-2012**
Optimism based on	**All**	**All**	**EB**	**CEO**
	41	**42**	**43**	**44**
Cash flow/lagged assets	0.072	0.072	0.129	0.030
	0.450	0.449	0.341	0.820
Lagged Tobin's Q	-0.132	-0.152	-0.059	-0.206
	0.104	(0.099*)	0.606	(0.074*)
Ln (total assets)	0.210	0.209	-0.217	0.591
	0.369	0.372	0.517	(0.073*)
Managerial optimism		-0.046	-0.140	0.044
		0.416	(0.079*)	0.588
McFadden's adjusted pseudo-R squared	0.481	0.504	0.511	0.515
Year fixed effects	yes	yes	yes	yes
Cases	483	483	483	483
Firms	76	76	76	76

This table shows fixed effects logit panel regression results of a mergers and acquisitions "dummy" variable on several control variables. The dependent variable is set equal to 1 if the "assets from acquisitions" variable is positive in a given year. In all regressions, we analyse cash flow divided by lagged assets, lagged Tobin's Q, and the natural logarithm of total assets as control variables. In regressions 2 to 4 we also include an optimism "dummy" variable. The "dummy" variable is equal to 1 when members of the EB and SB (ALL), only the EB, or only CEOs are classified as optimistic in given year. All regressions include firm and year fixed effects. Time period is 2007-2012. All variables are winsorised at the 1 per cent level. Robust p-values are in parentheses. *** indicates significance at 1 per cent, ** indicates significance at 5 per cent and * indicates significance at 10 per cent.

Table 5: Empirical Results: Optimistic versus non optimistic managers

Optimism based on	**All**	**All**	**EB**	**EB**	**CEO**	**CEO**
Group	**Non Optimistic**	**Optimistic**	**Non Optimistic**	**Optimistic**	**Non Optimistic**	**Optimistic**
	45	**46**	**47**	**48**	**49**	**50**
Cash flow/Lagged Assets	0.029	0.032	0.032	0.040	0.024	0.041
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.000***)
Lagged Tobin's Q	0.024	0.031	0.027	0.032	0.020	0.033
	(0.000***)	(0.000***)	(0.000***)	(0.000***)	(0.007***)	(0.000***)
Constant	-0.001	-0.007	-0.007	-0.004	0.005	-0.010
	0.840	(0.012**)	0.352	0.391	0.614	(0.001***)
Year fixed effects	yes	yes	yes	yes	yes	yes
Cases	349	3258	179	1604	170	1649
Firms	78	102	63	115	61	120
Adjusted R-squared	0.259	0.323	0.190	0.204	0.274	0.254

This table displays fixed effects panel regression results of capital expenditures on several control variables for large firms whose managers are classified as not optimistic (1, 3 and 5) and optimistic (2, 4 and 6). The dependent variable is capital expenditures divided by lagged assets. In all regressions, we analyse cash flow divided by lagged assets and lagged Tobin's Q as control variables. Managers are classified as optimistic based on an optimism "dummy" variable. The "dummy" variable is equal to 1 when members of the EB and SB (ALL), only the EB, or only CEOs are classified as optimistic in given year. All regressions include firm and year fixed effects. Time period is 2007-2012. All variables are winsorised at the 1 per cent level. Robust p-values are in parentheses. *** indicates significance at 1 per cent, ** indicates significance at 5 per cent and * indicates significance at 10 per cent.

5. Conclusions and Further Research

The basic instrument that was used was to link balance sheet and stock market data of Greek firms listed in the ASE to directors' dealings data, that is the buying and selling of stock from managers of their own firms on their personal accounts. Directors' dealings data were used in order to construct the optimism measures. The sample of firms consisted of 184 non-financial firms listed in the ASE. Financial firms were excluded due to the existence of differences in compiling their annual reports and financial statements. Eventually, this work produced some very important results.

Consistent with the relative literature (Malmendier and Tate, 2005a, 2005b; Martin, 2008; Glaser *et al.*, 2008; Michel, 2009) it has been found that managers are optimistic. They, consequently, voluntarily increase their firm's exposure to company specific risk. The number of transactions that were recorded as purchases were much greater than sells even though the volume of sells exceeded by far the volume of purchases. However, the tendency of managers was measured based on the volume of purchases and sales. Firms with optimistic managers invest more when compared with the degree of investment of non-optimistic managers.

The effects of managerial optimism on corporate investment are basically driven by smaller firms something that is consistent with the results of Glaser et al., 2008. In smaller firms such phenomena are more pronounced. The existence of managerial optimism is more intense since managers are less and as a result the impact of their decision making is stronger in these firms. Results are also stronger regarding the members of the Executive Board (EB) of smaller firms.

Ownership structure is an important aspect of corporate governance since it specifies the incentives of managers and consequently affects their firms' performance. In order to examine the impact of managerial optimism on corporate investment with dependence on ownership structure of firms, closely held shares was used as a proxy in order to rank firms according to their degree of closely held shares. Therefore, it was found that managerial optimism mainly affects corporate investment in firms with high degree of closely held shares. Moreover, managerial optimism is never linked to corporate investment regarding firms which belong to middle degree of closely held shares. According to Morck, Shleifer and Vishny (1988) and Glaser et al. (2008) a similar non-monotonic relationship between management ownership and market valuation of a firm is recorder, as measured by Tobin's Q in both studies.

Acquisitions are an aspect of corporate investment decision strategy. Dealing with profitable acquisitions can boost a firm to grow rapidly, improve its future performance, increase its profits, reduce financial risk and eventually have a larger market share. However, if an acquisition does not work, the fallout can be disastrous for a firm. Again, managers have to make these decisions either to decide to complete an acquisition or not. Yet, biased managers who are optimistic it is found that they do not significantly affect the probability of an acquisition although one could say that optimistic managers usually undertake risky projects and definitely acquisitions involve risk. Obviously, decisions for acquisitions are not affected by the manager's optimism regarding the prospects of his firm. This result it is not consistent with results of previous literature like Malmendier and Tate (2008) and Glaser et al. (2008) who have been found that cash flow, Tobin's Q and firm size mainly drive the probability of an acquisition. Probably the low number of observations constituted of an obstacle in order to explore the impact of managerial optimism on mergers and acquisitions decision making in greater detail.

Therefore, it is confirmed that investment of firms with optimistic managers was found to be more sensitive to cash flow than the investment of firms with managers who are

not optimistic. Optimism was proved to be extremely effective regarding investment. Cash flow as a significant predictor of investment served as an indicator of a firm's financial health and when a firm could generate positive cash flow, its long-term success could be regarded as granted. The sensitivity of cash flow to investment was greater for firms with optimistic managers due to the fact that optimistic managers can influence cash flow at a greater level because of their engagement in more risky projects than managers who are not optimistic.

A possible proposal for further research could be the testing of each year separately. In this work we have run the regressions for the whole of the 6-year period of 2007 to 2012. However, testing each year individually could provide researchers with the ability to compare different results, to find out whether there was anything special statistically for each specific year and maybe test the period after the year 2010 when the Greek crisis had started to come up on the horizon. The impact of the Greek financial crisis on managerial behaviour and on the personal characteristics of managers like optimism could constitute a field for further research.

During the empirical research, Greek financial firms were excluded from the sample due to differences in the compilation of their balance sheets and annual reports. However, this limitation can serve as a suggestion for further research in order to construct a sample consisting of only financial firms. It would be very intriguing the fact that in the current economic conditions in Greece, which is being whipped by large deficits, fiscal inefficiencies as well as great unemployment and depression conditions, to examine managerial optimism and its impact on corporate investment regarding financial firms and more specifically financial institutions at this period of time when the recapitalisation of Greece's banks has to be completed without any delays.

Another field of supplementary research would be the impact of managerial optimism on not only corporate investment, but on other financial and non-financial decisions such as risk management, investments in R&D, advertising and intangible assets. In other words the suggestion would be to examine the impact of managerial optimism on the whole range of decisions that managers have to make. Furthermore, other measures of investment profitability should also be taken into consideration. Additionally, it would be very interesting not to focus only on optimism, but on other cognitive biases too. Conservatism, the "curse" of knowledge, the empathy gap, the illusion of control, loss aversion and zero-risk bias are only some of the cognitive biases which could be proposed for further research.

It became clear during this research that the existence of optimism as a psychological and personal characteristic of Greek managers is met in every single step of their decision making process especially regarding the corporate investment decision making policies. However, the frequent and excessive use of optimism as a phenomenon of overinvestment usually has led to unfavourable outcomes for both managers and firms. It has been found that it is difficult to control this psychological bias since it is often connected to the managerial belief that personal psychological characteristics could only lead to greater outcomes for their firm.

Especially regarding Greece it should be highlighted that Greek managers are extremely overconfident and overoptimistic, something that has constituted as one of the reasons that have caused the Greek economic crisis to rise up mainly regarding the years after 2010 when economic depression has become more noticeable. To conclude, it is easily understood that the field of behavioural finance that was explored with the link of corporate investment to managerial optimism, is only a very small part of the overall possible research. There are many unexplored areas available for

further research. It is finally very important to examine more deeply how the investment decision process works within a firm. Is there a difference between upper and lower level managers in decision making? Is corporate culture significant enough to be affected by managerial cognitive biases? Can managers be non-biased? Well, future research is absolutely necessary in order to investigate cognitive biases and consequently their effects on corporate decisions.

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Investigation of the Greek Stock Exchange volatility and the impact of foreign markets from 2007 to 2012

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Abstract

Purpose of this paper - *The current paper aims to analyze the impact of the debt crisis on the FTSE / ASE 20 index volatility. The research also examines the impact of powerful foreign capital markets on the Greek Stock Exchange market, the seasonality returns (Day-of-the-Week effect) and the volatility structure.*

Design/methodology/approach - *The analysis of data is made by employing the GARCH models, and more specifically the GJR-GARCH model.*

Findings - *The results of the GJR-GARCH model demonstrate that the debt crisis and, therefore, its consequences increase the FTSE / ASE 20 index volatility and the Greek market does not react asymmetrically to negative information. In addition, the results indicate the importance of foreign markets in shaping the first moment of the FTSE / ASE 20 index and the presence of the Reverse Day of the Week effect.*

Research limitations/implications - *The implication of volatility measurement is vital in determining the cost for investment, security pricing markets, hedging and other trading strategies, and also for regulatory policies conducted within financial markets.*

Originality/value - *The paper may prove helpful to regulatory authorities, investors and financial analysts to understand the structure and behavior of volatility in a small stock exchange market under crisis.*

Keywords: *Greek market, volatility, GARCH models, Day-of-the-Week effect*

JEL Classification: *G10, G14, G15, C22*

1. Introduction

Stock Exchange volatility and the Day-of-the-Week patterns have been researched extensively in the framework of the financial literature, and great attention has been given to their association with stock returns. Although there is a large number of studies focusing on volatility in developed and mature markets, such as the U.S., British and Japanese markets, small but emerging markets, such as the Greek market, have been less frequently researched in terms of their Stock Exchange volatility, which appears to be crucial in the period of the sovereign debt crisis in Greece.

In this context, the present research aims at investigating the impact of major stock market indices on the FTSE / ASE 20 index, which will enable a better understanding and more accurate interpretation of its performance and volatility. In detail, the research examines:

- the effect of large foreign capital markets on the performance of the Greek Stock Exchange market
- seasonality returns (Day-of-the-Week effect)
- volatility structure
- the impact of the debt crisis on the Greek Stock Exchange volatility

It is worth noting that the Greek debt crisis was announced on April 23, 2010, by the former Prime Minister, George Papandreou, who made a declaration about the Greek appeal to the International Monetary Fund.

2. Literature Review

The present research discusses the results of previous work concerning the Athens Stock Exchange seasonality, and, in particular, the Day-of-the-Week effect as well as the Greek sovereign debt crisis. More specific the Day-of-the-Week effect, which in addition to research on the existence or not in many stock markets, tested for the strength and its correlation with other anomalies. Thus, it turned out that this phenomenon was strongest for companies with low capitalization Lakonishok and Smidt (1988).

Mills et al. (2000) evaluated the daily data of sixty stock returns and the market index for the period between 1986 and 1997. They claimed that the Greek Stock Exchange market cannot be considered efficient and provided evidence of the Day-of-the-Week effect (DOW effect) in the Greek market. In detail, Friday returns were tested positive, despite the analysis of individual stocks which showed that less than 50% of the Athens Exchange stocks tend to exhibit significant returns on Friday, whereas on the other weekdays they were lower than 20%. In addition, they suggested that market concentration is crucial to determine the DOW effect impact on the Athens Stock Exchange and they concluded that the intensity of seasonality effects is probably contingent on specific stock features, such as market capitalization, which is related to the case of heterogeneous investors focused on different stock types.

In the same framework, Alexakis and Xanthakis (1995) investigated the Athens Stock Exchange in the period between 1985 and 1994, namely, after the Greek accession to the European Union and before the Euro zone and demonstrated that the Athens Stock Exchange composite index generates the DOW effect. In detail, they provided evidence of Monday positive returns and Tuesday negative returns for the period earlier than 1990, which corroborates Coutts' et al. (2000) findings for the period from 1986 to 1996, who demonstrated that the DOW effect is largely associated with Market concentration and also that Friday returns were higher.

Later during that time, Kenourgios and Samitas (2008) compared the periods before and after the Euro zone and identified a "weakened" anomaly for the subsequent period, thus, indicating the significant progress of the Athens Stock Exchange since 1995. They argue that in the period between 1995 and 1999, there was a "massive entrance of individual and institutional investors in the capital market", which led to the growth of the Athens Stock Exchange as regards the number of transactions and market capitalization. A

similar tendency is observed for the period between 2003 and 2005. Thus, the "weakened" anomalies in concurrence with the Athens Stock Exchange growth imply that the Greek market is becoming more efficient because of its own growth.

Apergis and Eleptheriou (2001) investigates the volatility of the ASE stock returns over the period 1990-1999 through the comparison of various conditional hetero-skedasticity models with GARCH Models such as GARCH-M, EGARCH, GJR and GQARCH. The results for the day-of-the-week effects are similar to those reached by Alexakis and Xanthakis (1995) for the case of the ASE. Also the mean equation results show negative returns on Mondays and Tuesdays and positive returns for the remaining days.

In addition, Al-Khazali et al (2008) studied the General Index of the Athens Stock Exchange for the period 1/1985-12/2004 and concluded that the daily, weekly and monthly returns are positive and significantly different from zero. The highest daily returns were observed on Friday, whereas the lowest ones on Tuesday. Notably, the average daily returns are positive for every day of the week, and, apart from Tuesday, they are significantly different from zero. The results do not only contradict Alexakis and Xanthakis' (1995) survey, which demonstrated negative returns on Tuesday, but also the conclusions made by Coutts et al. (2000) and Mills et al. (2000), who indicated negative returns both on Tuesdays and Wednesdays.

Dicle and Levendis (2011), who studied the Athens Stock Exchange and market efficiency as determinants of development, examined the impact of 50 stock returns of foreign markets on the Athens Exchange in the period from 01/2000 to 12/2007. Based on an analysis of returns, the results demonstrated inefficiency and also the presence of the DOW effect resulting from the impact of other markets and from liquidity. Monday and Tuesday returns were negative whereas Friday returns were positive.

In relation to the market, the DOW effect in the Athens Stock Exchange was observed on Monday and Tuesday, whereas it was also noticed that on Monday and Thursday it affected 10% of the stocks. Thus, Monday negative returns can be explained by the "trading time" hypothesis. The DOW effect is higher in smaller firms, although it also affects larger ones; Monday is observed to be the day of the week to exhibit the lowest returns, and next comes Tuesday. In contrast, Friday is the day of the week with the highest returns. It is also worth noting that the DOW effect is not observed on Friday returns and in larger firms, which implies that on Friday the effect is explained by the "trading time" hypothesis.

Drimbetas et al. (2007), based on data during the period from 23/08/1997 to 05/04/2005, demonstrated that during the preliminary examination of the time series of returns of the FTSE / ASE 20 index, a daily seasonality was identified, which is consistent with previous research work on the ASE.

In contrast, Tsangarakis (2007) demonstrated the non-dominance of the DOW effect from 1981 to 2002 and emphasized that there is no systemicity in the Day-of-the-Week effect. More specifically, different results were derived concerning the daily seasonality in different sub-periods. Monday effect was observed only in 2001 whereas in 1986 and 1990 the "reverse" Monday effect was identified.

Among the studies focusing on the Reverse DOW effect, the research made by Brusa et al. (2000), who analyzed data from the U.S. Stock Exchange markets from 1/1990 to 12/1994, identified the "reverse" Monday effect, which implies positive returns on Monday compared with other weekdays. Later, Brusa et al. (2003) investigated the" reverse" weekend effect in the U.S. market by analyzing the returns of DJIA in the period 1963-1995. They suggest that in the last few years Monday returns tend to be positive and higher than the returns derived on other weekdays. They also discussed the reason for the specific "anomaly" and its relationship to the impact of industry.

To compare their results with previous research work in the field, they examined the presence of the 'conventional' and 'reverse' DOW effects on two major indices: Dow Jones Industrial Average (DJIA) and New York Stock Exchange (NYSE) composite index for the period 1966-1996. The results corroborate the fact that although there is a 'conventional' DOW effect during the period before1988, the effect is reversed in the period after 1988. The specific research, subsequently, provides evidence for the Reverse DOW effect in general indices, and, in addition, it examines whether the effect has affected industries or whether only a small number of industries has remained unaffected.

Four major industry indices were subsequently examined, which were readily available in the market (NYSE Industrial index, the NYSE Transportation index, the NYSE Utility index, and the NYSE Financial index). The results suggest that the DOW and the Reverse DOW effects are present not only in general indices, but in most industry indices in the period 1966-1996. The similarities on Monday returns between general and market sector indices may suggest that the sources of the DOW effect are financial incidents which affect all sectors of the economy rather than factors affecting only a few industries. It was also demonstrated that Monday performance standards are different between pre-and post-1988 periods.

In a later research, Brusa et al (2005) document the presence of the DOW Effect over an extended period of eleven years (1988-1998) and argue that Monday returns are very positive and higher than the returns on other weekdays. They also report that the 'conventional' DOW and Reverse DOW effects are associated with firm size. In addition, the 'conventional' DOW effect tends to be associated with small firms, whereas the Reverse DOW effect tends to be associated with large ones.

As regards market efficiency, Alexakis et al (2010) examined the predictability of stock returns (47 firms) on the Athens Stock Exchange (ASE) in the period 1993-2006. The results suggest that the portfolios selected on the basis of financial indices generate higher than mean returns, which implies that the emerging Greek market does not fully assimilate market information in stock prices and, thus, it is not efficient. The empirical results demonstrate that there are financial indices which include important information on anticipating a cross-section in the Athens Stock Exchange stock returns.

Similarly, Dicle & Levendis (2010) investigate the efficiency of the Athens Stock Exchange in relation to market tests and individual stock returns. Both at market and stock return level, the research provides evidence of inefficiency. In an earlier study Mollah and Mobarek (2009), noted that there is a long-term persistence shock in emerging markets compared to developed markets. That also indicates efficiency. Moreover, Dicle & Levendis (2010) based on the premise that approximately 94% of the Greek stock returns are Granger-caused by at least one foreign market, it is concluded that the Greek market does not provide evidence of international diversification. Considering the importance of liquidity for emerging markets, its impact on Greek stocks is assessed as part of the analysis of market efficiency. Hence, liquidity is found to be a statistically significant cause for the returns of less than 10% of the Greek market, which implies that despite being significant, liquidity it is not accountable for the returns of about 90% of Greek stocks.

Finally, and as regards the Greek sovereign debt crisis, Mink Haan (2013) examined the impact of the information about Greece and the Greek bailout plan on bank stock prices in 2010 using data from 48 European banks and identified twenty days exhibiting extreme returns for Greek government securities, which they ranked by relevance to current affairs in Greece and the information about the Greek bailout prospects. It was demonstrated that, with the exception of Greek banks, the relevant information did not generate irregular returns. Finally, it was suggested that the price of

sovereign debt in Portugal, Ireland and Spain comply both with the information about Greece and the information about the Greek bailout.

3. Data

The corpus of data is comprised of the daily FTSE / ASE 20 index prices of the Athens Stock Exchange, Hang Seng, China (Hong Kong) and DAX30, Germany, and it applies to a period from 4 January 2007 to 20 December 2012. Totally, 1318 prices were obtained from each index.

FTSE / ASE 20 index has been chosen on the basis of being representative of the Greek Stock Exchange progress, as the market capitalization of its 20 listed companies exceeds 60% of the ASE total capitalization.

DAX30 index was employed with a view to studying and isolating the systematic factors related to the European Union, whereas the Hang Seng Index was similarly employed for the factors related to Asia.

4. Methodology

The analysis of data was based on the null hypothesis of the mean returns of the researched Stock Exchange markets.

Table 1: Testing null hypothesis for the FTSE/ASE20, DAX30, HANG SENG stock market indices

	Sample (adjusted):	Sample Mean	t-statistic	Probability
Hypothesis Testing for FTSE/ASE20	1317	-0.001245	-1.936365	0.0530
Hypothesis Testing for DAX30	1317	0.000106	0.224238	0.8226
Hypothesis Testing for HANG SENG	1317	0.000009	0.165060	0.8689

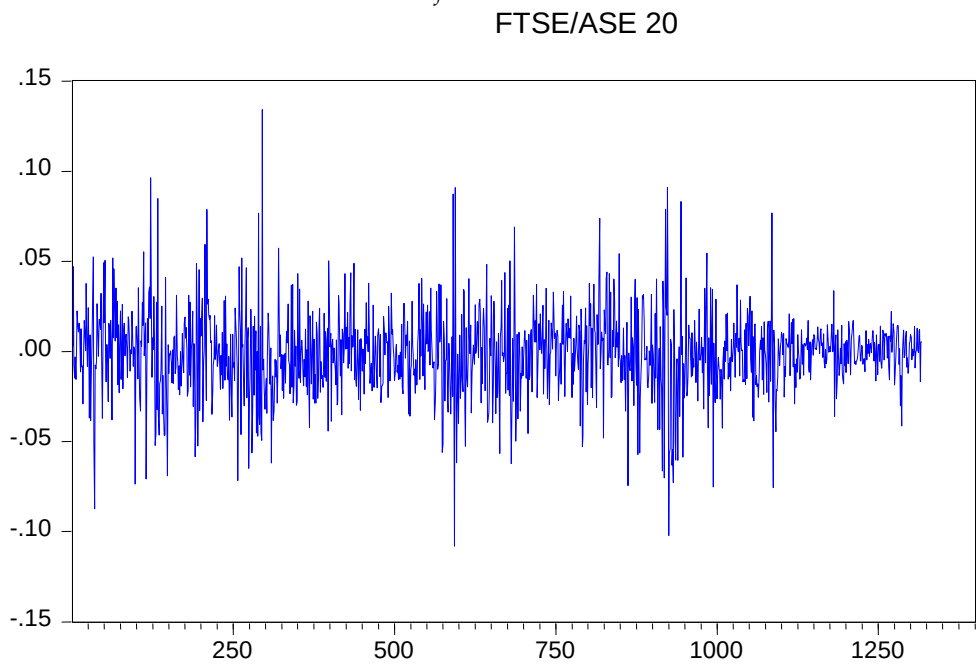
Table 1 shows that at a significance level of 5% and 1% the null hypothesis of the mean returns of the FTSE/ASE20 indices (p-value = 0.0530), DAX30 (p-value = and HANG SENG (p value) is not rejected.

In addition, more data about the type of distributions can be derived. Table 2 demonstrates that all series are leptokurtic. The highest value of kurtosis is exhibited in HANG SENG index (10.8), whereas the lowest in FTSE / ASE 20 index (5.8), much higher than the kurtosis of the normal distribution, which is equal to 3. The Jarque-Bera statistic values are high, indicating the rejection of the normal distribution for all series. In addition, a positive asymmetry (skewness) was observed in the series of FTSE/ASE20 and DAX30 indices and a negative symmetry in HANG SENG index.

Table 2: Descriptive measures of the distributions of stock returns of the FTSE/ASE20, DAX30 and HANG SENG indices

	FTSE/ASE20	DAX30	HANG SENG
Mean	-0.001	0.000	0.000
Median	-0.000	0.000	0.000
Maximum	0.134	0.103	0.142
Minimum	-0.108	-0.077	-0.146
Std. Dev.	0.023	0.017	0.020
Skewness	0.089	0.033	-0.069
Kurtosis	5.822	7.374	10.812
Jarque-Bera	438.830	1050.211	3350.432
Probability	0.000	0.000	0.000
Sum	-1.639	0.139	0.123
Sum Sq. Dev.	0.716	0.385	0.560
Observations	1317	1317	1317

Figure 1: Returns of FTSE / ASE 20 index
Data numbered from the most to least recent



In Fig. 1 return volatility is very high at points 900-1000, which is explained by the market shocks caused by the bank crisis (June-December 2008) (Mazumder and Ahmad 2010), and also at points 575-600 (June-April 2010), indicating the period during which Greece appealed to the International Monetary Fund.

Table 3: Testing for unit root for the FTSE/ASE20, DAX30, HANG SENG indices

		FTSE/ASE20		DAX30		HANG SENG	
		t-Statistic	**Prob.***	**t-Statistic**	**Prob.***	**t-Statistic**	**Prob.***
Augmented Dickey-Fuller test statistic		-20.193	0.000	-27.238	0.000	-36.909	0.000
Test critical values:	**1% level**	-3.965		-3.965		-3.965	
	5% level	-3.413		-3.413		-3.413	
	10% level	-3.128		-3.128		-3.128	

Table 3 shows the test results for the presence of unit root. Dickey-Fuller statistic demonstrated that the time series of stock returns of the FTSE/ASE20, DAX30 and

HANG SENG indices have been produced by stationary series, deriving from the t statistic values, which are much higher in absolute rates than the critical values at the conventional significance levels 1%, 5%, 10%.

Finally, Table 4 shows the autocorrelation tests of first and second moment controls for the FTSE/ASE20 index. As regards the first moment, p (probability) values are lower than the significance level of 5%, indicating autocorrelation.

With regard to squared returns (2nd moment), it is worth noting that these are value fluctuations as the mean has been proven to be zero ($\sigma^2 = \frac{\sum_{i=1}^{n}(x_i - \bar{x})^2}{n}$). It is, thus, suggested that the squared returns (GARCH effect) are auto-correlated, as p-values are lower than 5%.

Table 4: Testing serial dependence for first and second moment

Returns				**Squared Returns**			
Lags	**Auto-correlation**	**Partial Correlation**	**LB(n)**	**Lags**	**Auto-correlation**	**Partial Correlation**	**LB(n)**
1	0.035	0.035	15.916	**1**	0.142	0.142	26.649
2	-0.091	-0.093	12.625	**2**	0.199	0.183	79.033
3	0.076	0.083	20.203	**3**	0.155	0.112	110.83
4	0.018	0.003	20.640	**4**	0.090	0.027	121.49
5	-0.055	-0.042	24.686	**5**	0.178	0.127	163.37
6	0.063	0.065	29.990	**6**	0.108	0.047	178.77
12	0.056	0.059	37.696	**12**	0.087	0.024	251.60
22	0.036	0.042	50.501	**22**	0.037	-0.006	326.11
36	0.026	0.040	64.921	**36**	0.006	0.008	336.10

LB (n) is the Ljung-Box statistic for the n-lag of R_t and R_t^2 respectively. LB (n) follows X^2 (chi-square) distribution with n degrees of freedom. The sample is comprised of 1317 daily returns.

Results of the GJR-GARCH Model

In the above analysis, the mean is zero and the squared returns are related to the previous days; thus, mean and variance are modelled on the basis of the GARCH model.

Notably, a major weakness in ARCH and GARCH models is the fact that they assume the volatility reactions to positive and negative variation (shocks) in a symmetrical manner. The specific weakness is encountered by employing asymmetric models, which assume the asymmetric aspects of returns.

Within this framework, volatility will be discussed in terms of:

- The application of GJR-GARCH model, which involves fewer parameters than other GARCH models; thus, it saves degrees of freedom in assessing the model.
- The introduction of a bivariate model of analysis, related to the periods before and after the debt crisis. Thereby, a further identification of and approach to volatility is possible in the framework of the relationship

between the FTSE / ASE 20 index and DAX30 and HANG SENG indices before and after receiving a statement of the debt crisis.

- The introduction of a bivariate to examine daily seasonal patterns.

The proposed mean equation of the time series of stock returns of FTSE / ASE 20 index is:

$FTSE_t = b_1D_{FRt} + b_2D_{Mt} + b_3D_{TUt} + b_4D_{Wt} + b_5D_{THt} + b_6DAX_t + b_7Hang_t + b_8FTSE_{t-1} + b_9FTSE_{t-2} + b_{10}FTSE_{t-3} + u_t$

In detail:

- FTSEt is the dependent variable of the equation and displays the value of the returns index at time t.
- D_{Mt}, D_{TUt}, D_{wt}, D_{THt} and D_{FRt} are bivariate dummies to control daily seasonal patterns in the mean equation[1].
- DAX_t and $Hang_t$ are the variables reflecting the returns of German and Chinese markets respectively; in addition, they implicitly reflect the international systematic factors.
- Variables $FTSE_{t-1}$, $FTSE_{t-2}$ and $FTSE_{t-3}$, represent the previous to t-day FTSE/ASE20 index returns.
- The disruptive conditions u_t are assumed to follow the generalized normal distribution[2].
- bi are constant parameters.

Variance equation, according to the GJR-Garch model, is:

$$\sigma_t^2 = \alpha_0 + \alpha_1\sigma_{t-1}^2 + \alpha_2 u_{t-1}^2 + \alpha_3 S_{t-1}^- u_{t-1}^2 + \alpha_4 K$$

The estimate of the conditional variance σ_t^2 is based on the following:

- σ_{t-1}^2 is the variance of the previous to the GJR-Garch model period. It reflects how the shocks of the previous period (t-1) are lasting and affect the next period (t).
- u_{t-1}^2 is information on the volatility of the previous period.
- Variable $S_{t-1}^- u_{t-1}^2$ involves information on the model asymmetry.
- K is the bivariate representing the period before and after the crisis. At the time there is no impact of the Greek crisis, the variable value is 0, whereas after the crisis announcement, it is 1.
- α_i are constant parameters.

It is worth noting that the selection criteria of the set of lags in the model (Akaike and Schwartz criteria in Table 5), provides evidence that adding extra lags or removing some of them in the model does not increase model significance, according to the Akaike and Schwarz criteria values, which are required to be as low as possible.

Table 5: Akaike and Schwarz Criteria for the selection of lags for the dependent variable FTSE / ASE 20

Lags	Akaike	Schwartz
1	-5.317.662	-5.262.531
2	-5.324.724	-5.265.618
3	-5.328.236	-5.265.151
4	-5.326.891	-5.259.823

[1] factor $b_1D_{FR}t$, estimated with the constant factor of the regression; otherwise, the bivariates will show perfect linear relationship ie DM + DTU + Dw + DTH + DFR = 1 (high multicollinearity).

[2] In terms of Taylor (1994), to maximize the function of maximum probability, it is assumed that the residuals follow the generalized error distribution (GED), a special type of which is normal distribution. The generalized error distribution function includes the variable which adjusts heavy tails; thus, it can capture leptokurtosis usually exhibited in the distributions of stock returns.

Table 6: Mean equation

$FTSE_t = b_1D_{FRt} + b_2D_{Mt} + b_3D_{TUt} + b_4D_{Wt} + b_5D_{THt} + b_6DAX_t + b_7Hang_t + b_8FTSE_{t-1} + b_9FTSE_{t-2} + b_{10}FTSE_{t-3} + u_t$

b_1	b_2	b_3	b_4	b_5
-0.002217***	0.002225**	0.001205	0.001910	0.002526**
(-2.613166)	(1.985955)	(0.995462)	(1.643064)	(2.095298)

b_6	b_7	b_8	b_9	b_{10}
0.598401***	0.190847***	0.004166	-0.042901**	0.059631***
(24.92721)	(10.94410)	(0.199901)	(-2.024278)	(2.751660)

*t-statistics is shown in brackets. *** It indicates the statistical significance at 1% ** It indicates the statistical significance at 5%. * It indicates the statistical significance at 10%.*

Table 6, which shows mean equation, demonstrates that on average, Friday returns (b_1 = -0.002217) are lower than Monday (b_2 = 0.002225) and Thursday returns (b_5 = 0.002526) (Reverse DOW Effect).

In addition, the specific table demonstrates a statistically significant autocorrelation in the second and third lags of the historic series of returns of the FTSE / ASE 20 index at the significance level (b_9 = -0.042901) 5% and (b_{10} = 0.059631) 1%, respectively.

It also indicates that the influence of the German and Chinese markets on Greece is substantial; however, the influence of the Chinese market is considered less significant. DAX30 index (24.92721) with b_6 = 0.598401 and HANG SENG index (10.94410) with b_7 = 0.190847, are statistically significant at a significance level of 5% and 1%, respectively.

Table 7: Variance equation

$$\sigma_t^2 = \alpha_0 + \alpha_1\sigma_{t-1}^2 + \alpha_2 u_{t-1}^2 + \alpha_3 S_{t-1}^- u_{t-1}^2 + \alpha_4 K$$

α_0	α_1	α_2	α_3	α_4
0.00000243**	0.888708***	0.10401***	-0.013387	0.0000106**
(2.216534)	(48.89835	(4.377327)	(-0.402476)	(2.428554)

*t-statistics is shown in brackets. *** It indicates the statistical significance at 1% ** It indicates the statistical significance at 5%. * It indicates the statistical significance at 10%.*

Table 7, which shows variance parameters, demonstrates that the coefficient reflecting α_3 asymmetry (-0.013387) is not statistically significant at a significance level of 10%, which implies that the impact of negative information

does not seem to be stronger than the impact of positive information.

The variance dependence on past volatility α_1 (0.888708) is statistically significant at 1%, implying that past shocks have been present for a long time. In addition, the statistical significance of α_4 coefficient (0.0000106) at a significance level of 5% indicates that the debt crisis has increased volatility in the Greek Stock Exchange market.

The application of the GJR-GARCH model followed the assumption that the residuals exhibit a generalized distribution, as this may allow for heavy tails usually present in financial time series.

In Table 8, the diagnostic tests and quadratic residuals demonstrate that the GJR-GARCH model can satisfactorily describe the first and second moment of returns of the FTSE / ASE 20 index.

In addition in Table 9, the ARCH-LM TEST at a significance level of 5% confirms the deletion of ARCH effect at the residuals squared (lack of autocorrelation of square deviations).

Table 8: Autocorrelation function of residuals and squared residuals with respect to the regression

Residuals				**Squared Residuals**			
Lags	**Auto-correlation**	**Partial Correlation**	**LB(n)**	**Lags**	**Auto-correlation**	**Partial Correlation**	**LB(n)**
1	-0.046	-0.046	28.302	**1**	0.032	0.032	13.356
2	-0.049	-0.051	60.084	**2**	-0.017	-0.018	17.347
3	-0.027	-0.032	70.022	**3**	-0.046	-0.045	44.866
4	-0.013	-0.018	72.101	**4**	0.002	0.005	44.929
5	-0.048	-0.053	10.210	**5**	0.022	0.021	51.597
6	0.018	0.010	10.630	**6**	0.012	0.009	53.447
12	0.058	0.058	17.815	**12**	-0.016	-0.018	70.130
22	-0.003	-0.002	25.544	**22**	-0.012	-0.011	11.239
36	0.051	0.051	44.798	**36**	0.021	0.024	19.938

Table 9: ARCH LM Test

Lags	**T*R²**
1	1.331.560
2	1.774.668
3	4.375.578
4	4.411.565

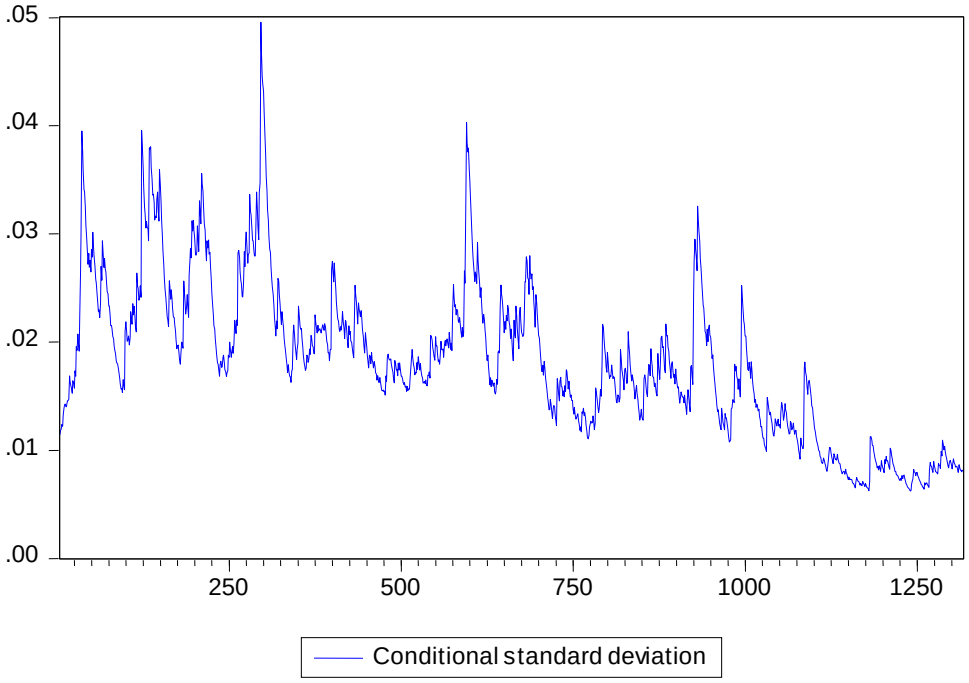
TR^2statistic (Observations on R^2) follows X^2 distribution with n degrees of freedom, where n is the number of the regression parameters.

Finally, below are the Figures showing standard deviations and residuals.

Figure 2 demonstrates that the points exhibiting the greatest volatility involve periods of crucial incidents. Points 900-1000 (June-December 2008), 600 (April 2010) and 250 to 0 (November 2011-December 2012) exhibit high volatility due to the U.S. bank

collapse, the declaration made by G. A. Papandreou about Greece's appeal to the International Monetary Fund, and the early outcomes of the appeal.

Figure 2: Conditional volatility of the GJR-GARCH model
Data are numbered from the most to the least recent.



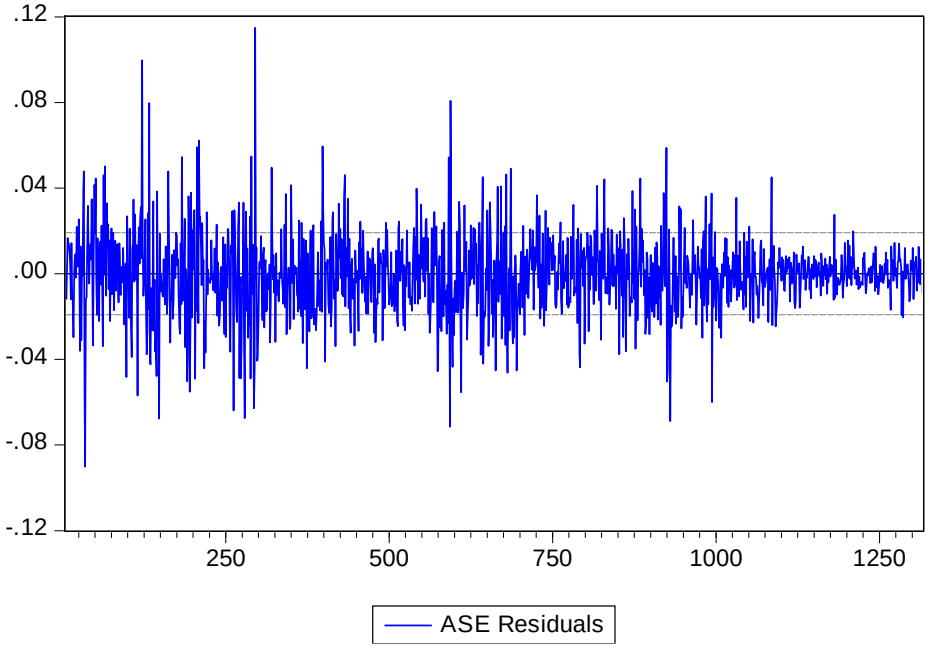
5. Conclusions

Volatility is one of the major concepts in modern Stock Exchange markets, as it plays a crucial role concerning their function, fund management, assessment of financial products and forecast accuracy. It has received considerable attention both from researchers and also practitioners; however, the vast majority of studies are focused on developed and mature markets, such as the U.S., British and Japanese markets. The present research, attempting to fill a part of this gap, focuses on volatility in the small but also developed Stock Exchange market in Greece.

Variance analysis of the FTSE / ASE 20 index of the Athens Stock Exchange was carried out on the basis of the GARCH model. In this context, the discussion was focused on daily seasonality, the role of foreign markets and the importance of the debt crisis in shaping volatility.

The results demonstrated the presence of the Reverse Day of the Week effect. In detail, it was demonstrated that Friday returns were lower than the corresponding Monday and Thursday returns, which contradicts other researchers' findings about the Greek market (higher returns on Friday, lower on Monday). It is likely that the accumulated uncertainty in the recent years (mortgage crisis in the U.S. and debt crisis in Greece), has forced investors to expect negative information on weekends, to sell on Friday and buy on Monday.

Figure 3: Residuals of the FTSE/ASE20 index
Data are numbered from the most to the least recent.



In addition, the importance of foreign markets in shaping the first moment of the FTSE / ASE 20 index was confirmed by the statistical significance of the German and Hong Kong markets. There are major international systematic factors in the German market returns which affect the Greek market, as the German market 'wakes up' before the Greek market and absorbs the most important information, such as the progress of the U.S. market as well as oil, currency and other financial product pricing of the previous evening close. In addition, owing to the political and socio-economic relationships between Greece and Germany, the German market appears to affect financial progress in Greece. Vortelinos (2010) also showed a strong correlation between the markets of Greece and Germany, while noting that the introduction of the euro highly upgraded its geopolitical role of Germany. Thus the determinant role of Germany is expected not only at European level but also internationally.

Similarly, the Hong Kong market is also considered significant as it reflects all developments in Asia, particularly China, which plays an important role in the world economy.

In addition, the application of the GJR-GARCH model demonstrated that the Greek market does not react asymmetrically to negative information. A thorough analysis of volatility demonstrated that, overall, market volatility in Greece depends more on older-than-one-day information, which indicates it is an inefficient market; this is confirmed by the impact of the autocorrelation of the FTSE / ASE 20 index on current returns and on the Day of the Week effect.

Finally, the present research examined the impact of the debt crisis on the Greek market volatility. The results of the GJR-GARCH model demonstrated that the debt crisis and its consequences increased the FTSE / ASE 20 index volatility.

ASE had a similar reaction when he was heavily influenced in 1987 by the crisis in

international stock markets Siourounis (2002). The market did not manage to overcome the negative impact of the crisis in October 1987 until mid-1989, despite the positive developments in the EU countries.

It is most likely that the adverse incidents affecting key sectors in the Greek economy have also affected the returns of Greek firms, and significantly increased uncertainty; apparently, this had a catalytic impact on volatility. Overall, the progress of capital assets and the deterioration of the Greek capital market, the labour market and also of the returns of Greek firms have produced a rather less dependable financial environment involving greater risks and, thus, fluctuations.

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Influencing Factors on Earnings Management
Empirical Evidence from Listed German and Austrian Companies

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Abstract

Purpose *– Since the 1960s earnings management has been a widely researched area and became presumably known by the current accounting scandals. This paper aims at empirically showing which factors affect earnings management.*

Design/methodology/approach *– According to former research literature factors are derived, which might influence the companies' earnings management behavior. These factors are the applied accounting standard, the industry sector and the country of official quotation. Although several measurements for earnings management like abnormal accruals or income smoothing exist, this paper is predominantly using the distribution of net income scaled by total assets (RoA) respectively total sales (RoS) as earnings management measure. These earnings management measures have been selected as they can measure the frequency of earnings management in reality and no estimates are necessary.*

Findings *– In general, analyses show that the distribution in earnings management intervals differ from the total population. Most noteworthy is that by adoption of principle-based accounting standards (IFRS/US-GAAP), in case of this study no differences of earnings quality was observable. The other two variables yield in mixed results due to the robustness checks, which indeed questions the scaling variables for data-sets including the financial industries.*

Research limitations/implications *– First, according to the chosen measurement parameter no distinct assertion concerning the reasons for execution or non-execution of earnings management can be deduced. Second, the method of earnings management's identification is not dividable and therefore real-, accounting-, legal- and illegal-earnings management cannot*

be identified. Third, the research results are just partially generalizable concerning representativity (e.g. other countries, non-market listed companies) and taken for granted just for similar data-sets

Originality/value *– Although prior studies presume a rise in earnings quality, which indicates a decrease in earnings management by the adoption of principle-based accounting standards (IFRS/US-GAAP) in comparison to national GAAP, there is no difference or superior accounting standard identifiable through the results.*

Keywords: *Earnings Management, Accounting Standards, Scaling Variables, Earnings Distribution*

JEL Classification: *M40, M42, M49*

1. Introduction

Since the end of the 1960s earnings management has been a current issue (Szczesny, 2007, p. 109) and extensive empirical research has been conducted in this field (Burgstahlerand Dichev, 1997; Copeland, 1968; DeAngelo, 1986; Dechow, Richardson, and Tuna, 2003; Dechowand Sloan, 1991; Glaum et al., 2004; Healy and Kaplan, 1985; Jeanjean and Stolowy, 2008; Jones, 1991; Kirchheimer, 1968; Leuz et al., 2003; Stolowy and Breton, 2004; Van Tendeloo and Vanstraelen, 2005). Earnings management got widely known by the accounting scandals concerning Enron, Worldcom and Parmalat. Notably, Austrian and German accounting scandals included the BAWAG, the Hypo Alpe Adria Bank, Comroad and the Bankgesellschaft Berlin.

In the available literature different terms and definitions for earnings management exist and are widely accepted. In order to cope with the empirical investigation within the scope of this paper the term is defined according to (Wagenhofer and Ewert, 2007, p. 237), outlined in the following: Earnings management is the figuration and adoption of financial statements, conducted mostly by executive staff, by means of corporate policy or accomplishing personal targets, within or without the limits of statuary regulations. The adoption of the financial statements comprises accounting as well as real[1] economic activities.

Researchers use various terminology to describe earnings management: in particular accounting policy, accounting manipulation, accounting-"Hocus-Pocus" or "Rumpelstilzchen"-accounting, in German literature referred to by "Bilanzpolitik" or "Gewinnsteuerung".

Besides, research concerning the measurement of earnings management, different objectives of earnings management were detected. Wagenhofer and Ewert (2007, pp. 245–255) distinguish between the following targets of earnings management:

- Maximization of income
- Minimization of income
- Income smoothing over the years
- Achieving targets (e.g. analysts prognoses, previous year's income)

During the last decades, various measurements and different approaches have been developed, e.g. the use of discretional accruals or the distribution of income to measure earnings management. The major method to analyze earnings management is the use of (discretional) accruals.

Our study is aimed to analyze the effect of the applied accounting standard, the industry sector and the country of official quotation on earnings management. Our unique setting allows us to compare the earnings

[1] Real earnings management: as defined in e.g. Ge and Kim (2014)

management behavior under different accounting standards that are applied in one institutional environment[2]. We extent the existing earnings management literature by a comparison of earnings management behavior in two insider economic countries[3]. To round off our analysis we also aim to investigate if differences in the earnings management behavior between various industry sectors exist. In the literature review section the different factors are deduced from former research work and its importance for reducing the research gap concerning the influencing factors on earnings management is shown.

As studies are lacking statistical analyses of the distribution of income to detect earnings management, this paper aims at empirically showing which factors influence earnings management and to what extent. According to former research literature, influencing factors are identified that might bias the companies' earnings management behavior.

In this case, the accounting standard, industry sector as well as the country of official quotation were identified. Subsequently, the influencing factors are tested against the data-set (2,203 company years from Austrian and German listed companies collected from the Bloomberg Database) and the earnings management intervals (Glaum et al., 2004) (245 company years). The research design mainly complies with the research design used in Jeanjean and Stolowy (2008). Non-parametric tests are applied (Mann-Whitney-U test and Kruskal-Wallis-Test), by using a 5% significance level, as a result of the non-existence of normal distribution in the total data-set (Kolmogorow-Smirnow-Test). The findings indicate that there is no distinct difference concerning earnings management by applied accounting standard, which is to be interpreted that no increase in earnings quality is discernable by usage of International Financial Reporting Standards (IFRS) or United States-General Accepted Accounting Principles (US-GAAP) in contrast to Austrian-General Accepting Accounting Principles (AT-GAAP) or German-General Accepted Accounting Principles (GE-GAAP). For the other two influencing factors the results differ according to robustness checks and just indicate that the scaling variables (RoA respectively RoS) are to be questioned.

In the next section a short literature review is presented. In the third section the development of the hypotheses is described. Section 4 outlines the research design and provides several insights. Section 5 presents the performed data analysis as well as the measures and the distribution of the data-set. Subsequently, section 6 states the results of the described data analysis, whereas the discussion of the results follows in section 7. Section 8, 9 and 10complete the paper by providing research limitations, conclusions and potential areas of further research.

2. Literature Review

Earnings management literature has had a long history and has been focusing on examining why, how and in which situations earnings management is pursued and which consequences earnings management behavior is likely to have (McNichols, 2000, p. 314; Szczesny, 2007, p. 102).

According to McNichols (2000, p. 314) and Szczesny (2007, pp. 102–107) research designs on earnings management mostly use discretionary or specific accruals (Beuselinck and Deloof, 2014; Kraft et al., 2014; Trombetta and Imperatore, 2014; Tsipouridou and Spathis, 2014; Ye, 2014; DeAngelo, 1986; Dechowand Sloan, 1991; Dechowet al., 1995; DeFondand Jiambalvo, 1994; Healy and Kaplan, 1985; Jeter andShivakumar, 1999; Jones, 1991; Peasnell et al., 2000; Sok-Hyon Kang and Sivaramakrishnan, 1995; Van Tendelooand Vanstraelen, 2005), whereas a minority of studies use the distributions of

[2] In both countries - Austria/Germany - different accounting standards were allowed throughout the observation period.

[3] We used the companies' country of official quotation as indicator for the country.

earnings (Degeorge et al., 1999; Burgstahlerand Dichev, 1997) or measures of income smoothing(Bouwman, 2014; Cai et al., 2014) to examine earnings management.

In the following the mostly used accrual models are listed:

- DeAngelo's random walk model (DeAngelo, 1986)
- Healy's average method(Healy and Kaplan, 1985)
- Industry model by Dechow and Sloan (Dechow and Sloan, 1991)
- Jones model(Jones, 1991)
- Modified Jones model developed by DeFond and Jiambalvo (DeFond and Jiambalvo, 1994)
- Modified Jones model by Dechow, Sloan, and Sweeney (Dechow et al., 1995)
- Kang and Sivaramakrishnan model (Kang and Sivaramakrishnan, 1995)
- Cashflow Jones model of Jeter and Shivakumar (Jeter and Shivakumar, 1999)
- Margin model developed by Peasnell, Pope, and Young (Peasnell et al., 2000)
- Van Tendeloo and Vanstraelen model (Van Tendeloo and Vanstraelen, 2005)

Burgstahler and Dichev (1997) and Degeorge, Patel, and Zeckhauser (1999) analyze the distribution of income as an earnings management measure and find that the frequency of small losses is unusually low, whereas the frequency of small profits is comparatively high in an interval of ± 1% of the operative income scaled by the equity's market value (Burgstahler and Dichev, 1997). Burgstahler and Dichev (1997) further show that 30% to 44% of companies with small losses conduct earnings management to report profits. Their data-set consists of listed companies retrieved from industrial and research Compust at databases from 1976 to 1994. The advantages and disadvantages of the distribution of the income method have been extensively discussed (Beaver et al., 2007; Daske et al., 2006; Dechow et al., 2003; Durtschi and Easton, 2005; Glaum et al., 2004; Jacob and Jorgensen, 2007; Jeanjean and Stolowy, 2008; Vidal, 2010). Predominantly, the scale variables, the interval width of the earnings management intervals and the distribution of unmanaged earnings are issues in these discussions.

Literature also focuses on the differences in earnings management behavior between countries. The following studies analyze the German and Austrian market: Leuz, Nanda, and Wysocki, (2003) use the model of Myers, Myers, and Skinner (2007) and show that insider economics like Germany and Austria conduct earnings management to a higher extent than outsider economics like the USA or the UK. Glaum, Lichtblau, and Lindemann (2004) as well as Leuz, Nanda, and Wysocki (2003) examine the differences in the income distribution in Germany and the USA and come to the result that in both countries earnings management is conducted and that the aim to reach analysts' prognoses is more important in the USA than in Germany. Respectively, a research gap is observable; a lot of comparison exists regarding insider economics vs. outsider economics whereas little is known about the relationship between insider economics like Austria and Germany.

Glaum, Lichtblau, and Lindemann (2004) as well as Van Tendeloo and Vanstraelen (2005) analyze German companies using the models of Myers, Myers, and Skinner (2007), Jones (1991) and the modified Jones model by DeFond and Jiambalvo (1994). Their studies determine that earnings management behavior differs regarding accounting standards. Coppens and Peek (2005) investigate the income distribution of countries with weak and strong ties between tax law and the commercial code and come to the conclusion that in countries with strong ties between tax law and commercial law more earnings management is conducted.

Coppens and Peek (2005) and Zimmermann and Goncharov (2006) analyze German companies using the models of Pincus and Rajgopal (2002) and the modified Jones model by Jeter and Shivakumar (1999). The results show that companies using US-GAAP conduct less earnings management than others. Burgstahler and Eames(2006) and Zimmermann and Goncharov (2006) use the

model of Myers, Myers, and Skinner (2007) and survey the income distribution of European companies and show that public companies conduct less earnings management than private companies.

According to the formerly mentioned results (Coppens and Peek, 2005; Leuz et al., 2003; Van Tendeloo and Vanstraelen, 2005; Zimmermann and Goncharov, 2006), it can be assumed that a difference in earnings management reasoned by the applied accounting standard exists.

Burgstahler, Hail, and Leuz (2006) as well as Dücker and Wagenhofer (2007) focus on examining Austrian companies. They concluded that no significant increase in earnings quality, which would induce a decrease in earnings management, was observable in Dücker and Wagenhofer's (2007) study on temporary observations between 1996 and 2005.

De Almeida et al .(2006) analyzed the industries' influence on earnings management by building on research statements by Ghemawat (2002) and Palepu and Healy (2008) that profitability of companies is explainable by industry factor and therefore De Almeida et al.(2006) interpreted that industry sectors conduct earnings management to a different extent. Nevertheless, this study, by using the model of Kang and Sivaramakrishnan (1995), could not prove and underpin the importance of the industry factor as explanatory power, however, no study provides argumentation using the distribution of income, thus, research is needed.

Earnings management literature during the last fifty years has exposed various research designs for detection of influencing factors, incentives and consequences of earnings management. Therefore, a variety of widely accepted research possibilities can be deduced and put in consideration to suit the hypotheses and the research design described in the following sections.

3. Development of Hypotheses

In accordance with the influencing factors mentioned above, three hypotheses are developed.

As listed companies in Germany and Austria have been allowed to apply national GAAP, IFRS or US-GAAP for their consolidated statements[4], the influence of various accounting standards on earnings management in one institutional environment can be evaluated (Wagenhofer, 2010, pp. 23–33).

The first hypothesis can be stated as follows:

H1: The extent of earnings management is dependent on the applied accounting standard.

All industries[5] are included in the analyses, as the paper aims at investigating whether earnings management differs by industries. Some studies like De Almeida et al. (2006) analyzed the industries' influence on earnings management using accrual models. According to these studies, this paper builds upon previous research and analyzes whether the extent of earnings management differs by industry.

Therefore, the second hypothesis can be stated as follows:

H2: The extent of earnings management differs by industry.

Last, by reviewing the insider economics more detailed, historically deducible multiple institutional and legal similarities between Austria and Germany exist (Wagenhofer and Ewert, 2007, pp. 23–30)[6]. Despite the historical aspects the early implementation of

[4] Until 2007.

[5] The industries used are in accordance with those used by the Vienna Stock Exchange (http://www.wienerborse.at/help/e/index.htm) and the Deutsche Börse Group.

[6] Cf. Wagenhofer, A./Ewert R. (2007), [Unternehmensrechnung] Corporate Accounting, 23 pp. with reference to Ballwieser (2006), [NutzenHandelsrecht] Usefulness German Commercial Code, in Ballwieser, W./Moxter, A./Nonnenmacher, R. (Hrsg.), [Rechnungslegung] Accounting; Schneider, D. (1997), [Rechnungswesen] Accounting, 11 pp., Schröer, T. (1993), 19th Century; with further reference.

a two-level enforcement procedure in Germany which came into force in July, 1st 2005[7] shifts a step away from the resemblant development of both countries. In contrast to Germany, Austria just implemented the enforcement procedure by law in 2012[8], thus, this development is not relevant for this study anymore. However, as the similar development of both countries seems more significant for this study it is expected that there are no differences in earnings management behavior between Germany and Austria.

Thus, the third hypothesis can be stated as follows:

H3: The extent of earnings management does not differ between Austrian and German companies.

4. Research Design

With regard to the three different earnings management measures used in literature (accruals, income smoothing, distribution of income), discussed in-depth in section 2, due to a lack of statistical analysis of income distribution in the earnings management research (Burgstahler and Dichev, 1997; Degeorge et al., 1999), this study uses the distribution of income as distinct measure for earnings management, as it was already applied in the study of Jeanjean and Stolowy (2008). In concrete terms, this study analyzes the distribution of net income scaled by return on assets (RoA) and return on sales (RoS) of listed German and Austrian companies. Further, the main focus lies on investigating various influencing factors on earnings management. The selected factors are: The applied accounting standard, the country of official quotation and the company's industry sector. These earnings management measures were chosen, due to the fact that they are suitable to measure the frequency of earnings management in reality. That clearly distinguishes this survey from other papers.

Primarily, the distribution of RoA is used as earnings management scale variable, in particular the ±1% interval was analyzed. For clarification Equation 1 is inserted.

$$\mathrm{RoA}_{\mathrm{EBIT}} = \frac{EBIT_t}{totalAssets_{t-1}} * 100 \quad (1)$$

Due to the fact that the amount of assets within various companies differs widely, robustness checks were executed by usage of the scale unit RoS, focusing on the same time lapse from 1998 to 2010. Additionally, for robustness' purposes all analyses are carried out in an interval width of ±2%.

To address the major difference between RoS and RoA Equation 2 is inserted below:

$$\mathrm{RoS}_{\mathrm{EBIT}} = \frac{EBIT_t}{Sales_{t-1}} * 100 \quad (2)$$

Moreover, Odds Ratios (OREM) are used to analyze the quantity of RoA in the earnings management intervals[9]. These ratios are the same as used by Glaum, Lichtblau, and Lindemann (2004).

Equation 3 illustrates the ratios in detail, in which n_p stands for the quantity of positive observations (≥ 0), n_n is the number of negative observations and $n_{pn}$the total quantity of observations.

$$OREM = \frac{n_p - n_n}{n_{pl}} \quad (3)$$

As this paper also reviews the industry sector the companies are listed according to the categories of industry used by the Vienna Stock Exchange which correspond to those of the Frankfurt Stock Exchange[10]. These

[7] §§ 342b to 342e HGB-Germany: http://dejure.org/gesetze/HGB/342b.html

[8] Bundesgesetzblatt I 21/2013, Republik Österreich 11.01.2013: http://www.ris.bka.gv.at/Dokumente/BgblAuth/BGBLA_2013_I_21/BGBLA_2013_I_21.pdf

[9] The earnings management interval is ±1% resp. ±2% or RoA resp. RoS.

[10] Vienna Stock Exchange: http://www.wienerborse.at/help/d/Branchen.htm; Frankfurt Stock Exchange: http://dax-indices.com/DE/MediaLibrary/Document/Equity_L_6_16_d.pdf.

categories are mainly in accordance with SIC respectively NACE classification of industries.

Although previous research (Burgstahler and Dichev, 1997; Jeanjean and Stolowy, 2008) has shown distorted effects by comprising the financial industries' sector, the related companies are included in the analyses. The financial industries contain a wide range of up-to-now not researched areas concerning the specific regulations or the development of earnings management since the start of the financial crisis in 2008. After an initial analysis including the financial industries, research is also conducted to review if exclusion is necessary. However, this exclusion provides no significantly different results; therefore the financial industry remains in the data-set.

Focusing on the research design, it is in accordance with Jeanjean and Stolowy (2008), but covers additional influencing variables like country and industry sector. Instead of a chi-square test a Kruskal-Wallis-H test and a Mann-Whitney-U test are used to analyze the earnings distribution. The decision to use the latter mentioned is based on the asymmetrical distribution and the multi dimensionality of the data. This fact can be clearly grasped by reviewing Figure 1 and Figure 2.

By comparison to the widely used accruals as variables, this method does not need any estimates due to the fact that the data is based on real company data. Subsequently, the frequency of earnings management can be examined in reality. On the contrary, the missing opportunity to question reasons for earnings management limits this way of analyzing.

To retrieve the necessary data, the Thomson database was reviewed targeting Austrian and German companies which issue common shares and existed before December 2000. On behalf of this resulting 1250 companies the list was extended using companies listed in the DAX (Deutscher Aktien index), MDAX (Mid-Cap-DAX) as well as all companies which issued common shares at the Vienna stock exchange and are listed according to the rules of the regulated market, target date July 1st 2011. The decision for these indices is chosen to include the biggest capital market oriented companies and due to the availability of data. The data itself was collected from the Bloomberg database, including the timeframe IFRS and US-GAAP was applicable for financial statements (Wagenhofer, 2010, pp. 113–115) - in total thirteen periods. In total data from 230 companies was collected. Next, using the scaling variable RoA (Equation 1) the year t-1 is needed, subsequently, 57 companies did not fulfill the requirement. Therefore, the resulting data-set consists of 173 listed companies including in total 2,203 company years.

5. Data Analyses

In accordance with the hypotheses and the research design mentioned in section 3 and 4, in the following used variables and statistical tests are explained:

Table 1: Description of Variables and Statistical Tests

Name	Description	Manifestation	Statistical Methods
EBIT/Total Assets	EBIT/Total Assets	RoA	Continuous Variable
EBIT/Sales	EBIT/Sales	RoS	Continuous Variable
ACC_STD	Differences in income distribution by accounting standard	1 = IFRS 2 = US-GAAP 3 = GE-GAAP 4 = AT-GAAP	Kruskal-Wallis Test
Country	Differences in income distribution by country	1 = Germany 2 = Austria	Mann-Whitney-U Test Odds Ratios
Industry	Differences in income distribution by industry	1 = individual goods & services 2 = consumer products 3 = technology & telecom 4 = consumer services 5 = financial industries 6 = utility sector 7 = health care 8 = basic industries	Kruskal-Wallis Test

5.1 Measure of Asymmetry

As a measure of asymmetry odds ratios are used. The odds ratios show that the frequency of small profits (SP) is much higher than those of small losses (SL). This indicates, according to the definition, it is assumable that the companies conduct earnings management to report profits (Glaum, Lichtblau, and Lindemann, 2004).

These, in total 245 company years, as visible in Table 2 (IW[11] 1%, Total (AT+GE)) are the resulting earnings management interval. The interval width 2% is listed providing evidence for the robustness checks and the two right sided columns display the quantity of 1%, respectively 2%, IW of RoA company years of total quantity company years (positive (profit), negative (losses)).

Table 2: Odd Ratios

	Annual Result	Quantity Companies	RoA	IW 1%	IW 2%	Qty. of 1% in % of Total Qty.	Qty. of 2% in % of Total Qty.
GE	Positive	1420	SP	96	173	6,76%	12,18%
	Negative	126	SL	36	60	28,57%	47,62%
AT	Positive	603	SP	94	144	15,59%	23,88%
	Negative	54	SL	19	23	35,19%	42,59%
Total (AT+ GE)	Positive	2203	SP	190	317	9,39%	15,67%
	Negative	180	SL	55	83	30,56%	46,11%

IW = interval width, SP = small profits, SL = small losses, GE = Germany, AT = Austria

[11] IW is interval width, means e.g. 1% IW RoA equals ±1% RoA per year as earnings management interval

Table 2 further displays that much more Austrian than German companies report small profits: About 16% respectively 24% (Table 2 – highlighted in red) of the profits are categorized as small (1% respectively 2% of RoA), whereas only 7% respectively 12% (Table 2 – highlighted in red/dark) of the German profits can be categorized as small. This can be interpreted that concerning descriptive overview first indices are visible that contrary to H3, a difference between German and Austrian companies is exhibited. These findings are in accordance with those of the results of the 1% interval width RoS analyses.

5.2 Distribution of the Total Data-Set

The analyses of the total data-set of 2,203 company years show that there is a highly significant difference between all manifestations of variables.

Figure 1: Distribution of RoA

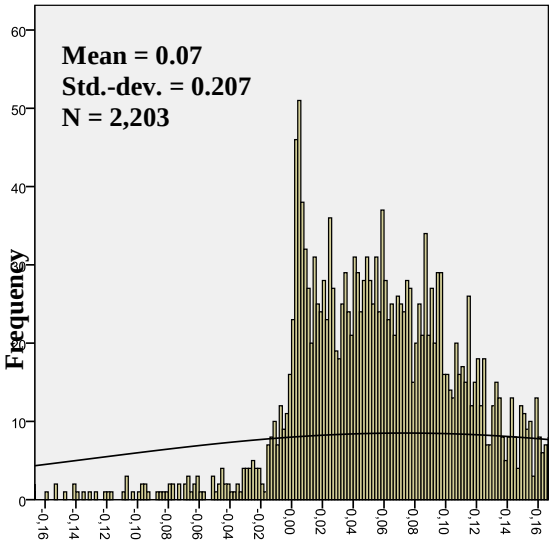
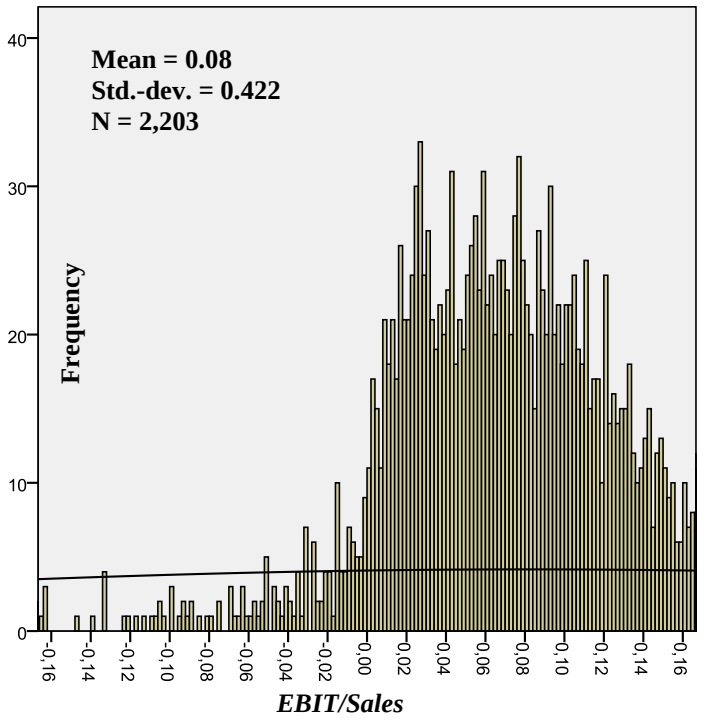


Figure 1 reveals the distribution of the RoA executed on the whole data-set. Even from the total results' distribution it can be seen that there are much more small profits than losses. The figure further displays that the data is not normally distributed, so the use of nonparametric statistics is necessary (Bühl, 2009, pp. 348–360).

Figure 2 presents the distribution by applying the RoS. This variable is also presented to provide further evidence by lowering the influence on assets. Like in Figure 1, it can be seen that there are much more small profits than losses and also the distribution of small profits according to the intervals is clearly reflected.

Figure 2: Distribution of RoS



6. Results

This section provides the results of this paper, in particular using nonparametric statistics[12] of the earnings management interval related to each hypothesis. Executing the non-parametric tests, described afterwards, on the total data-set shows significant differences between the various industries, the country of official quotation as well as the applied accounting standards.

6.1 Accounting Standard

First, the variable accounting standard is reviewed by using the four most influential accounting standards for the chosen geographic area: The International Financial Reporting Standards (IFRS), the United States General Accepted Accounting Principles (US-GAAP), the Austrian General Accepted Accounting Principles (AT-GAAP) and the German General Accepted Accounting Principles (GE-GAAP). These variables are examined by usage of the RoA by applying the earnings management interval ± 1%. The results are shown in Figure 3.

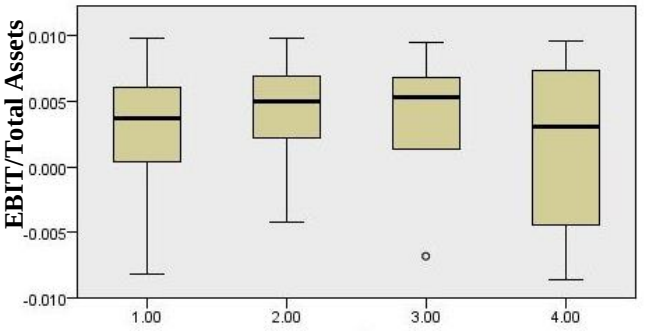
For the variable accounting standard a Kruskal-Wallis-H test (nonparametric test) for independent samples is used. The results provide evidence that there are no significant differences (p-value: 0.358) between the distribution of the categorical variable (accounting standard). The findings indicate that there is no difference in the earnings management behaviour between companies applying the four different accounting standards and lead – in accordance with the robustness tests (2% IW RoA) – to the rejection of H1. All robustness tests for the accounting standards show the same results as in Figure 3. Thus, no influence of the accounting standard on the earnings management

[12] The significance level of all analyses is 0,05. The tests were performed with SPSS.

behavior can be measured. These results indicate that on contrary to the former litrature all accounting standards provide the same earnings quality. Further, these results show that in contrast to the total data-set within the earnings management interval no difference in earnings' distribution is detected.

Figure 3: Kruskal-Wallis Test (Accounting Standard)

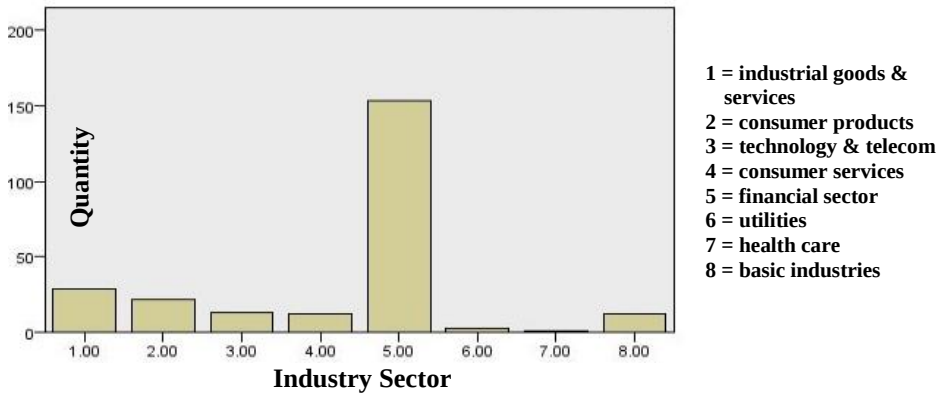
Quantity	245
H-Value	3.224
Degrees of Freedom	3
Asymptotic Significance	0.358



6.2 Industry

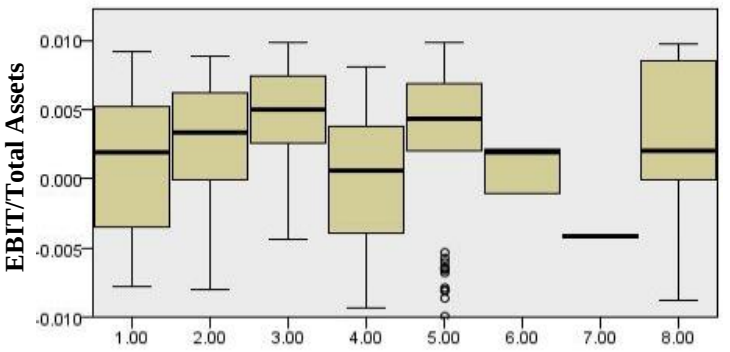
To get a vast overview of the different industries included in the data-set, Figure 4 is inserted to depict which industry sectorsare represented in the sample.

Figure 4: Quantity of Companies per Sector



As clearly observable, the financial sector is the most decisive within the data-set. On contrary to this research project many studies excluded the financial industries from their analysis (Burgstahler and Dichev, 1997; Glaum et al. 2004; Jeanjean and Stolowy, 2008). However, as there were no significant differences detected while excluding the financial sector it remains in the data-set. Therefore the results are displayed in Figure 4.

Figure 5: Kruskal-Wallis Test (Industry)



1 = industrial goods & services
2 = consumer products
3 = technology & telecom
4 = consumer services
5 = financial sector
6 = utilities
7 = health care
8 = basic industries

Quantity	245
H-Value	15.539
Degrees of Freedom	7
Asymptotic Significance	0.03

Next, a Kruskal-Wallis-H Test is executed against the data-set providing the results displayed in Figure 5. The figure shows that the medians of the different industry sectors discern. Thus, it can be interpreted that the distribution differs by industry. Subsequently, as distribution differs by industry, the results indicate clearly that earnings management differs by industry as well. Within the predefined significance level (p-value: 0.03) H2 can be supported. The test is replicated; using the 2% IW RoA (robustness purpose) and the results clearly indicate supporting H2.

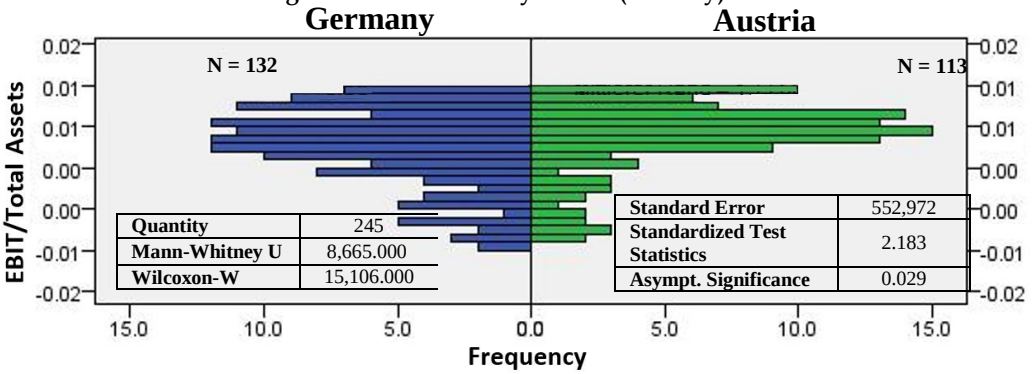
Information about the categorical variables shows that a majority of the small profits and losses come from financial industries. Therefore, this analysis is replicated with EBIT scaled by Sales (RoS) to reduce the influence of the financial industries' sector. Surprisingly, by executing the statistical tests against the data-set, the results are quite different from those by the usage of EBIT scaled by assets and show that there are no meaningful differences between the different industries anymore (± 1% interval width p-value is 0.242, ± 2% interval width p-value is 0.29).

6.3 Country

As only two independent samples (Austrian vs. German companies) are examined, a Mann-Whitney-U test is performed. Contrary to the predictions made within the development of the third hypothesis, that there is no difference in earnings management between Austrian and German companies, the earnings management behavior differs by country. Therefore, H3 is to be rejected according to the 1% IW (p-value: 0.029). Thus, it could be interpreted that the earlier enforcement implementation of Germany could be a reason for this result. However, by executing the robustness check 2% IW (p-value: 0.125), the results with more than twelve percent, in contrast to 1% IW, support H3.

Although about twice as many German observations are included in the total data-set, nearly the same number of observations is chosen for the earnings management intervals of Austrian and German companies (113 Austria vs. 132 Germany). This limitation of German companies should provide a higher comparability. The results confirm the odds ratios presented in Table 2.

Figure 6: Mann-Whitney-U Test (Country)



7. Discussion of Results

The analyses show that the distribution in the earnings management intervals differs from the distribution of the total population. Further, it is clearly visible through the odds ratios and the analyses of the total data-set that it is assumable that earnings management is conducted by the reviewed companies to report (at least small) profits.

The analyses of the distribution of earnings indicate that results vary when being executed on the total data-set by the applied accounting standard. However, it is similarly distributed in the set earnings management intervals. According to these results, which show that the distribution does not differ by accounting standard, it is to be stated that distribution does not differ. All executed statistical tests and robustness checks came to the same results and underpin the findings that H1 has to be rejected. Although prior studies presume a rise in earnings quality, which indicates a decrease in earnings management by the adoption of principle-based accounting standards (IFRS/US-GAAP) in comparison to national GAAP (rule-based accounting standards) there is no difference or superior value observable in the results.

On the contrary, distribution of earnings is likely to differ by industry and country. For the variable 'industry' the results are not concise. If RoA are used as scaling variable, the distribution differs by industry clearly and therefore, H2 can be supported in the 1%interval width as well as in the 2% interval width. This result is mostly driven by the financial industries and the public services sector. After the execution of the first robustness checks, applying the variable RoS to lower the implications of the financial sector, the results change surprisingly and indicate no significance anymore and H2 has to be rejected.

Focusing on the results of the variable 'country' (Austria vs. Germany), it is likely that earnings management behavior differs by country. This can be presumed as the distribution discern significantly. According to the 1% IW RoA H3 has to be rejected, whereas the 2% IW RoA cannot confirm the results and indicates support for H3. Therefore, no explicit proposition can be postulated.

In general, all analyses show that the distributions of the results in the earnings management intervals are more similar than those of the total population. The robustness tests partially support the results. Table 3 provides a quick overview of all collected results.

The reviewed time frame indicates the following results: Concerning the analyzed time frame, the medians differ by year, but are not significantly different (significance level: 0.05). Information about the categorical variable further shows that in the years 2001 and 2002 as well as 2008 and 2009 25 to 30

Table 3: Main Results.

Variable	Interval width		Result
	1%	2%	
ACC_STD [RoA]	The distribution does not differ by accounting standard.	The distribution does not differ by accounting standard.	According to these results, H1 is rejected.
Industry [RoA]	The distribution differs by industries.	The distribution differs by industries.	According to these results, H2 is supported.
Industry [RoS]	The distribution does not differ by industries.	The distribution does not differ by industries.	According to these results, H2is rejected.
Country [RoA]	The distribution differs by country.	The distribution does not differ by country.	The tests do not indicate a definite result, as according to the results in the 1% interval H3is rejected and in the 2% interval H3is supported.

percent more observations are contained in the earnings management intervals than in other years. This might have been caused by the scandal of Enron in 2001 and the start of the economic crisis in 2008. No change in earnings management behavior which can be measured is indicated within the data during the whole time.

8. Limitations

Due to the research setting the limitations are mentioned as follows:

First, according to the chosen measurement model no distinct assertion concerning the reasons for conducting earnings management can be deduced. Further, not yet discovered parameters can have meaningful influences on the data as it is or may be of importance for further explainability of non-explainable results. Aspects which might influence earnings management could be, e.g. the regulative and institutional environment of a company, the elected auditor or the management's personal targets.

Second, the method of earnings management's identification is not dividable and therefore real-, accounting-, legal- and illegal-earnings management cannot be split while researching and accordingly no conclusion concerning result implications outside the norm can be drawn.

Third, the research results are just partially generalizable concerning representativity (e.g. other countries, non-market listed companies) and taken for granted just for similar data-sets.

9. Conclusion

Generally, the results differ from the authors initial expectations. It is important to point out that our study provides insights concerning the influencing factors on earnings management. For our analysis we specifically chose the applied accounting standard, the industry sector and the country of official quotation to show the effect and relevance of these vital factors in practice.

One of the biggest challenges for researching earnings management is the choice of the model to measure earnings

management. Although accrual models are decisively used in literature our aim was to measure earnings management in reality without the need of estimations. By using Burgstahler and Dichev's model (1997) we provide evidence that earnings management behavior leads to unified results within the earnings management intervals (Glaum et al. 2004). In the following the main results are subsumed:

First, the applied accounting standard does not lead to significant differences in earnings quality, thus although former mentioned literature clearly elaborates on the superior value of principle-based accounting standards compared to rule based accounting standards, no superior value of any accounting standard can be identified.

Second, we find that the earnings management behavior differs by industry using the scaling variable RoA. When applying RoS as scaling variable the distribution does not differ anymore. Thus we conclude, that the scaling variable is to be questioned.

Third, we analyze if differences between earnings management behavior between insider economics (Austria/Germany) exist. Our results are mixed but indicate that differences in the earnings management behavior of insider economics could exist.

Our study contributes to the literature dealing with the influencing factors on earnings management. Within the following section we elaborate on further research opportunities.

10. Further Research

Further research opportunities are seen in analyzing more factors and their effects on earnings management as e.g. corporate governance regulations, auditors, audit opinion, size of the audit committee and company size. In particular, the relation between earnings management and auditors, audit opinion and size of the audit committee could be added to possible analyses.

The most vital question concerning research design is the choice of the scaling variable**.** Therefore, the scaling factor or benchmark, as there could be more adequate scaling factors or benchmarks, need to be reviewed. Specifically, for the financial industries' sector a better benchmark should be found, as this sector is very important and affects other sectors. Finding adequate benchmarks for various groups of companies could improve empirical earnings management research by far.

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Monetary and Economic Union in West Africa: An analysis on trade

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Abstract

Purpose*-This paper makes an analysis of trade in the WAMZ as well as the WAMZ's trade with other countries in West Africa, Europe and Asia based on the Optimal Currency Area (OCA) theory. This theory first proposed by Mundell (1961) as a basis for evaluating whether or not an area constitutes an optimal currency area is exploited in assessing whether or not the WAMZ constitutes an OCA.*

Methodology/Design/Approach*-Data utilized for the trend analysis were sourced from the World Bank's World Development indicator (WDI) and annual reports of the central bank of each WAMZ member country considered. The data spans from 2002 to 2013 and it covers five (5) WAMZ member countries. Similarly, data for the trade analysis was sourced from the World Bank's World Integrated Trade Solution (WITS) and it for the period 2000 to 2012.*

Findings*-While, I found strong evidence against trade symmetry in the WAMZ, there are some evidence of marginal convergence in inflation, real GDP growth and monetary policy rate. Moreover, while I found reasons to believe that the convergence is partially as a result of the convergence criteria, trade in WAMZ remains significantly low and more so for WAMZ's trade in West Africa.*

Originality/value*-This paper concludes that on the basis of trade, WAMZ does not qualify as an OCA. This means that more time is needed for convergence of intra WAMZ trade and in this regard, this paper supports the WAMI's declaration of achieving integration in the year 2020.*

Keywords: Integration, monetary union, convergence criteria, WAMZ

JEL Classification: F15, F33, G15

1. Introduction

The consideration for a monetary union in West Africa has remained a central focus and a major point of deliberation for most institutions in the African continent. A regional central monetary institution is envisaged to harmonize economic and monetary policies, to liberalize trade in the region, to supervise members' balance of payment, to provide members with better access to the resource of the primary international institutions and also to offer the community a better instrument at the world's collective bargaining table. "A special function of such an institution would be to offer advice and guidance to the whole region on monetary matters on the basis of the study of the special conditions and needs of the community" Ofori-Abebrese(2006).

The West African Monetary Institute (WAMI/Institute) was set up in Accra, Ghana, on January 2001 as a specialized agency instituted by the Economic Community of West African States (ECOWAS). The Institute is to undertake technical preparations for the establishment of a single West African Central Bank and the launching of a common currency called **"Eco"** in the West African Monetary Zone (WAMZ/Zone). Thus, aside the monitoring of quantitative convergence criteria, the mandate of the Institute has been extended over the years to include taking measures that will facilitate trade integration, financial sector integration, payments system development and statistical harmonization. The monetary zone is composed of six West African countries, namely Ghana, Gambia, Guinea, Liberia, Nigeria and Sierra Leone. The mandate for the proposed integration was established when these countries except Liberia[1] signed the 'Accra Declaration' which defined the objectives of the Zone as well as an action plan and institutional arrangements to ensure the speedy implementation of the proposed integration. It is envisaged that this Zone will later be merged with the West African Economic and Monetary Union (WAEMU)[2] to form a single monetary zone in West Africa. These are decomposed strategic objectives of the Economic Community of West African State (ECOWAS), a mother body with the comprehensive objective of integrating the economies of all it fifteen (15)[3] member states in West Africa. Let me hasten to add that the proposed integration is inspired by the success of the Euro as a common currency of the European Monetary Union. Despite efforts by the West African Monetary Institute (WAMI/Institute) to fast-track the integration, as initial date for the launch of the common currency was on January 1, 2003, member States' inability to comply with all the four (4) primary criteria[4] simultaneously and on sustainable basis have delayed convergence. Thus, the zone has witnessed further three consecutive postponements of scheduled integration on July, 1 2005, December 1, 2009 and January 1, 2015 from the initial date of January 2003. Following the failure of the scheduled integration in January 1, 2015, concerns were that more time is needed to allow for convergence of macroeconomic indicators and this development led to the postponement of integration to 2020 during the convergence assessment meeting held in Abuja, Nigeria on July 2014. The Economic Community of West African State (ECOWAS) started the Eco initiative in April 2000 but later handed it over to the West African Monetary Institute (WANI/Institute) to achieve integration in the West African

[1] Liberia declined to sign and participate in the proposed integration but re-joined in 2010.

[2] WAEMU, which is part of the CFA franc zone, has eight members, namely, Benin, Burkina Faso, Cote d'Ivoire, Guinea-Bissau, Mali, Niger, Senegal, and Togo.

[3] Membership includes Cape Verde who is not yet a member of either WAEMU or WAMZ.

[4] A single-digit inflation rate at the end of each year; A fiscal deficit of not more than 4% of the GDP;A central bank deficit financing of not more than 10% of the previous year's tax revenues; Gross external reserves that can give import cover for a minimum of three months.

Monetary Zone (WAMZ). The feasibility of a wider monetary unification in ECOWAS poses several economic and institutional threats as discussed in Debrun, Masson & Pattillo (2005). Regardless of the possible positive impacts of the proposed integration and the success of the Eco likened to the Euro, it must be emphasized that the "European monetary integration was a multilateral effort culminating in the creation of a supranational currency. Following the Euro ideology, we can only see in the future how the Eco will enhance the single market ideology harbored in the ECOWAS since 1975. The rest of this paper is given as follows; a theoretical review in section 2 and an analysis of convergence in section 3. Section 4 discusses trade in WAMZ as well as WAMZ's trade with the rest of the world and finally, conclusion remarks given in section 5.

2. Literature Review

The introduction of a common currency among countries means the giving up of sovereign national currencies, which define the country's political power and identity, for a currency which now defines these countries as a single economic block. The decision of not only giving up a country's sovereign currency but also waiving the powers of its central bank is a critical one to make. The Optimal Currency Area as proposed by Mundell (1961), suggests two possible paths (flexible and fixed currency area) depending on which authority will be responsible for ensuring external rebalancing as a result of current account imbalances. In his seminal work, Mundell (1961) again established that the fault lies not with the type of currency area but with the domain of the currency area. However, he concluded that factor mobility across national boundaries permits a fixed currency area as opposed to a flexible currency area. Thus, a country's decision to join a monetary union should be based on not just the situations that apply ex-ante but also the conditions that apply ex-post, thus weighting the economic effects under the currency union Alesina, Barro and Tenreyri (2003). The benefits associated with either of the system of a currency area, as proposed by Mundell, should be evaluated carefully, as gains in trade emanating from the aftermath of the intended integration may not accrue to countries forming the union since trade may be diverted to higher cost-supplier within the integrating area Viner (1950) thus, trade diversion losses may now outweigh trade creating gains Whalley (1998). However, it should be noted that this is only possible if the proposed new currency devalue against the formal currencies of the respective member countries of the new economic union. Debrun, Masson and Pattillo (2005), argues that government in most African countries tend to channel public resources towards socially useless activities and they are inefficient at raising sufficient tax revenue-thus violating fiscal discipline. Given this preamble, giving up monetary policy through a currency union may not be counted as a significant loss of policy control. Moreover, Ofori-Abebrese (2006), concluded that even though policy cooperation in the West Africa is a positive sum game, member states should first streamline their macroeconomics policy such as inflation, deficits and public debt ratio, gross reserve and exchange rate policies etc. toward the achievement of the convergence criteria set by the West Africa Monetary Institute (WAMI). Also relevant in the discussion of an OCA is factor mobility. However, scanty data on this variable makes it difficult for its extensive discussion. Chuku (2012) did not conclude that labour mobility was a hurdle to the currency union in West Africa, but he, however, stated that labour mobility was a challenge in the sub region. His concern was that there were not enough credible data to access this effect empirically. Perhaps, the supremacy of trade and it extensive discussion in most academic papers[5] on

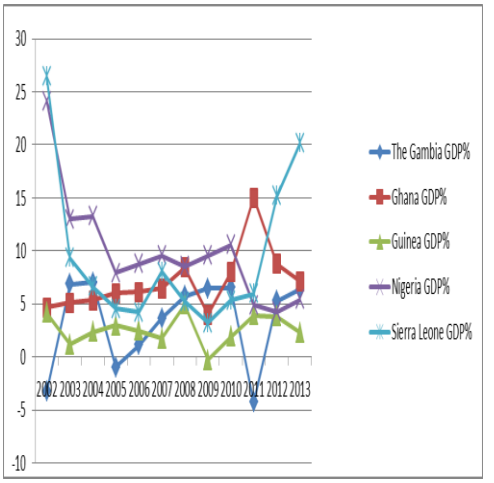
[5] Rose (2000), Chuku (2012), Ofori-Abebrese (2006), Debrun, Masson and Pattillo (2005), Alesina, Barro and Tenreyri (2003), Beetsma and Giuliodori (2010)

issues of currency union could be based on the work of Rose (2000) who found that currency union between two countries tends to triple trade. Furthermore, the findings in Frankel and Ross (2002) and Qureshi and Tsangarides (2009) all throw their weight in favour of trade. More specifically, Oureshi and Tsangarides (2009) found that the effect of a currency union on Africa's bilateral trade is almost double than that for an average country in the world. Thus, suggesting that a currency union in Africa has a relatively greater positive spillover effect on intra-trade among members of the union. Moreover, more evidence of monetary union effect on trade, especially for small countries are given in Glick and Ross (2001)[6], Persson (2001)[7] and Tenreyro (2001) where the sample are basically country pairs of common currencies that are either currency unions formed by very small or poor countries or very small or poor countries adopting the currency of larger countries.

3. Analysis of convergence

Given the diverse economic objectives of member states, the West Africa Monetary Institute (WAMI) has established standards which aim at achieving convergence of the economies of member states. These standards[8] are a set of macroeconomics indicators called the convergence criteria. This section analyses convergence of real growth using the real GDP, convergence of prices using inflation (CPI, average consumer prices %), and financial market integration using the monetary policy rate. Data for these analyses are from the World Bank's World development Indicator (WDI) and annual reports of each member states' central bank.

Figure 1 Trend in Real GDP growth level for some WAMZ member countries



Source: Self drawn

Differences in economic shocks, terms of trade, natural endowment, asymmetric economic and international policies, and variations in the political objectives of member states have accounted for the differences in the stages of real growth in the WAMZ. This has impacted convergence and has made the work of the WAMI technically difficult. For example, GDP growth of the WAMZ was projected to decline from 8.7% to 6.9% in 2011 and 2012 respectively. Also, the convergence scale in the WAMZ area was projected to go down from a score of 79.2% to 62.5% in 2011 and 2012 respectively. Thus, in 2012 none of the member countries met all the four primary criteria. Moreover, average inflation rate also increased from 11.6% in 2011 to 12.6% in 2012 in the WAMZ. However, Nigeria achieved in 2014 all the four primary criteria in the recent convergence assessment[9] done in Abuja, Nigeria. In addition to the diverse economic challenges facing member states, the recent Ebola epidemic ravaging West Africa is making things much more complicated. Thus, it had already claimed over 5,000 lives

etc only measure the effect of trade without considering labour.

[6] They used a panel data from 1948 through 1997. Thus, they found that adopting a currency union nearly double trade among member countries.

[7] His work was a major critic of Ross (2000). His methodology solved the problem of non-random selection and found that the effect of currency union on trade weight about 65 percent

[8] See note 5 for the primary convergence criteria

[9] See Table 1a in appendix

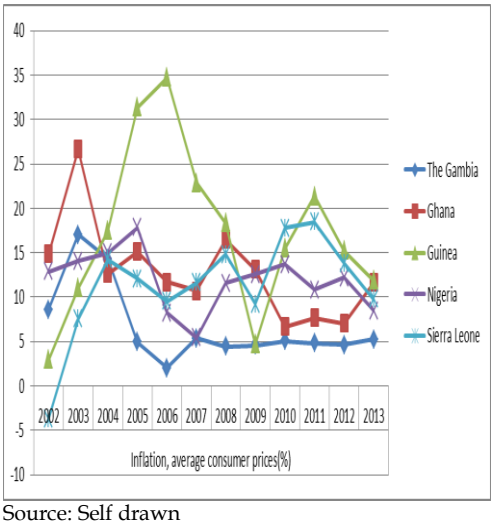
by July 2014 in the affected countries[10]and left over 7000 infected people sitting on tenterhooks as the world is yet to develop lasting vaccines for its cure. According to the September 2014 World bank economic impact report on the Ebola epidemic, forgone output is likely to account for a short run loss of 2.1 percentage points in GDP in Guinea, 3.4 percentage points in GDP in Liberia and 3.3 percentage point in GDP in Sierra Leone. Also in fiscal terms, short term losses are estimated to be 1.8% of GDP for Sierra Leone, 4.7% of GDP for Liberia and 1.8% of GDP for Guinea.

Starting from different GDP growth levels with Sierra Leone recording the highest of about 26.5% followed by Nigeria with a growth level of 24% and The Gambia recording the least of -3.2% in 2002, GDP growth levels have converged among member states between 0% to 10% over the years starting from 2003 to 2013 with significant shocks in 2005 and 2011, where the GDP growth level fell to -0.92% and -4.29% respectively in The Gambia. Also in 2009, was a marked fall in GDP growth level in Guinea below the 0% benchmark to -0.28%. However, Ghana experienced a positive shock in 2011 pushing it GDP growth to a record high of 15%. It is important to note that the factors which caused these shocks were not conventional factors that usually influence the dynamics of the GDP growth. For example, the sharp increase in Ghana's GDP growth level in 2011 was as a result of the inclusion of the oil[11] revenue in its GDP. Similar to the growth of Ghana, was that of Sierra Leone in 2012 and 2013 which stood at 15.2% and 20.1% respectively. However, it is not very clear whether this evidence of convergence in GDP growth can be attributed to member states commitment to signaling their readiness for a currency union or as a matter of generic coincidence. Moreover, it is also not clear whether to attribute the evidence of the convergence in the GDP of member states to the workings of the WAMI and its commitment to work achieve the much needed monetary integration of the member states of the WAMZ. Intuitively, there are reasons to believe that this evidence of convergence might have some connection with the workings of the convergence criteria as member states are tasked to achieve convergence leading to integration.

3.1 Analysis of Price Convergence

As done in the analysis of real GDP growth and using 0% to 10% as the benchmark inflation rate for integration, The Gambia and Guinea started off in 2002 within the benchmark inflation interval attaining 8.6% and 2.9% respectively. Exceptions were the inflation levels in both Ghana and Nigeria, which were at higher levels above the benchmark levels set. Also critical was the deflation in Sierra Leone of 3.6%.

Figure 2 Trend in inflation for some WAMZ member countries



Source: Self drawn

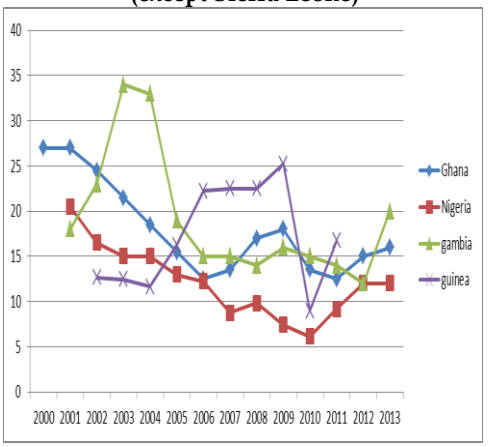
[10] The three most-affected countries are convectional member states of WAMZ except for Liberia who only confirmed her membership in 2010. Also, two of the leading members of the WAMZ are also in the list of highly susceptible Ebola country-thus Ghana and Nigeria.

[11] The discovery of the oil in commercial quantity was announced in 2007 by Kosmos Energy, Anadarko Petroleum and Tullow Ghana Limited a consortium engaged in the oil exploration west of Cape Three Point near Axim.

It is quite evident that achieving the benchmark inflation level has been a critical challenge for member states. Except for The Gambia, who has been quite consistent in achieving the inflation target after 2003, other member states achieved relatively higher but similar inflation levels that were above the benchmark target of single inflation digit. While inflation levels in The Gambia were more robust and relatively stable starting in 2007, inflation in other member states remained elastic and relatively high. Ghana's inflation showed a marked decrease starting in 2008 to 2010 and was roughly stable in 2011 and 2012 at 7.6% and 7.0% respectively. This decrease was critical, in that it was within the benchmark level, meaning that from 2010 to 2012 only Ghana and The Gambia achieved the single digit inflation target after only The Gambia achieve this target in 2006, The Gambia and Nigeria in 2007 and The Gambia, Guinea and Sierra Leone in 2009. Despite efforts by member states to achieving the primary[12] convergence criteria, a fiscal deficit of less than 4% of GDP and single digit inflation targets have been the toughest to achieve by member states. However, Gambia has been much disciplined in achieving the latter since 2004.

3.2 Analysis of financial integration

Figure 3. Trend in monetary policy rate (except Sierra Leone)



Source: Self drawn

According to Bordo (2004), it took the US about 150 years to achieve monetary union, an objective the EU achieved less than one-tenth of the time of the US. It is not very clear how long it will take the WAMI to integrate the financial markets of its member states. However, some structural engagements to integrate the financial sectors in the zone are given as follows; the College of Supervision of the WAMZ (CSWAMZ) was tasked to review the computation, mode of classification, and reporting of the Non-performing Loans (NPLs) in member states with a view to proposing a common treatment among member states (a marginal response to statistical harmonization in the financial sector). Furthermore, there were collaborations in 2014 to enhance the payment system development project and some member states including Nigeria and Gambia have already started with its implementation.

In this analysis, findings are quite similar to that of real GDP growth and inflation discussed above. However, I found evidence of a marginal convergence of interest rates between the range of 10% and 20%. Note that Sierra Leone is not represented due to lack of data. Generally, interest rates in West African countries are considerably high and volatile and the intuition could be principally the risk factor in the financial market and the fact that it is the mostly used monetary variable to adjust for inflation, GDP growth and other external shocks. For example, in Ghana, the monetary committee of the central bank usually adjusts interest rate as a response to volatility in exchange rates and inflation coming from hikes in factor cost and imported goods. While interest rates in Ghana fell sharply in 2001 to 2006, it fell relatively slowly in Nigeria in the said period. Also in the same period, interest rate in Gambia rose to its peak in 2003 and thereafter fell sharply in 2004-2005. From 2006-2013, interest rate in Ghana and Gambia fluctuated between 10%-20%, while in Nigeria, interest rate fell below 10% from 2006-2011 but re-entered the 10%-20%

[12] See appendix Table 1b&c

domain thereafter. In Guinea, interest rate stood at 16.25% in 2005 but rose above the 10%-20% benchmark in 2006 and stood considerably stationary above the said benchmark from 2007-2008 reaching its peak in 2009. In 2009, the interest rate in Guinea fell sharply from its peak to its lowest of less than 10% in 2010. Moreover, while interest rate in Guinea increased again and sharply from 2010-2011 it remained within the range of 10%-20% afterwards. In summary, even though interest rates in member countries have remained relatively high, it is quite typical of countries that usually have high risk of borrowing and possibly lack of competition between national and zonal financial institutions. Moreover, it is not very clear as to whether the evidence of the marginal convergence should be attributed to policy formulation aimed at integrating the financial sector in each member states. However, such co-movements are usually not coincidental and some commendation should be given to all stakeholder involved in the bid to integrate the financial sector which of course remains a technically challenge for the WAMI.

4. Analysis of WAMZ trade

4.1 The Optimal Currency Area (OCA): Trade Symmetry in the WAMZ

After the theory of the Optimal Currency Area (OCA) pioneered by Mundel in 1961, other theories have emerged over time to enhance the assessment of what actually constitute an optimal currency area. Furthermore, research on this subject became more profound given the finding in Ross (2000) and other academic papers that concluded on a high significant effect of currency union on trade. This section makes an extensive analysis of intra-WAMZ trade, WAMZ's trade in West Africa and finally, WAMZ's trade with the rest of the world. Data for this analysis was sourced from the World Bank's World Integrated Trade Solution (WITS).

4.1.1 WAMZ trade with some developing and developed countries - the case of Gambia

Table 2a&b (see appendix) describe the trend in Gambia's export and import trade for the period 2000-2012. In this analysis, I will consider Gambia's trade with some West African countries (as defined in UNCTAD handbook 2013), its intra-WAMZ trade and finally trade with its major trading partners in Europe, America and Asia. The choice of the year 2000 as the start date of most figures in this section is motivated by the fact that most critical activities in the WAMZ were initiated from the year 2000 starting with the Accra declaration in 2002 and the first integration date in 2003. Thus, my interest is to critically consider how policy changes have influenced and guided the trend of trade during years of critical institutional initiative in the WAMZ. It is reasonable to think of member states support for policies that motivated the objective of economic integration at both country and regional levels and it will not be surprising to see this trend in the trade relation among member states. This is to say that there is somewhat high expectation for intra-WAMZ member trade. Again, the inclusion of some West African countries in this trade discussion is to assess in a naive way the trend of trade in the sub-Sahara region and the rational for the future broader integration of the WAMZ to the WAEMU. Generally, Gambia's exports to its external (non-African countries) partners have decreased considerably, however there are no clear-cut patterns to describe its export in West Africa and to other WAMZ member states. Gambia's fluctuating intra-West Africa export trade trend started with about 40% export trade in 2000, which reduced by 37% to about 2% of export trade in 2001. The fluctuating trend continued until 2004 when it begun to increase marginally until 2006 where export trade stood at approximately 31%. The trend continued to fluctuate after 2006 reaching its peak in 2011 of about 63.5% intra-West Africa export trade. Despite the fluctuating trend, the average of export trade was higher for the last half of 2006-2012 than

the average of the other half of 2000-2006 of the period under review. Similarly, Gambia's export trade with other WAMZ member countries fluctuated considerably starting with as low as about 1% intra-WAMZ export trade which fell in 2001 but rose sharply in 2002 to about 13.1%. The aftermath of the 2002 rise, was a disappointing fall in 2003 reaching its lowest in 2004 of about 0.18% of export trade. Possibly motivated by the scheduled integration in 2005, export trade rose sharply to its highest of about 46% which fell in 2006 to about 0.96%. The fluctuation in export trade continued after 2006 with considerably high export trade in 2009 and 2011 of about 24.2% and 23.3% respectively. Surprisingly, unlike the intra-West Africa higher export trade average for the last half of the period under consideration, Gambia's intra-WAMZ export trade average was higher in the first half of 2000-2006 than the average of the last half of the period 2006-2012. It is quite evident that policy formation motivates Gambia's intra-WAMZ trade and this is explained by the higher export trade in years preceding or years of scheduled monetary integration. Thus, for the scheduled date of January 2003, export trade in 2002 rose significantly to 13.1% with similar trend for the scheduled dates of July 2005 and January 2009 with 46.0% and 24.2% of export trade respectively. What is striking in this analysis is that despite the general falling export trade trend, the magnitude of export trade with its external trading partners especially in Europe remained significantly high relative to export trade in WAMZ and West Africa analyzed individually or put together. Unfortunately, Gambia's export trade is highly dependent on the UK market which makes UK the preferred export destination for Gambia as against the possible choice of Ghana, Nigeria, Gambia, Guinea or Sierra Leone given the idea of a monetary union. Aside the UK, Senegal was the second recipient of export trade from Gambia, however, this makes sense because of the geographical proximity. As stated before and as shown by the data, Gambia has no clearly established trade links that yield any significant export trade results except for the marked export with Sierra Leone in 2003 and with Guinea in 2005 and 2009 representing about 11.6%, 45.09% and 23.9% of export trade respectively. However, all these high export trade can be thought to be motivated by zonal policy formation intended to motivate integration as 2003, 2005 and 2009 were all scheduled but failed years of monetary integration. Except for Gambia's significant policy motivated bilateral export trade with Sierra Leone and Guinea in 2003, 2005 and 2009, bilateral export trade relation with Ghana and Nigeria have been discouraging. Thus, even for the years of expected integration in the zone, Gambia's export trade with Ghana and Nigeria hardly increased ranging between approximately 0.03% and 1.5% and 0.004% and 0.85% respectively for the period 2000-2012.

As disappointing as Gambia's export trade may seem for the integrating institution and managers of the WAMZ, it however seems much better than its intra-WAMZ and intra-West Africa import trade. Thus, Gambia's import trade depended relatively more on Cote d'Ivoire than on Guinea and Sierra Leone despite the geographical advantage these two countries have over Cote d'Ivoire and the possible zonal properties that these two countries share with Gambia. In general terms, Gambia's average export trade was higher than its import trade in West Africa, and while Senegal dominated it export trade, Cote d'Ivoire dominated its import trade with significant import trade shares of about 11% of the total import trade of about 13.8% in 2000, about 12.6% of the total import trade of about 16.3% in 2009 and 21.09% of the total import trade of about 26.3% in 2011. Despite Cote d'Ivoire's influence on Gambia's import trade, Gambia traded relatively higher but marginal with Senegal than with Cote d'Ivoire in 2002 and 2003 with import trade of about 4.4% and 4.6% respectively. However, Gambia's intra-WAMZ import

trade yielded disappointing trend which it is quite tempting to disbelieve its possible trade synergy with other WAMZ member countries. Thus, the sum of its year on year import trade with all WAMZ member countries were not enough to account for even half of its year on year trade with both Cote d'Ivoire and Senegal. Moreover, contrary to the influence of policy change that resulted in the marked increase in export trade in years of scheduled integration, import trade was generally stationary and did not reflect any principal shock (not even in 2003, 2005 and 2009) which could be thought to have been motivated by policy change to quicken integration. Gambia's import trade with its external trade partners was fairly distributed. Thus, Gambia extended its bilateral import trade relation by trading fairly with most of its external partners in Europe, America and Asia. However, Germany dominated Gambia's import trade with the UK and China following with relative similar share of import trade. Moreover, the momentum of China's trade relation with Gambia has increased over time starting in 2006. Despite the general decreasing import trade dependence on external markets, the average and the share of import trade with it external partners still remain significantly high compare to Gambia's import trade in the WAMZ and also in West Africa. Also, important to consider in the discussion is an analysis of the trend of trade loss from external (developed) trading partners to internal (African country preferable a WAMZ member) as trade relationships overtime are affected by the dynamic nature of global trade and commodity price.

Unfortunately, trade losses to developed partners were gained by developing countries like China, India and Malaysia other than member states of the WAMZ except for the years 2003, 2005 and 2009 where significant gains were made by only Guinea and Sierra Leone. Thus, Ghana and Nigeria never accounted for any material gain in trade loss from developed partners except for the conventional fluctuation of trade (import and export) with Gambia.

4.1.2 WAMZ trade with some developing and developed countries – the case of Ghana (see Table 3a&b**)**

Ghana's export trade in West Africa was relatively lower than Gambia's export trade with the highest export trade in 2011 of about 33.1% which was about 0.06 percentage points less of Gambia's third highest export trade in 2000. In general sense, geographical proximity made Senegal an important trade partner for Gambia, however, similar feature was seen in Ghana's export trade trend as it traded relatively more with Burkina Faso, Togo and Cote d'Ivoire than with any other West African country (excluding member states of WAMZ). Thus, Ghana's export trade with Togo was the highest among its border countries trade representing about 25% of the total of about 33.2% of export trade in 2011. Also, Ghana's export trade with Burkina Faso was significantly high of about 12.6% of the total of about 13.4% in 2006. If geographical proximity which manifests itself into higher cross border trade runs supreme over differences in external prices, then a single currency in the WAMZ will be a disadvantage to Ghana and Nigeria given their geographical positions relative to the position of other WAMZ member countries. However, it is still early to make a conclusion on this hypothesis since it is necessary also to take into consideration the trade trend in other member states of the WAMZ. Finally, on intra-West Africa export trade, Ghana's export trade with other West Africa countries (excluding WAMZ member states) though small, increased considerably over the period of 2000-2012. Thus, for the first half of the period 2000-2012 year on year export trade was hardly above 7%, however, in the second half of the same period export trade remained relatively high above the 7% benchmark in 2006, 2009, 2011 and 2012 of about 13.4%, 9.8%, 33.1% and 8.0% respectively. In intra-WAMZ trade, Gambia's export trade was relatively robust especially in the years of scheduled integration than the

export trade of Ghana (assuming away the effect of missing data). Thus, Ghana's export trade in the zone was roughly stable between limits of approximately 1.2% and 3%, except for the lowest export trade in 2004. In addition, contrary to Gambia's exceptionally high export trade in 2003, 2005 and 2009 possibly motivated by proposed integration, Ghana's export trade trend showed nothing to favor integration in the above stated years, except for the marked increase in export trade with Nigeria in 2005 which represented about 98% of the total intra-WAMZ export trade. Moreover, trade in 2009 was nothing better as it fell from the previous year share of about 2.4% to 1.9%. Ghana's export trade was dependent on Nigeria in the intra-WAMZ trade; however, export trade between these two countries was only relatively high in 2005 and did not appreciate significantly afterward, despite the long term trading relationship between these two countries. Likewise the case of Gambia, Ghana's export trade was highly dependent on its developed trading partners in Europe. Thus, Gambia and Ghana depended relatively on Europe for their export trade revenue than on USA, Japan or China. Colonial traits, though strong, were not enough to guide the trend of export trade as Ghana's export trade went more to Switzerland than into any other European country, with the Netherlands and the UK sharing roughly equal export trade with Ghana after Switzerland. Ghana's trade with its European partners, though falling, still remained significant, with export trade of more than half in 2000, 2001 and 2003. However, export trade to Europe fell a little below 50% in 2004 but stood strongly over a quarter of export trade from 2005 to 2012, except in 2010 when export trade was approximately 1/5. Ghana's year on year sum of intra-West Africa and intra-WAMZ import trade were relatively higher than its year on year sum of export trade. However, Ghana's import trade was fairly distributed among most countries in West Africa with no principal trading partner(s). The advantage of geographical proximity repeated itself in Ghana's import trade as it traded relatively higher (though marginal) with Burkina Faso, Togo and Cote d'Ivoire than with any other West African country (except WAMZ member state). Ghana's intra-West Africa import trade has decreased fairly over the years with a marked fall in

2003 from its highest import trade in 2002 of about 10.6% to about 1.0%. Except for the first three years of intra-West Africa import trade beginning in 2000, import trade on yearly basis have remained significantly low, below 4%, making the average of import trade for the first half of 2000-2012 relatively higher than the average of import trade for the second half of the same period. With regards to intra-WAMZ import trade, even though import trade was relatively higher than exports trade, it did not reflect any pattern of trade motivated by policy changes, as seen in the case of Gambia. Ghana's import trade fell in 2002 (the year proceeding the scheduled integration date of January 2003) by approximately 7%. However, it increased in 2005 (2nd scheduled integration date) to about 11.7% and again fell in 2009 (3rd scheduled integration date) to a disappointing level of about 2.1%. Nigeria still remained the preferred trade destination for Ghana's import accounting for more than 97% of intra-WAMZ trade and roughly about 88% of intra-West Africa (including other WAMZ member countries) trade of Ghana. Thus, the long trade history between Ghana and Nigeria, which date as far back as the 1960s and 1970s, was enough to render worthless the geographical proximity advantage and cross border trade, which was quite prominent and more or less dictated the pace of Gambia's intra-West Africa and intra-WAMZ trade. However, Ghana's intra-WAMZ trade (thus both import and export) has reduced strongly in the last four years ending in 2012, and this has impacted significantly on its import trade with Nigeria. Ghana's import trade with its external trading partners similar to the case of Gambia has remained fairly distributed with

no principal trading partner. What was encouraging was that Ghana's import trade with Nigeria remained relatively stronger than with most of its external trading partners in Europe. However, Ghana's recent (for the last four years as explained above) falling import trade in Africa and in Europe could be explained by the significant gains in import trade from China and the USA. Thus, starting in 2000, China's export (thus Ghana's import) to Ghana has increased steadily from about 3.1% in 2000 to about 17.1% in 2012. Likewise import trade from USA fluctuated during the first half of 2000-2012 but increased steadily beginning 2006 from about 6.6% to approximately 11.1% in 2012. While relatively cheaper external prices motivated and explained the recent increase in import trade from China, it remains relatively unclear the rational behind the general rising import trade with the USA. However, this trend works together to violate the advantage of geographical proximity in trade given the distance between Ghana and China, and likewise the USA, relative to its closer developed partners in Europe who have more or less equal production efficiency for most goods imported from China and the USA.

4.1.3 WAMZ trade with some developing and developed countries - the case of Guinea (see Table 4a&b**)**

Unfortunately, analysis of Guinea's trade might not be comprehensive because of missing data for the period 2009-2012. That notwithstanding, the available data allows for trade analysis of 2003 and 2005 which were years of schedule integration. Guinea's intra-West Africa export trade was at its peak in 2005 of about 6.1% trading principally with Senegal, who accounted for about 3.2%, and Mali accounting for approximately 2.9% of the export trade. From the perspective of geographical proximity, Guinea's trade with Mali made sense since it's a border trade, moreover, its trade (export) with Senegal is also justified by its closeness to Senegal and the fact that Senegal remains relatively a good trading partner to all its neighboring countries of Guinea Bissau, Gambia, Guinea and Mali and Mauritania. In addition, Guinea's export trade with Mali and Senegal was not only considerably high in 2005 but trade between Guinea and these two countries was sustainable over the years. Within the WAMZ, Guinea's export trade between other member countries was relatively low, falling and did not reflect any trend of change motivated by policy formulation to induce integration since export trade fell both in 2002 and in 2005. The fall of export trade in 2005 was at its lowest of approximately 0.0%, a worrying and a disappointing trend contrary to reasonable expectation of a possible increase in trade since both years were scheduled for integration. Guinea had no principal export trading partner within the WAMZ since its export trade was fairly distributed among member countries of the WAMZ even though geographical proximity could have made Gambia and Sierra Leone preferred favorite. Despite the general assumption of falling trade dependence of WAMZ member countries on external markets, Guinea's export trade with its external European partners remained fairly stable for the period 2000-2008 of an average of about 60% of export trade. While France remained the major recipient of Guinea's export and the principal external export trading partner, Spain and USA followed respectively in that order as possible future contenders. Guinea remained relatively more dependent on external market (with respect to export trade) than Gambia and Ghana. Thus, in the case of Gambia, there were years of export gains from its external trading partners-thus during years of expected integration. Also for Ghana, its trade relation with Nigeria was strong enough to generate trade that was more than Ghana's trade (especially export trade) with most of its external trading partners. Unfortunately, Guinea's intra- West Africa trade (including member countries of WAMZ) was not enough to compare with its trade with most of its external trading partners in Europe and in the USA.

Guinea's intra-West Africa import trade was relatively higher than its export trade as in the case of Ghana. Guinea imported principally from Cote d'Ivoire and the trade had similar features with Ghana's intra-WAMZ import trade with Nigeria representing (in this case about 0.01 percentage points more) roughly 98% of the import trade in West Africa (excluding member states of the WAMZ). This border trade (import) makes sense in terms of geographical proximity thus similar to the case of Gambia but contrary to the case of Ghana. As stated above, even though year on year import trade was relatively high compared to export trade, it had fallen considerable over the period 2000-2008 from about 22.2% of intra-West Africa import trade to about 3%. Guinea's total intra-WAMZ trade remained relatively low and fell over the periods of available data. Thus, its export trade trend was similar if not the same to its import trade trend with no principal trading partner, no evidence of geographical proximity advantage to Sierra Leone or Gambia and no evidence of policy change motivating intra-WAMZ trade to affirm its inclusion in the monetary union (the last two features could be inferred from the trade trend of Gambia). In terms of its external import trade, Guinea still depended on France but in this case relatively lesser. The pervasiveness of USA and Spain in its export trade is less strongly felt in its import trade; however, import trade with the Netherlands, Belgium and China is fairly stronger relatively to import trade with other external import trade partners. More seriously, Guinea's total year by year intra-WAMZ trade (thus the sum of both import and export trade) was basically nothing considering its yearly trade with most of its trading partners in Europe, USA and Asia. Thus, a trend that could not be easily inferred from the trade flows of both Gambia and Ghana.j

4.1.4 WAMZ trade with some developing and developed countries – the case of Nigeria (see Table 5a&b)

Of all the member countries of the WAMZ, Nigeria's membership remains the most controversial and the less preferred given its economic size, its relatively better terms of trade and the fact that its inclusion in both WAMU and the later integration of the WAMU to the WAEMU poses relatively higher negative net effect to all participating member state Chuku (2012) and Masson & Pattillo (2005). As the biggest economy in the WAMZ, it is expected to champion the course of the integration given its influence in trade in the African continent. However, despite its capacity in intra-Africa and global trade and its greater propensity to assist other member countries to achieve integration in the zone largely through trade, Nigeria's trade in West Africa and among other member states of the WAMZ have been very much disappointing, thus the worst of all the member states of WAMZ considering its size and the volume of its trade in Africa. In West Africa (including all countries), Nigeria traded (export) principally with Cote d'Ivoire than with any other country. Even in the intra-WAMZ export trade, Nigeria's trade with Ghana though significant was nothing compared to its trade with Cote d'Ivoire. Thus Nigeria's export trade with Cote d'Ivoire was enough to account for its total export trade in the WAMZ. Nigeria's intra-WAMZ export trade was relatively stable between 1% and approximately 2.7% for the period 2000-2008 but fell to less than 1% from 2009 to 2012. Nigeria's export trade trend like the case of Guinea depicted no critical positive change motivating integration, while export trade marginally increased by roughly 0.5% in 2002 its fell considerably in 2009 from about 2.3% to roughly 0.6%. Moreover, the advantage of geographical proximity was less seen in Nigeria's export trade trend since its trade with Cote d'Ivoire was relatively more than its trade with its border countries and Ghana with which its shares long trade history and

zonal characteristics. While external trade (both import and export) of all member states depended principally on its developed trading partners in Europe, Nigeria's export trade depended heavily on the USA. Nigeria's export trade with the USA accounted for approximately 40% of its external export trade and was enough to represent its trade with most of its major export trading partners in Europe. Nigeria's export trade with India remained quite significant and large compared with its developed European trading partners. As explained before, the rationale for the sustained growth in the trade between Nigeria and the USA, it is relatively unclear what motivated export trade between Nigeria and India, given the huge pay-off of geographical proximity for its trade with its developed European partners. Similar to the features in its export trade trend are those in its import trade trend but much more deteriorating in this case. Thus, while Nigeria's intra-West Africa import trade was considerably low and showed no principal trading partner contrary to its intra-WAMZ export trade, import trade was fairly distributed among member states and showed no indication of significant policy adjustment (thus significant trade increase) motivating integration during years of scheduled monetary union. Thus, Nigeria's import trade with Cote d'Ivoire and Ghana in West Africa (including WAMZ member states) were not significantly different from other West African trading partners as in the case of its export trade. Again, while its year on year intra-WAMZ import trade was less than 1%, its import trade in West Africa (excluding WAMZ member countries) was no better, and thus it reduced to less than 1% from 2009. In terms of external import trade, the USA still remains a principal trading partner for Nigeria, however, tainted by China's recent dominance in African trade motivated by its price competitiveness. Thus, Nigeria's import trade with China grew over time from about 3.4% in 2000 to about 21.5% in 2012. Moreover, Nigeria's import trade from Europe stood relatively stronger than its export trade and the recent loss of import trade to China and other European countries meant that Nigeria's import trade with the USA was not enough to account for its total import trade with most of its major trading partners in Europe, as it was in the case of its export trade. China's engagement in African trade has grown stronger in recent times and it has accounted for a greater share of Africa's trade diversion from developed trading partners in Europe and USA as seen in the case of Ghana and Nigeria. However, as member states (principally Ghana and Nigeria) enjoy the advantage of relatively lower price for imported goods from China, care should be taken in order not to over depend on China, which might result in abandoning the much needed intra-WAMZ trade synergy.

4.1.5 WAMZ trade with some developing and developed countries -the case of Sierra Leone (see Table 6a&b)

As at the time of writing, there were no enough available trade data to address in a comprehensive way Sierra Leone's trade flow in West Africa and among member states of the WAMZ. In a boarder sense, Sierra Leone's trade is concentrated in few markets, and since 2000, the direction of trade structure has not changed. The European Union remains the main destination of export (about 80% of export), followed by ECOWAS (about 12%), while imports from the EU (about 30%), followed by ECOWAS (29%), ASEAN countries (26%), the United States (6%), and Middle East (5%) see Sierra Leone trade policy (June,2010). What more could be expected from a country that has seen years of series of civil and tribal war principally in the 1990s? The war largely affected infrastructure development and local demand (population loss through death) and had left behind in the post war regime political frictions which hampered effective rule of law. Trade with its neighbor and border countries in agriculture inputs and products have remained sufficient and institutional arrangement like "Everything

but arms" initiatives and the Africa Growth and Opportunity Act (AGOA) have also granted Sierra Leone sustained access to the market in Europe and USA. In 2013, South Africa and Cote d'Ivoire were the only two African countries to be in the list of top ten import traders of Sierra Leone, while Europe top the list with China following. On the other hand, China was the largest export trader of Sierra Leone with approximately 79% share of Sierra Leone world export trade. Like in the case of Nigeria and Ghana, China's influence in Sierra Leone's trade (largely export trade) in recent times has been relatively strong and care should be taken by member countries not to over depend on China. Thus the deteriorating intra-Africa and intra-WAMZ trade history of Sierra Leone is a vulnerable situation and it calls for proper institutional adjustment and assistance from stakeholders, principally the WAMI and ECOWAS.

5. Summary and Conclusion

In summary, trade by member states of the West Africa Monetary Zone (WAMZ) is quite disappointing as analyzed for the period 2000-2012. Marginal convergence in some macroeconomics variables though necessary is not sufficient for a monetary union given the high level of uncertainty that exist ex-ante. Some motivation can be gathered from the recent happenings in the Eurozone and the associated macroeconomic challenges puzzling them. Most pertinent to the issues under consideration is the trend in intra-WAMZ trade. While Nigeria, Guinea and Gambia traded principally with Senegal and Cote d'Ivoire, Ghana traded principally with its neighboring countries of Togo, Burkina Faso and also Cote d'Ivoire. Thus, the zone's trade in West Africa is largely represented by its trade with Cote d'Ivoire and this would have been of much essence if Cote d'Ivoire is a member of the WAMZ. However, WAMZ's trade with Cote d'Ivoire has some sort of economic significance if we think in terms of the comprehensive program of the ECOWAS for which the idea is to integrate all member countries in West Africa. Also, except for Ghana's trade with Nigeria which depicted some significant level of dependence, trade among member states of the zone is generally low. Moreover, Gambia's import trade with Sierra Leone in 2002 and with Guinea in both 2005 and 2009 were also significant but only in years of expected integration. Thus, the case of Ghana and Nigeria brings to the floor the ideal that trade induces countries to the formation of regional blocks and economic unions. However, the alternative hypothesis is true and it quite evident in the case of Gambia, Guinea and Sierra Leone that trade is endogenously determined by unions and blocks/area formations. In terms of external trade, there exist some symmetry of dependence for Ghana, Gambia, Guinea and Sierra Leone except Nigeria. While these four member states depended solely on Europe (despite the pervasiveness of China in recent times) on both import and export trade, Nigeria dependent heavily on the USA. This asymmetry might have an inherent divergence pay-off in terms of policy formulation depending on whether the Eco is pegged to the Euro or the dollar. Strategic policy in the zone has it that the Eco will be pegged to the Euro in anticipation of the inclusion of the other eight (8) West African countries of the WAEMU. Generally speaking, there seem to exist significantly weak trade synergy between member states of the WAMZ, hence more aggressive policy change is needed to trigger the connections (if it exist at all) given the fact that four scheduled date of integration have already been missed.

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APPENDIX

Table1a Status of compliance with the Primary convergence criteria

	2001 Dec	2002 Dec	2003 Dec	2004 Dec	2005 Dec	2006 Dec	2007 Dec	2008 Dec	2009 Dec	2010 Dec	2011 Dec	2012 Dec
Gambia	2	1	1	3	3	4	4	4	3	2	3	3
Ghana	1	0	2	1	2	2	2	0	2	3	4	3
Guinea	3	2	0	0	2	1	2	1	1	0	2	2
Liberia	n.a	n.a	n.a	n.a	n.a	n.a	1	3	4	4	3	3
Nigeria	3	3	2	3	3	4	4	3	3	2	3	3
Sierra Leone	2	2	0	2	2	2	2	2	1	1	1	2

Table 1b Target of Inflation Rate < 10%

	2001 Dec	2002 Dec	2003 Dec	2004 Dec	2005 Dec	2006 Dec	2007 Dec	2008 Dec	2009 Dec	2010 Dec	2011 Dec	2012 Dec
Gambia	8.1	13.0	17.6	8.0	4.9	0.4	6.0	6.8	2.7	5.8	4.4	4.9
Ghana	21.3	15.2	23.6	11.8	13.9	10.9	12.8	18.1	16.0	8.6	8.6	8.8
Guinea	1.1	6.1	14.8	27.6	29.7	39.1	12.9	13.5	7.9	20.8	19.0	12.8
Liberia	n.a	n.a	n.a	n.a	n.a	n.a	11.7	9.4	9.7	6.6	11.5	5.5
Nigeria	16.5	12.2	23.8	10.0	11.6	8.5	6.6	15.1	14.0	11.8	10.3	12.0
Sierra Leone	3.4	-3.1	11.3	14.4	13.1	8.3	12.2	13.2	12.2	17.8	16.9	11.4
Nber of Countries	3	2	0	1	1	3	2	2	3	3	2	3

Table 1c Target of Fiscal Balance (excluding grants) as per cent of GDP < 4 %*

	2001 Dec	2002 Dec	2003 Dec	2004 Dec	2005 Dec	2006 Dec	2007 Dec	2008 Dec	2009 Dec	2010 Dec	2011 Dec	2012 Dec
Gambia	10.0	9.1	7.6	8.3	7.4	2.7	1.0	3.3	7.2	6.7	9.0	13.5
Ghana	13.2	8.3	7.5	8.1	6.9	7.0	9.5	10.6	7.0	8.2	3.0	7.4
Guinea	5.2	8.0	10.5	5.9	0.8	1.8	0.5	1.7	6.8	14.4	4.7	5.5
Liberia	n.a	n.a	n.a	n.a	n.a	n.a	-12.2	-2.7	-2.0	-6.4	0.2	1.8
Nigeria	3.2	3.9	2.0	1.2	1.3	0.6	0.6	0.2	3.3	5.0	3.1	2.5
Sierra Leone	16.5	11.7	10.0	8.6	9.6	8.5	5.0	6.3	8.6	10.6	10.0	8.1
Nber of Countries	1	1	1	1	2	3	3	4	2	0	3	2

Source: WAMZ Staff/Authorities

TABLE 2a WAMZ trade with some developing and developed countries (Gambia) in percentage share

WAMZ export (Gambia)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Western Africa													
Benin													
Burkina Faso													
cote d'Ivoire	0.1026	0.076		0.0238	0.0098	0.1674	0.0255			0.013		0.0036	
Guinea-Bissau				0.4475	0.2448	0.0956			0.0439	14.0172	2.3363	11.3317	
Liberia						0.0915							
Mali	0.0255		0.1798		7.2879	0.1695	0.1737	0.0449	0.8854		0.4473	16.6927	
Mauritania				0.1489		3.0362			2.875	0.8515	0.1654	0.1731	
Niger													
Senegal	39.3982	2.6274	7.9453	4.7378	0.7413	8.9554	30.7907	25.1662	17.4114	26.7822	15.9083	35.269	
Togo													
	39.5263	**2.7034**	**8.1251**	**5.358**	**8.2838**	**12.5156**	**30.9899**	**25.2111**	**21.2157**	**41.6639**	**18.8573**	**63.4701**	**N/A**
WAMZ Countries													
Ghana	0.9646	0.3836	1.2202	0.4996	0.1372	0.8928	0.9026	0.5378		0.1405	1.3988	0.0227	
Guinea					0.0362	45.0929			0.1338	23.9279	5.7653	23.166	
Nigeria	0.0036		0.3174	0.4713		0.0576	0.0584	0.0012	0.8448	0.1488	0.027	0.0909	
Sierra Leone			11.5633									0.1005	
	0.9682	**0.3836**	**13.1009**	**0.9709**	**0.1734**	**46.0433**	**0.961**	**0.539**	**0.9786**	**24.2172**	**7.1911**	**23.3801**	**N/A**
Other Non-African Countries													
Belgium	10.3752	12.4751	3.6334	0.787	0.3963	1.6791	0.1433	5.5134	0.3394	0.0739	0.4159	0.2061	
France	1.4696	35.3581	1.2194	1.3864	0.3428	1.4439	4.6685	13.6407	1.8559	7.3475	16.0359	1.5776	
Germany	8.8393	1.1234	3.3146	9.9979	2.5329	2.4647	4.1557	1.849	6.1919	0.1105	0.1992	0.0604	
Ireland					0.0013								
Italy	0.1159	0.5766	9.3652	17.7105	0.033	0.0136		0.0611	0.0293	0.0334	0.0189	0.0086	
Netherland	2.3513	0.7015	3.5507	6.9154	15.8604	7.8762	1.1239	6.4716	11.6468	1.2927	2.2072	0.7774	

Spain	2.209	7.1832	4.3296	3.0365	0.1517	0.2867	0.345	2.904	8.7381	0.3043	1.7371	0.4835	
Switzerland	0.0279	0.0256	31.1039	0.1638	2.0764		0.0019		0.0007	0.0676	0.0824	0.0171	
United Kingdom	6.7083	27.1169	12.239	23.8357	46.4368	18.5527	49.0095	19.739	10.1119	7.4485	25.3468	2.3685	
	32.0965	**84.5604**	**68.7558**	**63.8332**	**67.8316**	**32.3169**	**59.4478**	**50.1788**	**38.914**	**16.6784**	**46.0434**	**5.4992**	**N/A**
Turkey									0.2489			0.0019	
Russia Federation					0.0916						0.0018		
China	0.0253	0.1198	0.0611	0.6915	9.401	0.2444	1.0955	0.3599	0.5836	2.1171	2.0866	0.5932	3.1145
Japan	0.6753	0.1962	0.5708	0.5789	0.0782	0.5525	0.9104	0.4012	0.6122	0.3201	0.0928	0.0012	
Malaysia							0.0536		0.1051				
India	0.2456	0.6706	0.0268	0.0229	2.2174	0.2782	0.023	0.1495	0.7547	17.446	4.4437	8.0747	2.5757
United State	1.5336	1.8205	0.5595	0.5565	0.7863	0.2053	1.3842	1.7719	2.1098	3.3059	3.2924	2.1313	0.0309
	2.4798	**2.8071**	**1.2182**	**1.8498**	**12.5745**	**1.2804**	**3.4667**	**2.6825**	**4.4143**	**23.1891**	**9.9173**	**10.8023**	**5.7211**
grand total	34.5763	87.3675	69.974	65.683	80.4061	33.5973	62.9145	52.8613	43.3283	39.8675	55.9607	16.3015	5.7211

Table 2b WAMZ trade with some developing and developed countries (Gambia) in percentage share

WAMZ import (Gambia)	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Western Africa													
Benin													
Burkina Faso													
cote d'Ivoire	11.0169	8.0717	3.624	3.1362	12.0699	12.5731	8.6428	6.709	8.9407	14.3022	19.7056	21.0975	
Guinea-Bissau				0.0112	0.0175	0.0231			0.1577	0.1398	0.2474	0.2191	
Liberia						0.2217						0.0619	
Mali	0.0095		0.0044	0.0136	0.0261	0.0146	0.0009	0.0016	0.0065		0.1134	0.0879	
Mauritania				0.003	0.0121	0.0573	0.0029		0.0263	0.0152	0.0599	0.0061	
Niger													
Senegal	2.7656	1.7936	4.3964	4.6422	3.0954	2.0318	3.9615	2.7478	3.0023	1.8318	2.1408	4.8151	
Togo													
	13.792	**9.8653**	**8.0248**	**7.8062**	**15.221**	**14.9216**	**12.6081**	**9.4584**	**12.1335**	**16.289**	**22.2671**	**26.2876**	**N/A**

WAMZ Countries													
Ghana	0.1021	0.1569	0.1354	0.2096	0.2098	0.1086	0.1182	0.1546		0.2276	0.3541	0.2921	
Guinea					0.0548	0.0644			0.1802	0.2059	0.3774	0.6167	
Nigeria	0.2433		0.1875	0.1866		0.1895	0.1381	0.8461	1.4788	0.7173	0.0707	0.1307	
Sierra Leone			0.0576				0.1641					0.0882	
	0.3454	**0.1569**	**0.3805**	**0.3962**	**0.2646**	**0.3625**	**0.4204**	**1.0007**	**1.659**	**1.1508**	**0.8022**	**1.1277**	**N/A**
Other Non-African Countries													
Belgium	3.4722	4.6051	2.6099	2.668	3.0279	3.0779	3.8213	3.8585	3.0426	3.7572	2.843	4.4454	
France	7.1577	6.2195	5.0917	6.253	5.8873	3.7493	4.9295	2.9725	2.7206	3.37	1.8965	2.3244	
Germany	22.4206	25.8951	39.1644	36.163	11.2819	11.5138	8.2851	8.2093	10.8793	5.6665	3.1909	3.4353	
Ireland		0.0642			0.0972							0.0224	
Italy	1.5486	1.5752	1.3567	1.7582	1.648	1.4795	1.6117	0.5546	0.9457	0.565	0.3881	0.8401	
Netherland	6.1985	5.9635	2.1029	2.7911	4.0054	2.8321	2.7322	5.6056	7.0415	5.6735	5.8732	4.0391	
Spain	1.9681	2.3354	2.4003	1.941	1.6684	1.278	1.248	2.3015	1.1504	2.1271	4.0568	1.3413	
Switzerland	0.4576	0.4007	0.7078	0.257	0.2737	0.2599	0.2139	0.6054	1.4629	1.5926	0.5799	0.424	
United Kingdom	7.6192	10.355	10.1913	10.3268	7.8543	9.0798	7.0442	7.7029	8.0982	7.7811	3.9158	4.7069	
	50.8425	**57.4137**	**63.625**	**62.1581**	**35.7441**	**33.2703**	**29.8859**	**31.8103**	**35.3412**	**30.533**	**22.7442**	**21.5789**	**N/A**
Turkey		0.6354	0.2917						0.4788	2.7998	2.3078	3.8487	
Russia Federation				0.2049						0.2564			
China	7.5381	6.5244	4.2559	5.1087	12.0522	9.2911	9.2815	10.5977	10.7671	11.4919	7.4683	8.7459	
Japan	2.6573	2.1162	2.5849	1.4693	1.5639	2.1388	3.3926	2.756	1.903	1.4783	0.8721	1.0951	
Malaysia		0.0195			0.0227	0.722	1.182	0.5867	1.2154	4.4782	1.8254	3.5926	
India	1.5456	2.0321	2.434	3.4939	1.8149	4.707	0.953	2.0103	1.7265	3.5109	3.2055	2.7528	
United State	4.0082	2.9645	4.6114	2.095	7.3792	6.4594	12.0395	13.0307	10.9107	2.3404	1.7942	1.6688	
	15.7492	**14.2921**	**14.1779**	**12.3718**	**22.8329**	**23.3183**	**26.8486**	**28.9814**	**27.0015**	**26.3559**	**17.4733**	**21.7039**	**N/A**
grand total	**66.5917**	**71.7058**	**77.8029**	**74.5299**	**58.577**	**56.5886**	**56.7345**	**60.7917**	**62.3427**	**56.8889**	**40.2175**	**43.2828**	**N/A**

TABLE 3a WAMZ trade with some developing and developed countries (Ghana) in percentage share

WAMZ export (GHANA)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Western Africa													
Benin	0.6599	1.0088		1.8236	0.5973	0.105	0.0807	0.1282	0.1409	2.4735	0.7186	0.4746	0.4556
Burkina Faso	0.3776	0.1437		0.1047	0.0151	0.0262	12.6182	4.6142	2.1457	4.0946	1.3924	2.7204	1.9697
cote d'Ivoire	0.6348	0.8895		0.8153	0.1028	0.479	0.2761	0.7365	0.7573	1.2374	0.5072	3.8988	0.436
Guinea-Bissau				0.0017		0.0029	0.0031	0.001		0.0156	0.002		0.0016
Liberia	0.4105	0.1036		0.0227				0.0399	0.0385	0.4526	0.0515	0.7654	0.0645
Mali	0.0452	0.0457		0.0032	0.0178	0.0008	0.0342	0.0726	0.1467	0.195	2.4216	0.1172	0.3111
Mauritania		0.0055		0.0014		0.0025	0.0161	0.0362	0.0187	0.0017	0.0025	0.0202	0.0041
Niger	0.6452	0.318		0.0027	0.0256	0.003	0.0118	0.0509	0.1459	0.0458	0.2817	0.0924	0.0877
Senegal	0.1497	0.4215		0.5163	0.3323	0.4447	0.2904	0.5719	0.4684	0.2609	0.1793	0.0889	0.0741
Togo	3.8196	3.0806		1.2912		0.0024	0.0472	0.1942	0.3308	0.9897	1.3402	24.9667	4.6896
	6.7425	**6.0169**	**N/A**	**4.5828**	**1.0909**	**1.0665**	**13.3778**	**6.4456**	**4.1929**	**9.7668**	**6.897**	**33.1446**	**8.094**
WAMZ Countries													
Gambia	0.0318	0.0558		0.0371	0.1041	0.0339	0.0234	0.0434		0.0443	0.1178	0.03	
Guinea	0.0197	0.009		0.0155	0.0294	0.0296	0.0268	0.0906	0.105	0.1013	0.0882	0.0954	0.0508
Nigeria	1.6144	1.7452		1.0492		12.8746	1.9326	2.2783	2.2566	1.5648	1.9318	1.0706	1.3273
Sierra Leone	0.1825			0.112			0.0379	1.1044		0.1829	0.0925	0.1189	0.0762
	1.8484	**1.81**	**N/A**	**1.2138**	**0.1335**	**12.9381**	**2.0207**	**3.5167**	**2.3616**	**1.8933**	**2.2303**	**1.3149**	**1.4543**
Other Non-African Countries													
Belgium	1.9037	1.7095		4.899	5.3255	6.9521	4.0103	1.7513	1.1375	0.9539	2.1041	2.1921	0.6964
France	2.4994	3.6797		4.7211	4.4785	4.9203	4.5578	3.382	2.3931	1.3536	1.2411	9.3607	7.5282
Germany	5.3658	4.1616		4.8762	1.541	2.4187	2.6661	2.1822	1.4847	1.1331	1.2884	0.9224	1.0554
Ireland	0.8461	0.7393		0.2426	0.5773	0.4459	0.3451	0.3496	0.3498	0.3296	0.2812	0.0398	0.0569
Italy	2.9298	4.8513		4.7645	2.5651	2.18	2.5109	1.2408	1.6419	0.9715	0.7366	5.66	6.5526

Netherland	11.1833	5.5918		11.7938	18.4599	11.275	11.1392	12.0478	11.7454	8.6583	5.5759	3.8625	4.0537
Spain	1.3351	1.5003		2.1262	1.7952	1.7251	1.408	1.82	1.5683	0.9874	1.2764	0.7205	1.4333
Switzerland	23.495	24.8512		25.293	1.4252	4.542	6.7903	5.9473	2.6427	10.1664	4.1178	4.7056	6.4748
United Kingdom	18.8488	18.1605		19.9942	9.7752	7.0949	4.0055	5.9366	3.687	3.2006	3.3587	2.0579	1.3901
	68.407	**65.2452**	**N/A**	**78.7106**	**45.9429**	**41.554**	**37.4332**	**34.6576**	**26.6504**	**27.7544**	**19.9802**	**29.5215**	**29.2414**
Turkey	1.1097	1.6668		0.0137	0.0724	0.0019	0.0164	0.0049	1.4416	0.8096	0.5694	0.9303	1.217
Russia Federation	0.4663	0.3642		0.4078	0.0032	0.0119	0.0275	0.0838	0.0762	0.0251	0.0314	0.004	0.0077
China	1.6578	1.4388		1.3889	0.8191	1.3635	1.0737	0.9252	1.8793	0.9076	0.9794	1.4013	3.3476
Japan	1.4333	1.9551		2.5103	2.4283	1.684	2.0141	2.1909	0.514	1.9166	0.7918	0.3579	0.4841
Malaysia	0.2414	0.1621		0.1971	1.0961	1.5496	2.6212	3.4469	3.1623	1.4139	0.5903	0.7587	1.4537
India	0.9386	0.5079		0.5282	0.4768	1.3579	1.6284	2.2176	5.3271	1.1681	0.9277	3.9248	10.0028
United State	5.8696	7.0388		2.9118	2.7238	2.7286	2.9427	2.3753	2.8377	1.9882	1.9643	2.4176	1.5846
	11.7167	**13.1337**	**N/A**	**7.9578**	**7.6197**	**8.6974**	**10.324**	**11.2446**	**15.2382**	**8.2291**	**5.8543**	**9.7946**	**18.0975**
grand total	80.1237	78.3789	N/A	86.6684	53.5626	50.2514	47.7572	45.9022	41.8886	35.9835	25.8345	39.3161	47.3389

Table 3b

WAMZ import (GHANA)	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Western Africa													
Benin	0.2707	0.0179	0.0333	0.018	0.0389	0.0094	0.0135	0.0133	0.0026	0.0135	0.0135	0.0245	0.0211
Burkina Faso	1.382	1.5253	3.2905	0.0086	0.0002	0.0012	0.0901	0.077	0.0496	0.073	0.0845	0.1108	0.1188
cote d'Iviore	2.3371	2.0111	1.5361	0.4168	0.7684	0.2248	0.3182	1.637	1.7736	0.8399	0.6194	0.509	0.6781
Guinea-Bissau				0.0061		0.0352	0.0152	0.0182		0.0112	0.0082		0.0011
Liberia	0.0255	0.8117	0.0908	0.053				0.007	0.0056	0.276	0.0063	0.0062	0.0664
Mali	0.1065	0.2986	0.8882	0.0132	0.0014	0.0012	0.0008	0.001	0.0019	0.025	0.0075	0.0235	0.0184
Mauritania		0.0394	0.594	0.2461		0.5657	0.3368	0.1108	0.0735	0.1278	0.2353	0.7083	0.5256
Niger	0.8276	1.4293	1.0877	0.0122	0.0052	0.0032	0.005	0.0023	0.0233	0.119	0.1331	0.0959	0.0581
Senegal	0.2548	0.1106	2.5737	0.2397	0.0839	0.0348	0.0245	0.0421	0.0347	0.0453	0.1071	0.2144	0.3053
Togo	1.7157	0.9533	0.5144	0.0117		1.565	1.2987	1.359	1.2637	1.4361	1.067	1.0219	1.02
	6.9199	**7.1972**	**10.6087**	**1.0254**	**0.898**	**2.4405**	**2.1028**	**3.2677**	**3.2285**	**2.9668**	**2.2819**	**2.7145**	**2.8129**

WAMZ Countries													
Gambia	0.026	0.018	0.0109	0.0198	0.0136	0.0102	0.0057	0.0049		0.0004	0.0006	0.0004	
Guinea	0.0003	0.0297	0.0159	0.0323	0.0127	0.0035	0.4334	0.0141	0.04	0.0861	0.0794	0.015	0.0314
Nigeria	10.9288	11.094	7.1644	18.6825		11.6984	9.5706	6.9048	8.7275	2.0904	0.4298	0.3979	2.0384
Sierra Leone	0.0032		0.0325	0.0105			0.0059	0.0039		0.0191	0.0165	0.0151	0.0751
	10.9583	**11.1417**	**7.2237**	**18.7451**	**0.0263**	**11.7121**	**10.0156**	**6.9277**	**8.7675**	**2.196**	**0.5263**	**0.4284**	**2.1449**
Other Non-African countries;													
Belgium	4.9086	4.1787	5.2636	4.5429	6.1759	5.8183	5.6472	5.9219	5.0246	5.2889	5.5301	5.9624	6.5949
France	3.1855	3.7653	3.8479	3.6885	4.0258	3.2619	3.7032	2.3798	2.7532	4.5606	6.1863	1.9832	1.7184
Germany	7.0721	6.6745	6.982	6.8173	7.7267	5.8057	5.4155	5.4474	3.8427	3.6023	3.3812	3.5443	3.8573
Ireland	0.2248	0.2447	0.3073	0.2965	0.4852	0.4984	0.4252	0.4026	0.4151	0.397	0.48	0.3768	0.4878
Italy	5.0233	3.3124	4.562	3.0559	3.8064	3.0813	3.2054	3.6066	2.0088	2.9868	2.369	2.0349	2.0652
Netherland	6.3442	6.0784	5.0684	5.0428	5.07	3.692	3.6297	3.7165	3.3455	3.6176	3.4602	3.0616	2.9567
Spain	4.8113	3.1839	2.0581	2.1044	2.3226	1.9074	1.8424	1.9597	1.349	1.224	1.4215	1.4288	1.887
Switzerland	1.0266	0.8385	0.6599	0.8985	0.7296	0.4612	0.4393	0.5525	1.3327	0.7867	0.6943	0.2584	0.3312
United Kingdom	9.1487	10.018	8.7936	6.8197	5.7436	7.558	8.8943	5.6486	4.3429	4.9978	4.8098	16.5316	10.0144
	41.7451	**38.2944**	**37.5428**	**33.2665**	**36.0858**	**32.0842**	**33.2022**	**29.6356**	**24.4145**	**27.4617**	**28.3324**	**35.182**	**29.9129**
Turkey	0.6867	0.3835	0.8131	0.8536	0.74	0.5194	0.5918	0.6096	0.9799	0.9256	1.1476	1.2748	1.4759
Russia Federation	0.7097	0.7217	0.537	0.4499	0.2037	0.4081	0.453	0.3922	0.3694	0.2232	0.3827	0.3714	0.3544
China	3.1791	3.8684	4.7378	5.5941	8.9547	8.1132	9.4588	11.0748	11.7105	12.9291	13.1675	15.1924	17.1663
Japan	1.8093	1.6704	2.4401	3.0992	3.6944	2.4489	2.2751	2.2502	2.212	1.8026	1.8482	1.3371	1.9217
Malaysia	0.509	0.3471	0.5163	0.6199	0.6532	0.8578	0.7348	0.8027	0.9422	0.9498	0.9221	0.8649	0.8774
India	1.6854	2.0437	2.5669	3.0965	3.6856	3.3594	3.8623	4.3855	4.3331	4.1431	3.9716	4.2637	4.2275
United State	7.4742	6.8563	7.4385	7.0327	8.9042	7.0837	6.6111	7.6361	7.6563	8.0882	13.6681	9.631	11.1603
	16.0534	**15.8911**	**19.0497**	**20.7459**	**26.8358**	**22.7905**	**23.9869**	**27.1511**	**28.2034**	**29.0616**	**35.1078**	**32.9353**	**37.1835**
grand total	57.7985	54.1855	56.5925	54.0124	62.9216	54.8747	57.1891	56.7867	52.6179	56.5233	63.4402	68.1173	67.0964

Table 4a WAMZ export (GUINEA)	2000	2001	2002	2003	2004	2005	2006	2007	2008
Western Africa									
Benin					0.0146	0.0077		0.0002	
Burkina Faso									
cote d'Iviore	0.0576	0.141	0.0142		0.0061	0.0295	0.0305	0.1162	0.0497
Guinea-Bissau			0.1346		0.0442				
Liberia									0.2951
Mali	0.1265	0.3639	0.2138		0.5972	2.8775	1.2552	2.8379	0.8247
Mauritania					0.0312	0.0041		0.0375	0.0346
Niger								0.0032	
Senegal	0.0253	0.1298	0.0972		0.2938	3.2355	0.0515	0.1366	0.0917
Togo		0.0056			0.0013			0.0021	0.0001
	0.2094	**0.6403**	**0.4598**	**N/A**	**0.9884**	**6.1543**	**1.3372**	**3.1337**	**1.2959**
WAMZ Countries									
Gambia					0.006	0.0155			0.0068
Ghana	0.0277	0.0524	0.0072		0.022	0.0129	0.0061	0.0069	0.0245
Nigeria	0.0071	0.7221	0.0102		0.0001	0.0007	0.0028	0.0055	0.4863
Sierra Leone	0.1703	0.4569	0.2084		0.3735			0.2145	
	0.2051	**1.2314**	**0.2258**	**N/A**	**0.4016**	**0.0291**	**0.0089**	**0.2269**	**0.5176**
Other Non-African countries;									
Belgium	0.5174	2.789	3.8942		0.3725	10.592	1.1261	0.0415	0.4822
France	33.0436	26.041	24.3493		8.6635	14.4172	6.648	17.6617	24.4557
Germany	6.1451	6.5338	8.0152		9.0045	8.3503	8.0336	7.9707	5.8681
Ireland	9.0863	11.3306	10.173		13.665	10.43	9.047	18.5173	7.4292
Italy	0.0696	0.2282	0.2254		0.492	0.1957	0.3682	0.3285	0.697

Netherland	0.0487	1.2635	1.2543		1.1874	0.2609	0.2059	0.7028	0.1682
Spain	9.593	9.4922	10.1703		21.7594	12.4516	11.5121	15.4713	9.89
Switzerland	5.0717	0.9628	5.8813		0.0061	1.8419	1.4871	3.2362	19.4629
United Kingdom	3.3399	5.6183	5.5322		0.4572	3.2728	0.0249	0.6116	0.0183
	66.9153	**64.2594**	**69.4952**	**N/A**	**55.6076**	**61.8124**	**38.4529**	**64.5416**	**68.4716**
Turkey	0.0163	0.0017	0.0046			0.0091	0.0245	0.0159	0.2479
Russia Federation	4.1392	7.7608	6.4355					9.316	10.5772
China	0.0071	0.0021	1.8704		0.0304	0.2001	1.7668	0.1243	1.3925
Japan		0.0215	0.0087		0.0015	0.0043	0.0024	0.0831	0.0163
Malaysia					0.0104	0.0376	0.0061	0.0412	0.3989
India	0.1093	0.052	0.0125		0.0147	0.1577	0.2308	0.0625	0.2518
United State	12.7613	16.8589	8.8119		14.9226	9.9893	10.3348	13.7373	6.7171
	17.0332	**24.697**	**17.1436**	**N/A**	**14.9796**	**10.3981**	**12.3654**	**23.3803**	**19.6017**
grand total	83.9485	88.9564	86.6388	N/A	70.5872	72.2105	50.8183	87.9219	88.0733

Table 4b

WAMZ import (GUINEA)	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**
Western Africa									
Benin					0.0072	0.7988		0.0244	
Burkina Faso									
cote d'Iviore	21.3715	12.7133	14.5349		18.5488	14.3533	15.9133	4.3098	1.6938
Guinea-Bissau			0.3502		0.03				
Liberia									0.7531
Mali	0.0362	0.0845	0.0131		0.0425	0.0029	0.0036	0.0176	0.0132
Mauritania					0.003	0.0998		0.019	0.0034
Niger								0.0023	
Senegal	0.65	1.1319	0.4176		0.5771	0.4464	0.5867	0.4462	0.5057
Togo		0.4417			0.4427			0.2329	0.0099
	22.0577	**14.3714**	**15.3158**	**N/A**	**19.6513**	**15.7012**	**16.5036**	**5.0522**	**2.9791**

WAMZ Countries									
Gambia					0.0374	0.0559			0.0102
Ghana	0.069	0.1101	0.0704		0.0972	0.0745	0.2188	0.1554	0.1564
Nigeria	0.2725	0.2122	0.1932		0.4312	0.0804	0.0735	0.0969	0.1794
Sierra Leone	0.6643	0.1657	0.0004		0.0619			0.0347	
	1.0058	**0.488**	**0.264**	**N/A**	**0.6277**	**0.2108**	**0.2923**	**0.287**	**0.346**
Other Non-African countries;									
Belgium	7.7255	13.1325	6.3895		7.8781	4.5852	7.3374	15.4059	5.2066
France	19.785	17.4311	16.1519		10.8114	5.8769	10.4066	8.5024	10.1025
Germany	3.1287	2.2592	3.2557		2.2114	1.0674	1.262	1.1656	1.1826
Ireland	0.0379	0.0219	0.077		0.0688	0.0079	0.1071	0.044	0.0513
Italy	3.4276	3.4329	4.4247		2.2708	2.6084	0.7747	0.6809	1.5159
Netherland	2.3388	4.7769	1.7652		3.2215	1.2017	5.5789	13.6371	20.5714
Spain	1.8806	2.9681	1.8892		1.4741	0.5526	1.1789	4.5789	2.2362
Switzerland	0.7337	1.6002	1.3278		1.2006	0.5307	0.3007	0.513	0.3469
United Kingdom	1.4945	2.6228	2.3595		1.1361	1.7294	3.2122	2.8109	7.8638
	40.5523	**48.2456**	**37.6405**	**N/A**	**30.2728**	**18.1602**	**30.1585**	**47.3387**	**49.0772**
Turkey	0.25	0.6766	0.4396		0.7549	0.4813	0.6969	1.5238	0.8396
Russia Federation	0.1861	0.2223	0.1164					1.2726	0.8076
China	4.6393	5.3928	6.5607		7.7003	3.9388	7.5319	5.8291	6.7211
Japan	5.5822	3.856	5.4376		2.456	1.0762	3.2344	4.5599	2.5839
Malaysia	0.3622	0.4488			0.9058	0.2763	1.3002	0.3616	0.4274
India	1.855	1.5521	3.1302		2.8962	2.3142	7.8109	4.9723	2.6358
United State	7.9005	7.1134	8.2894		7.6677	6.6312	5.4166	6.1232	5.1798
	20.7753	**19.262**	**23.9739**	**N/A**	**22.3809**	**14.718**	**25.9909**	**24.6425**	**19.1952**
grand total	**61.3276**	**67.5076**	**61.6144**	**N/A**	**52.6537**	**32.8782**	**56.1494**	**71.9812**	**68.2724**

Table 5a WAMZ trade with some developing and developed countries (Nigeria) in percentage share

WAMZ export (Nigeria)	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012
Western Africa													
Benin	0.0233	0.0222	0.3285	0.0631			0.0008	0.0826	0.0103			0.0714	
Burkina Faso	0.0017		0.0001	0.0004				0.0191	0.0134	0.0167	0.0601	0.0136	0.0043
cote d'Ivoire	3.1103	1.8924	1.4515	1.4964			3.6169	2.1975	2.2398	3.0128	1.4679	1.4335	1.8295
Guinea-Bissau										0.0005			
Liberia	0.0006						0.0008		1.4157			0.2269	0.3964
Mali	0.0173	0.1354	0.0013	0.0142			0.0042	0.004	0.0038	0.0031	0.0021	0.0119	0.0027
Mauritania		0		0.0015				0.0006	0.0013	0.0069	0.0012	0.0018	0.0004
Niger	0.0014	0.0115	0.0004	0.0032			0.008	0.1318	0.1147				0.0031
Senegal	0.9115	0.9686	0.6383	1.0556			0.0001	0.1368	1.1425	0.5711	0.2229	0.3787	0.6829
Togo	0.0004	0.0002	1.9941	0.0166			0.0079	0.0251	0.0119	0.0024			0.0323
	4.0665	**3.0303**	**4.4142**	**2.651**	**N/A**	**N/A**	**3.6387**	**2.5975**	**4.9534**	**3.6135**	**1.7542**	**2.1378**	**2.9516**
WAMZ Countries													
Gambia	0.0002						0.0002	0.0102	0.0073	0.0056	0.0013	0.001	0.0011
Guinea	0.0448		0.0476	0.0009			0.0019	0.0119	0.0064	0.002	0.0002		
Ghana	0.9685	1.5025	2.0432	1.8886			2.6397	1.5926	2.2754	0.6078	0.5111	0.7068	0.9151
Sierra Leone									0.0091	0.0092	0.004	0.0039	0.0035
	1.0135	**1.5025**	**2.0908**	**1.8895**	**N/A**	**N/A**	**2.6418**	**1.6147**	**2.2982**	**0.6246**	**0.5166**	**0.7117**	**0.9197**
Other Non-African countries;													
Belgium	0.1479	0.1479	0.1479	0.0018			0.0127	8.3586	1.0305	0.5975	2.4405	0.2299	0.7333
France	6.1199	6.33	5.3681	5.6463			5.6593	3.6535	4.1195	5.4343	4.05	5.8664	4.1625
Germany	0.414	1.3497	1.9645	2.0994			0.006	2.3237	1.5467	0.9106	0.6478	1.0144	1.4978
Ireland	0.0002								0.0001	0.0043	0.0005	0.2332	1.3789
Italy	4.1263	4.7324	3.8852	2.8574			2.4797	1.0827	3.285	4.1656	3.5208	5.0977	6.1451

Netherland	0.9365	2.0214	1.5514	2.2237			2.5811	0.3236	4.0272	2.6824	4.5474	2.1291	6.956
Spain	8.6643	6.5141	5.4855	6.1642			7.9807	1.3304	3.4204	4.362	3.2692	5.8957	5.4502
Switzerland		0.0035		0.1135			0.0173	0.2117	0.2216	0.0616	0.1181	0.4046	0.051
United Kingdom	0.0249	0.2485	0.0573	0.3996			0.0539	0.525	1.6398	2.107	1.464	6.2154	6.3164
	20.434	**21.3475**	**18.4599**	**19.5059**	**N/A**	**N/A**	**18.7907**	**17.8092**	**19.2908**	**20.3253**	**20.0583**	**27.0864**	**32.6912**
Turkey							0.0027	0.0662	0.0636	0.3899	0.5492	0.3564	0.3675
Russia Federation		0.0007						0.0044	0.006	0.005	0.0002	0.0021	0.0029
China	0.5182	0.7038	0.3935	0.5131			0.007	1.6184	0.3277	1.4356	1.6644	2.0104	5.6155
Japan	0.401	0.9584	2.9559	4.0105			1.8799	0.6653	0.3603	0.4638	0.4533	0.3079	0.4887
Malaysia	0.0001							0.032	0.038	0.0137	1.0992	0.2451	0.0713
India	14.4766	11.5441	11.6131	9.9399			9.3009	8.1516	9.6205	9.5492	10.4756	10.1798	11.1038
United State	42.4659	40.567	31.3323	38.2556			45.0163	46.6194	42.4812	27.2706	34.3729	22.5457	16.8628
	57.8618	**53.774**	**46.2948**	**52.7191**	**N/A**	**N/A**	**56.2068**	**57.1573**	**52.8973**	**39.1278**	**48.6148**	**35.6474**	**34.5125**
grand total	78.2958	75.1215	64.7547	72.225	N/A	N/A	74.9975	74.9665	72.1881	59.4531	68.6731	62.7338	67.2037

Table 5b

WAMZ import (NIGERIA)	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**2012**
Western Africa													
Benin	0.6192	2.2203	0.3516	0.0848			0.2898	0.73	0.0132			0.0005	
Burkina Faso	0.0019	0.001	0.0128	0.0105				0.0003	0	0	0.1486	0.0043	0.0006
cote d'Iviore	0.2859	0.7144	0.0525	0.0711			0.1506	0.0995	0.08	0.0798	0.2369	0.2301	0.1875
Guinea-Bissau	0.0146	0.0062	0.0295	0.0867			0.0045	0.0078		0.0011			
Liberia	0.0091		0.006	0.0052			0.0317		0.0188			0.0033	0.0004
Mali	0.0034	0.0152	0.0007	0.0035			0.08	0.0006	0	0.0056	0.0001	0.0004	0.0001
Mauritania	0.8895	0.6814	0.2539	0.0834			0.1742	0.053	0.0821	0.0008	0.1393	0.1475	0.1785
Niger	0.0103	0.0033	0.0139	0.0088			0.0598	0.0033	0.0057				0.0101
Senegal	0.0091	0.0267	0.0293	0.2106			0.01	0.0362	0.0466	0.0412	0.0014	0.0138	0.0173
Togo	0.0925	1.1299	0.2389	1.6293			0.2875	1.2018	2.9531	0.0006			0.001
	1.9355	**4.7984**	**0.9891**	**2.1939**	**N/A**	**N/A**	**1.0881**	**2.1325**	**3.1995**	**0.1291**	**0.5263**	**0.3999**	**0.3955**

WAMZ Countries												
Gambia	0.0094		0.0007	0			0.0001	0.0009	0.0023	0.0014	0.0016	0.0411	0.0011
Guinea	0.024	0.1414	0.065	0.1667			0.0063	0.0039	0.0013	0.0004	0.0028		
Ghana	0.2434	0.1505	0.2013	0.1504			0.2378	0.2169	0.1602	0.0794	0.0148	0.8004	0.204
Sierra Leone	0	0	0	0.003					0.0017	0.0013	0.0068	0.0828	0.0009
	0.2768	**0.2919**	**0.267**	**0.3201**	**N/A**	**N/A**	**0.2442**	**0.2217**	**0.1655**	**0.0825**	**0.026**	**0.9243**	**0.206**
Other Non-African countries;												
Belgium	5.4168	5.5054	5.9298	3.5833			5.1126	12.2408	5.6521	4.8004	3.8576	3.1404	3.6578
France	5.5892	4.6707	4.1537	3.223			4.4926	3.8505	4.7236	5.7879	5.8496	4.4913	2.0544
Germany	10.2226	9.8107	6.0757	7.3095			5.58	4.876	6.764	0.8993	0.4639	4.7104	2.6599
Ireland	0.5954	0.4442	0.6251	0.4587			0.7272	1.4328	0.6824	0.4473	0.4427	1.2969	1.1478
Italy	4.6831	2.5226	2.9646	4.2737			3.4109	2.547	2.5888	1.962	4.5163	2.8142	2.0844
Netherland	4.328	4.9221	3.1751	2.1516			3.0842	3.1386	1.5799	0.6204	0.794	2.3641	1.4456
Spain	1.3036	1.3604	0.9612	0.9557			0.831	0.6935	0.2949	0.2134	0.6897	1.5133	0.852
Switzerland	1.7014	1.2132	1.0611	0.8382			0.9416	0.7593	3.1312	0.6071	0.4506	0.4169	0.8359
United Kingdom	12.9857	13.442	12.5254	9.5405			11.7929	5.3006	4.3559	4.5467	2.7911	2.6553	6.5807
	46.8258	**43.8913**	**37.4717**	**32.3342**	**N/A**	**N/A**	**35.973**	**34.8391**	**29.7728**	**19.8845**	**19.8555**	**23.4028**	**21.3185**
Turkey	0.3302	0.2679	0.325	0.006			0.0188	0.0333	0.3701	0.9494	0.6093	1.5719	0.7642
Russia Federation	3.358	1.4542	1.0388	0.9774			0.9796	0.5796	0.4054	0.258	0.1775	0.2976	0.6608
China	4.3447	6.6199	8.4563	7.1715			13.802	15.1768	15.2245	17.6945	16.5578	14.7687	21.5077
Japan	4.8907	4.5267	4.9369	2.4453			3.3062	2.3126	2.6941	2.8542	2.5847	4.5198	2.7351
Malaysia	0.2485	0.1237	0.1554	0.0816			0.2632	0.221	0.2449	0.3616	0.5809	0.3642	0.4142
India	3.4225	3.9669	3.5408	2.536			4.8454	4.4602	3.632	3.6627	5.3742	3.8609	8.0497
United State	11.351	10.339	12.8261	15.5839			15.6778	15.1223	8.2043	6.0213	17.9417	18.0038	13.6232
	27.9456	**27.2983**	**31.2793**	**28.8017**	**N/A**	**N/A**	**38.893**	**37.9058**	**30.7753**	**31.8017**	**43.8261**	**43.3869**	**47.7549**
grand total	**74.7714**	**71.1896**	**68.751**	**61.1359**	**N/A**	**N/A**	**74.866**	**72.7449**	**60.5481**	**51.6862**	**63.6816**	**66.7897**	**69.0734**

Table 6a WAMZ trade with some developing and developed countries (Sierra Leone) in percentage share

WAMZ export (SIERRA LEONE)	2000	2001	2002
Western Africa			
Benin			
Burkina Faso			
cote d'lviore			0.06
Guinea-Bissau			
Liberia			
Mali			
Mauritania			
Niger			
Senegal	0.0075		0.0115
Togo	**0.0075**	**N/A**	**0.0715**
WAMZ Countries			
Gambia			
Guinea	13.3408		
Ghana	0.0418		
Nigeria			
	13.3826	**N/A**	**N/A**
Other Non-African countries;			
Belgium	1.5757		0.0358
France	0.0855		0.0764
Germany	1.7427		0.0678
Lreland			
Italy	0.0342		

Netherland	1.1117		
Spain			
Switzerland			
United Kingdom	4.9285		0.0351
	9.4783	**N/A**	**0.2151**
Turkey			
Russia Federation			0.1824
China			0.1103
Japan			0.064
Malaysia			
India			0.0269
United State	1.0781		1.0274
	1.0781	**N/A**	**1.411**
grand total	**10.5564**	**N/A**	**1.6261**

Table 6b

WAMZ import (SIERRA LEONE)	**2000**	**2001**	**2002**
Western Africa			
Benin			
Burkina Faso			
cote d'Iviore	19.5539		36.689
Guinea-Bissau			
Liberia			
Mali			
Mauritania			
Niger			
Senegal	3.3063		1.963
Togo			
	22.8602	**N/A**	**38.652**

WAMZ Countries			
Gambia			0.1478
Guinea	0.5418		0.18
Ghana	0.2956		0.3181
Nigeria			0.7332
	0.8374	**N/A**	**1.3791**
Other Non-African countries;			
Belgium	8.4257		1.3401
France	5.4751		1.325
Germany	8.2205		2.569
Lreland			0.0249
Italy	2.3216		1.2034
Netherland	8.2385		5.5179
Spain	2.0398		1.0727
Switzerland	5.6089		0.3888
United Kingdom	11.4652		3.3701
	51.7953	**N/A**	**16.8119**
Turkey			0.7
Russia Federation			0.0717
China	7.169		3.3537
Japan			4.2295
Malaysia			1.1286
India	3.0634		3.7551
United State	8.693		4.93
	18.9254	**N/A**	**18.1686**
grand total	70.7207	N/A	34.9805

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Socioeconomic Determinants of the Changes in Homicides over Time: A VAR Analysis

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Abstract

Purpose *– We search for determinants of the change in homicides over time by analyzing the interconnection between a high incidence of murders and the socioeconomic environment, using Puerto Rico as the case study. This case presents intriguing facts that challenge some of the conventional crime hypotheses. For instance, in forty years homicides quadrupled by four times while the population was aging and declining.*

Design/methodology/approach *– First, a new and simple theoretical formalization is exhibited. Then, we applied three vector autoregressions, showed the variance error decompositions, and revised its structural stability.*

Findings *– We found that jobless growth is insufficient to decrease murders. Instead, lower employment, a growing number of families led by a single parent, and higher urbanization have partially caused the increases in homicides. We also found that the homicide incidence partially is a self-propelled phenomenon.*

Research limitations/implications *– The punishment approach is not sufficient in explaining and reducing the high level of homicides. The economic inequality does not map directly onto the changes, though it may explain the level of murders.*

Originality/value *– The homicide incidence is found to be embedded in the socioeconomic structure.*

Keywords: homicides determinants, socioeconomic conditions, crime

JEL Classification: K42, K14, K0

1. Introduction

Many researches use case studies, including relatively small areas such as provinces and cities, to inquire into the causes of crime (Glaeser et al., 1996; Hojman, 2002; Funk and Kugler, 2003; Harcourt and Ludwig, 2006; Buonanno and Montolio, 2008). We chose Puerto Rico as the case study; a jurisdiction where conventional explanations do not completely describe the elevation in homicide incidence. For instance, while it has been proved in cross-country studies such as Fajnzylber et al. (2002a) that economic inequality causes crime and this country has a

very high inequality, inequality does not explain the increase in the murder rate from 7.07 in 1970 to 30.48 in 2011[1].

According to the United Nations Office on Drugs and Crime (UNODC), Puerto Rico is ranked 17th among countries with the highest homicide rate per 100,000 inhabitants. Contrary to conventional wisdom, this increase in homicide incidence occurs at a time when the population is declining and aging.

Researches like Soares and Naritomi (2010) point out that a low incarceration rate is one of the main determinants of high crime. However, Puerto Rico has one of the highest incarceration rates in the world; in the top 30 according to UNODC. Therefore, this cannot fully explain why the crime rate has multiplied by more than four times in 40 years.

A high number of police agents and repressive public policies, such as the "iron fist against crime", are considered insufficient to reduce the homicide incidence and sometimes can have perverse results (Montalvo-Barbot, 1997).

Puerto Rico has one of the highest proportions of police agents, with close to 528 policemen per 100,000 inhabitants (excluding federal and municipal police). This is a number significantly higher than the US, which has 325 agents per 100,000 people (Soares and Naritomi, 2010), or the city of New York, which has around 435 per 100,000 inhabitants. In addition, the Penal Code was reinforced in 2004, but it was not sufficient to reduce the soaring rate in homicides. It would appear that criminals in this country have a high discounting rate (Lee and McCrary, 2005) or that the situation of this country supports the conclusions of Andreoni (1991), where an increase in punishment is not necessarily an optimal solution to reduce crime.

This raises the question: What factors can be at the root of a dramatic change in homicide incidence? We emphasize changes since there are factors that in a cross-sectional analysis can explain the levels (such as inequality and incarceration rates) but cannot completely describe the increases over time. For instance, in the natural sciences there is a theory that links a high temperature with crime (Simister, 2008). However, this cannot explain the multiplication in murder rates, since Puerto Rico had almost the same temperature for the period 1970-2011 (our sample).

Given the challenges with the previous approaches, crime in this country will be studied as a problem embedded in the socioeconomic structure using vector autoregressions (VARs). A few studies before have applied VARs to study crime-related topics in other jurisdictions (Funk and Kugler, 2003; Gkanas and Dritsakis, 2009; Tang, 2009), but it has not been applied in this and many other countries. One of the advantages of VARs over single equation models is that all the variables are endogenous. New as well as standard socioeconomic factors are found to be causing or exacerbating the homicides.

In subsection 1.1, we discuss some of the literature on socioeconomic determinants. One of the contributions is showed in Section 2, where we present a new and simple theoretical foundation and also test many hypotheses using two dynamic econometric models with some new variables. In Section 3, we illustrate the results, and in Section 4, we state the conclusions. The focus will be on quantifying the effect of changes in the socioeconomic environment as an exacerbating factor of the likelihood of homicides, and not on the etiological inquiries of the homicides level.

[1] Because in some supranational organizations (such as the World Bank) Puerto Rico is classified as a country and the legal terminologies are complicated and debatable, for ease of reading, here we refer to Puerto Rico as a country. However, we acknowledge the long and ongoing political debate.

1.1 Related Literature

There is no a clear-cut determinant for the changes in the high incidence of murders. One of the socioeconomic hypotheses is the age effect, which states that the younger population is more likely to commit crime (Nunley et al., 2011). This argument will be tested in the models of the next section.

Another conventional thesis is population growth, namely that the higher the population, the higher the crime (Blau, 1977). Nonetheless, the Census Bureau reports a decline in the population for the period 2000-2010. Given the resonance of this paradigm of criminology, in the next section we will indirectly test the population effect.

Many models use inequality as a regressor (Fajnzylber et al., 2002a). In this paper, there is no attempt to deny that a high level of crime and a high level of economic inequality are intertwined. For instance, the level of economic inequality in this territory is one of the highest in the whole world, with a Gini index of 0.54 in 2011, ranking among the five worst Gini indices in the World Bank. However, economic inequality could explain the level of homicides but not the changes. According to Sotomayor (2004), this country had a Gini coefficient of 0.55 in 1969 and 0.55 in 1999. But in the same period, the homicide rate doubled from 7.07 to 15.6. The same occurred between 1999 and 2011 when the Gini was stabilized around 0.54 but the homicide rate doubled from 15.68 in 1999 to 30.68 in 2011.

It is clear that there is an absence of a one-to-one mapping between the changes in the homicide rates and the changes in inequality or punishment. Other exacerbating factors might be found in the socio-economic environment. For instance, Calvó-Armengol et al. (2007) theorize the interconnections between unemployment and crime, suggesting that in a country where crime is relatively profitable for individuals (e.g., Puerto Rico), the unemployed are more vulnerable to enter into criminal activities. On empirical grounds, Mocan and Rees (2005) and Ihlanfeldt (2007) find an inverse relationship between labor-market access and crime. Raphael and Winter-Ebmer (2001), Weinberg and Mustard (2002), Mocan and Bali (2010), and Altindag (2012), find an inverse association between unemployment and crime.

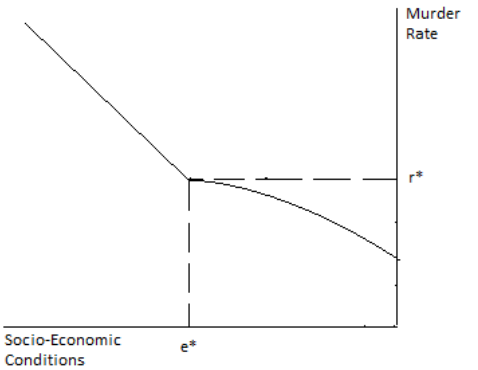
In our specification below, we considered some of these socio-economic variables as well as new determinants that will be justified in the next section.

2. A Model and the Data

The previous discussion can be summarized quickly in Figure 1. Under ideal socioeconomic conditions, there is a "natural" rate of murders or a level of homicides that are due to non-socioeconomic factors; this point is the intercept. There is also a level of murder rate that can be controlled by effective and non-coercive law enforcement. In the graph below, that level is r*.

As the socioeconomic conditions continue to deteriorate, there is a point where law enforcement is insufficient to leash the homicide incidence. This point is e*.

Figure 1. Theoretical Relation between Murder Rate, Socio-Economic Conditions, and Law Enforcement



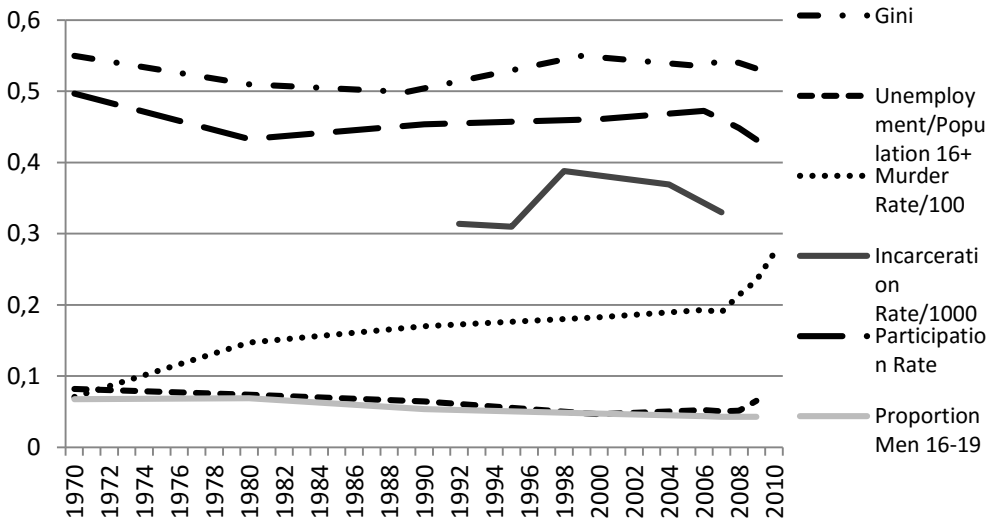
That is, assuming that $\exists\, S \in \mathbb{R}$,

$$\frac{dH}{dS}\Big|_{S<e*} > \frac{dH}{dS}\Big|_{S>e*}$$

where H is the murder rate and S are the socioeconomic conditions. Also note that if S < e*→ $\frac{d^2H}{dS^2} > 0$ and vice versa. Both points can move in time, but in our empirical approach it is assumed that the situation in this country passed the point (e*, r*), which would correspond to a murder rate of a single digit.

Figure 2 illustrates some of the observed data; the source of every variable is in Appendix I. It is important to point out that many series found points of inflection near 1980 and a new pattern started: the ratio of men aged 16-19 to the civilian population 16 and older decreased, the participation rate started to increase and the homicide rate reduced its rate of growth. None of these series had a one-to-one relation with the homicide rate, which suggests that a combination of factors were causing or exacerbating the homicide incidence. Note that in the last decade the homicides increased significantly while the labor market was showing a sharp deterioration.

Figure 2. Patterns of the Homicide Rate and its Possible Determinants, 1970-2010



Note: The incarceration rate was divided by 1000 and the murder rate by 100 to make the graph readable.
Sources: BLS (2012), University of Puerto Rico (2011), UNODC (2012). In the appendix, there is a detailed description of the sources of every variable.

We acknowledge that there is no exhaustive list of homicide determinants. Donohue (1998) states, "With all the random factors that influence the amount of criminal conduct, it is virtually impossible to fully explain or precisely predict the crime rate at any point in time." (p.1423). Based on the literature, we suspect that (the lack of) employment is one of the main determinants. Searching for other exacerbating factors of a high homicide incidence, we first remove the non-statistically significant variables and then assumed that homicides rates can be described by,

$$H_t = \beta_0 + \theta H_{t-1} + \tau L_{t-1} + \gamma A_{t-1} + \rho E_{t-1} - \delta I_{t-1} + \emptyset G_{t-1} - \omega U_{t-1} + \mu_t \quad (1)$$

where β_0 is the constant; H is the homicides rates; L is the ratio employment to population (economically active); A is the ratio of men aged 16-19 to population 16 and older; E is the enrolment in secondary education per 1,000 inhabitants; I is real Gross National Income per capita; G is the employment to population ratio of single head of households (those with absent partner, widow or divorced); U is urbanization rate (proportion of urban

population to total population), and μ is the error term.

As in Funk and Kugler (2003), we chose VARs since it has many advantages over single equation or structural multi-equation models. For instance, there are no exogeneity assumptions over the variables of interest because all regressors are endogenous in the multiple five-dimensional systems to be applied. Pure exogeneity can be a strong assumption because these socioeconomic variables may be determined inside of the system.

Thus, attempting to validate the results without disobeying the parsimonious principle, we estimate different VAR specifications based on Equation (1). The first one is given by,

$$y_t = K_0 + K_1 y_{t-1} + \cdots + K_p y_{t-p} + u_t \quad (2)$$

where $y_t^{'} = (H, L, E, I,)$; K_p are coefficient matrices, and u is an independent and identically distributed vector of disturbances. We refer to Equation (2) as VAR 1.

By analogy, the second and third VAR follows:

$$x_t = A_0 + A_1 x_{t-1} + v_t \quad (3)$$

where $x_t^{'} = (H, G\ , E, L)$ for VAR 2 and $x_t^{'} = (H, U\ , E, A)$ for VAR 3, and v is the respective vectors of innovations. These VARs are first-order by following the Schwarz criterion. The Johansen tests point out that these three VARs have no cointegrating relationships.

Both models passed the Lagrange multiplier test for serial correlation, indicating that there are no misspecification problems at the 95% confidence interval. Since most of these regressors are I(1), we applied first differences to the three VARs. The VARs have all the characteristic roots outside of the unit circle[2].

The effect of young men on crime is represented with the variable *A*, the production per capita with *I*, the labor market with *L*, the education effect with *E*, the urbanization changes with *N*, and the effect of family as an institution with *G*. The last two determinants deserve more explanation since they are part of our innovations.

The employment to population ratio of single head of households was included to study the effects of family instability on homicide incidence throughout the years. *G* can be thought of as an instrument for family stability, which also has a higher correlation with the divorce rate. Family is considered to be a very important institution that affects the attitude and the level of self-control of individuals (Tangney et al., 2004) and reduces the likelihood of crime (Loureiro et al., 2009). We deemed it important to include this variable since there is an upward trend of single-parent households. For instance, according to the Census Bureau, single female householders represented 27% of the total family households in 2000 while in 2010 this segment increased to 31%.

Figure 3. Employment to Population Ratio of Single Head of Household, 1970-2010

Since single householders have a higher probability of poverty, this increasing trend can imply, on average, a higher likelihood of future adults involved in crime. In addition, a single head of household may have, on average, more difficulty teaching self-control to his (or her) offspring. Using other methodology, Sampson and Laub (2006) find a direct relation between marriage and lower crime. In cross-sectional surveys there is the

[2] For in-depth details of these usual regressions, refer to Hamilton (1994) and Johansen (1988). Tests are in the appendix, not necessarily for publication. The data set is available upon request.

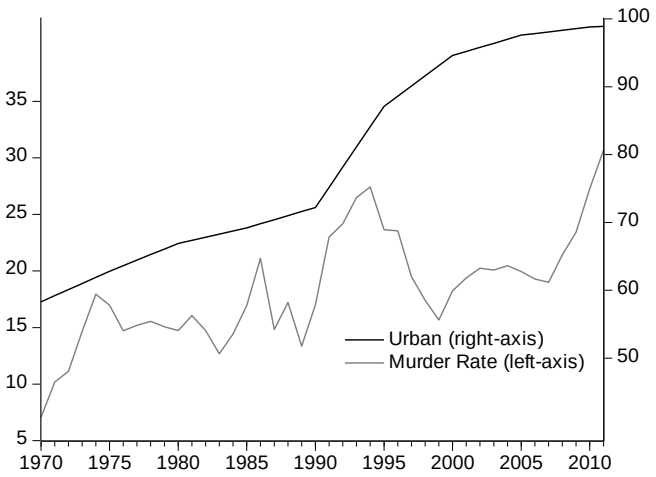
opportunity to study different family influences on crime in one period, but a methodology that does not contain time cannot explain, once again, why the homicide rate has multiplied by four in 40 years. Here *G* is the proposed measurement to study the family (de) composition throughout the years, which has change significantly according to Figure 3 and could indicate some changes in social institutions and social capital.

It is worth mentioning that population growth has, in this case, a negative association with the homicide incidence, but that variable was not included explicitly since it has a very high correlation (about 0.95) with A. In other words, even if it is not our aim, A can be thought of as instrument to total population.

Another interesting point of this research is the inclusion of the proportion of urban population as a determinant. Using other econometric specifications, Buonanno and Montolio (2008) find that urbanization is a determinant of crime for Spanish provinces. In Puerto Rico, more than half of the numbers of homicides are committed in six out of 78 municipalities, namely cities, while many country towns have less than five homicides per year. This is the case at least for the period 2003-2009 when the data segregation is available. As a matter of fact, the capital has a murder rate of 43 while many municipalities have a murder rate close to zero.

As part of its fast modernization, Puerto Rico had a relatively rapid urbanization process. Figure 4 shows that the surge in homicide incidence and the increase in urbanization occurred simultaneously. It is remarkable how the takeoff in 1989 is closely matched by an increase in the total number of murders or vice versa. In the next section, we will report if there is a strong association between urbanization and homicides after controlling for other influences.

Figure 4. Pattern of Urban Population and Homicides, 1970-2010



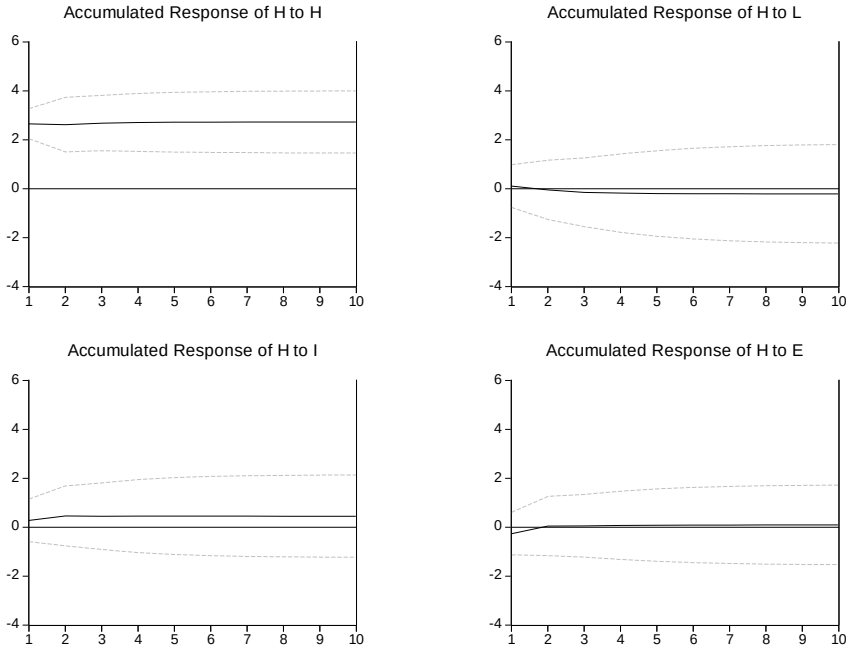
Note: Urban is the urban population divided by total population.
Sources: WB (2012), University of Puerto Rico (2011)

3. Empirical Discussion

There are different procedures to decompose the residuals in a VAR analysis. We selected the orthogonal set of innovations constructed by Pesaran and Shin (1998), which provide generalized impulses that are not dependent on the variables' ordering. We maintained the convention in these models of only presenting the impulse-response

function and the variance decomposition (Stock and Watson, 2001)[3].

Figure 5. Accumulated Homicides Responses to Generalized One Standard Deviation on the Innovations (VAR 1)



Note: Bands are asymptotic confidence intervals based on two standard errors.

When there are both negative and positive responses, the accumulated responses are recommended since they represent series that allow the measurement of impacts in net terms. In Figure 5, we can observe that an unexpected shock in homicides in one period is highly correlated with the homicides of the subsequent periods. This would be very intuitive since the vast majority of homicides are directly linked to drug trafficking (Rodríguez-Madera and Torres-Narváez, 2005): the revenge between groups or gangs produce more homicides in the next periods. In other words, violence generates more violence. Fajnzylber et al. (2002b) find a similar conclusion in this regard.

Another variable that has a direct relation with the murders is the GNI per capita. Holding everything else constant, an unexpected shock in the GNI per capita is associated with an increase in the homicide rates of the next two periods. In other words, an increase in output per capita has a negative effect on murders.

This result, which could be deemed counter-intuitive, is easy to explain given that these results are built on a ceteris paribus (holding everything else constant) assumption: a jobless growth is ineffective to

[3] Referring to these statistics, Stock and Watson (2001) remind: "Because of the complicated dynamics in the VAR, these statistics are more informative than are the estimated VAR regression coefficients or r-squared statistics, which typically go unreported." (p. 104)

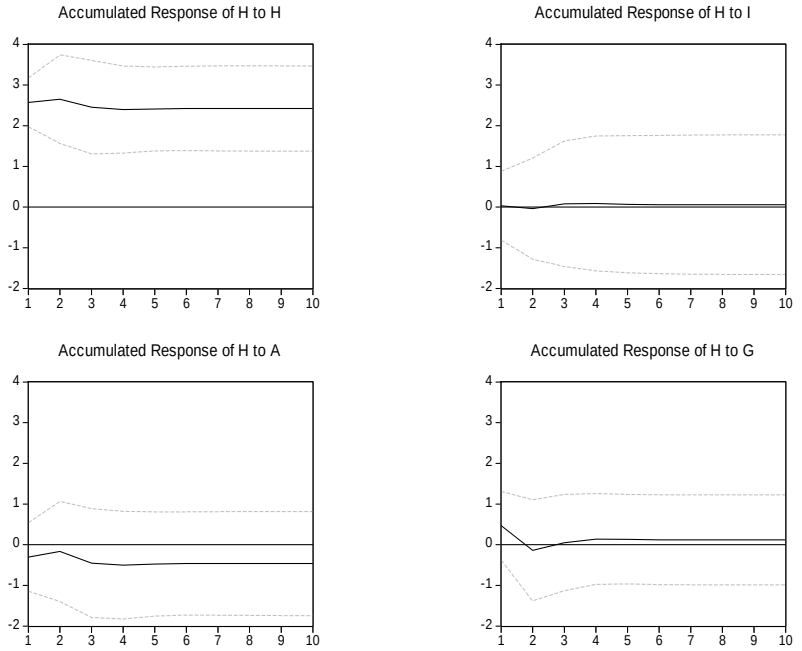
decrease homicide incidence. This is a useful outcome since output growth does not always map the movement in the labor market. In the US, for instance, there is recent literature on the dismissal of Okun's law, which links GDP growth with employment (Gordon, 2010).

On the other hand, employment has long positive effects on murders. In particular, a positive increase in the ratio of employment to population in period t is related with a decrease in total murders for four periods. Clearly, job creation is an effective policy to reduce murders.

Likewise, an unexpected innovation in enrollment creates a dampening effect on the murder rate for two periods. This result will be compared with other specifications such as the system illustrated in Figure 6.

In VAR 2, homicide rates continue to have a long and relatively strong impact on its definite perpetuation. In particular, an unexpected positive shock in homicides today would have a direct correlation with the homicide rates for the following four periods. Another result that is validated in this specification is the consequences of production impulses on the homicide incidence. An unexpected innovation in the GNI per capita does not reduce the homicide rates.

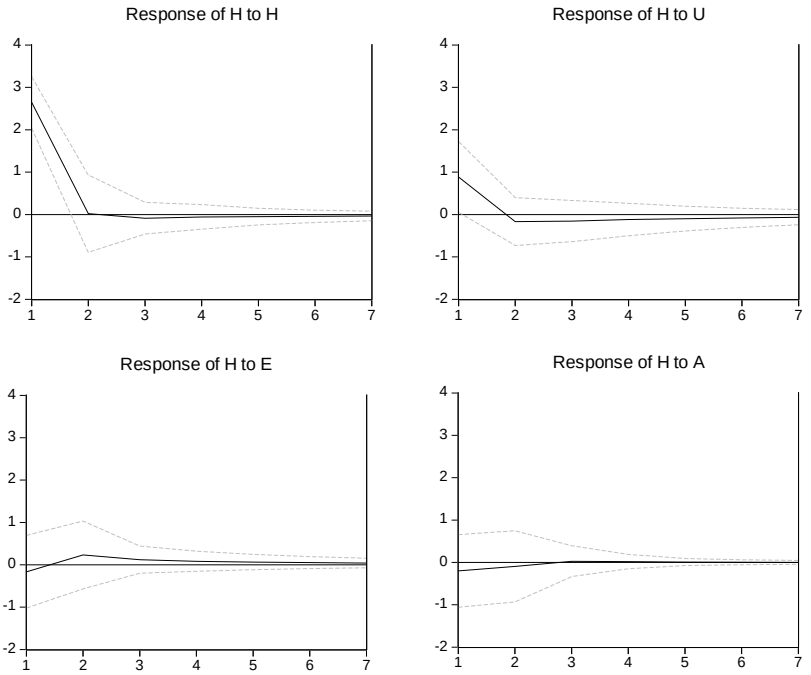
Figure 6. Homicides Responses to Generalized One Standard Deviation on the Innovations (VAR 2)



A higher proportion of young men does not appear to cause an increase in homicide rates. Contrary to some expectations, A is negatively associated with homicide incidence. It would appear that there are other factors playing a more relevant role in this system such as the increase in single head of households. In fact, an unexpected shock in G in period t-1, namely more single head of households in the last year, is related with an

expansion in homicides. This suggests that a lower proportion of single-parent families, or perhaps more stable families, have positive effects in the next generations by declining homicides. As we stated above, a suggested channel might be (on average in the long run) that higher unstable relationships end up in a higher probability of poverty and higher vulnerability of children to attain self-control, which negatively affects the homicide incidence. All the effects combined may have repercussions in the long run that increase the likelihood of being involved in crime.

Figure 7. Homicides Responses to Generalized One Standard Deviation on the Innovations (VAR 3)



In terms of the effect of homicides, the findings reported in Figure 7 are similar to those from the previous VARs: an unexpected shock in the murder rate today has a significant cumulative effect in the murder rate for the following two periods. This would confirm the hypothesis that violence generates more violence.

The responses generated by the proportion of enrollment in secondary education appear to be enigmatic. In this four-dimensional system, on average an unexpected innovation in the enrollment ratio is positively correlated with homicide rates. However, the outcome appears to be relatively small, with a relatively high confidence interval. The contradictory results of these VARs would lead to the conclusion that the role of secondary enrollment does not have a high statistical significance to analyze the evolution of the homicide incidence.

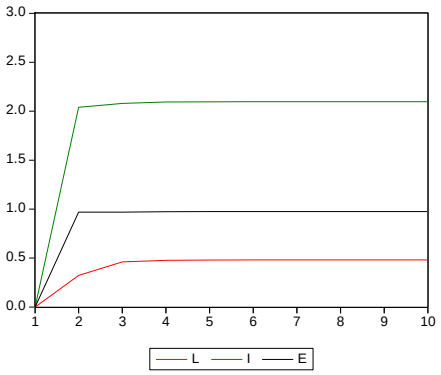
Likewise, based on the results of the last impulse-response function, we conclude that an increase in the proportion of men aged 16-19 has at most no effect on the homicide rate in the long run, dampening also a causality from population growth to homicides since *A* has a correlation of 0.95 with population.

Contrary to Pol and Silvestrini (2004), the proportion of men aged 16-19 is inversely linked to homicide incidence: *ceteris paribus*, one innovation in the proportion of men aged 16-19 produces a small reduction in the murder rate for two consecutive periods. The absence of a positive relation is clear from Figure 2 where the population of men 16-19 is declining while the murder rate inched up steadily. That is another interesting fact: the population is diminishing and aging while the homicide incidence is edging up speedily[4].

Another variable that has a surging effect on the murder frequency is the urbanization rate. In particular, an unexpected innovation in the proportion of the urban population generally enlarges the homicide rate. In the long run, the multiplication in murders appears to be partially embedded in the urbanization process.

What is the relative importance of the determinants of *H*? Can we say that urbanization affects more than lower employment? The error variance decomposition is a widely used tool that can help to answer this type of question. Figure 8 shows the decomposition results for VAR 1.

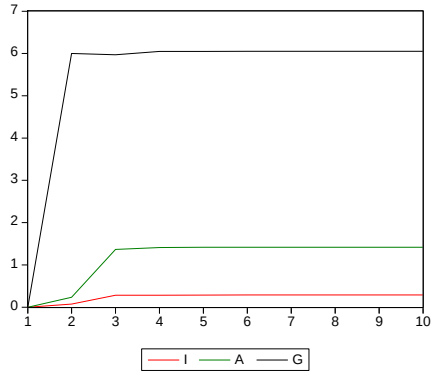
Figure 8. Variance Decomposition of VAR 1



For these three VARs, homicides in the past period are the variable of greatest influence. Thus, we avoid presenting it for ease of presentation. In the first VAR, the second variable of greatest influence appears to be the increases in the GNI per capita followed by the proportion of secondary enrollment. The employment to population ratio appears to have the lowest magnitude in this first specification.

However, in the second system, which is presented in Figure 9, the GNI per capita shows the lowest impact among the socio-economic variables. Both VAR 1 and VAR 2 indicated that what matters for a reduction in the homicide rate is employment performance, not just economic growth. This might suggest that the illegal drugs industry is fuelled by low employment creation, which may attract some individuals that seek high remunerations that are less likely in the legal market.

Figure 9. Variance Decomposition of VAR 2



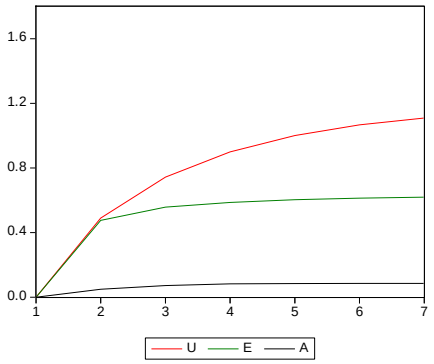
On the other hand, increases in single heads of household represent the second highest impact on the homicide rates, having a relatively higher correlation than other variables. One could infer that a more stable family plays a significant role in reducing the homicide incidence, perhaps by creating a higher probability of attaining self-control for children (future adults).

The proportion of young men has a middle influence in VAR 2 while it represents the variable of least influence in VAR 3, as

[4] There is a wide consensus in Puerto Rico that the population is aging and the population pyramids confirm it, though they were not included here for space considerations.

illustrated in Figure 10. These two error variance decomposition can lead us to reaffirm that the proportion of men aged 16-19 plays a minor role in explaining homicide incidence. The same conclusion applies to the proportion of secondary enrollment, which appears to have the second lowest impact on the homicide rates. On the other hand, urbanization rates create the strongest repercussions on homicide incidence

Figure 10. Variance Decomposition of VAR 3



Are these parameters structurally stable for the whole period? To answer this important question we applied a Chow forecast test, where the Chow forecast statistic is given by,

$$\lambda = \frac{1-(1-R_r^2)^{1/s}}{(1-R_r^2)^{1/s}} * \frac{Ns-q}{Kk^*} \approx F(Kk^*, [Ns-q]) \quad (4)$$

with $s = \left(\frac{K^2k^{*2}}{K^2+k^{*2}-5}\right)^{\frac{1}{2}}, q = \frac{Kk^*}{2} + 1, N = T - k_1 - k^* - \frac{K-k^*+1}{2}$;

$R_r^2 = 1 - \left(\frac{T_1}{T}\right)^K |\widetilde{\Sigma}_{(1)}|(|\widetilde{\Sigma}_u|)^{-1}$; $\widetilde{\Sigma}_{(1)} = T_1^{-1}\sum_{t=1}^{T_1} \hat{u}_t^{(1)}\hat{u}_t^{(1)'}$

where k_1 is the number of regressors), k^* is 23 and equals the forecast periods considered (T - T_1), T is full sample, $\hat{u}_t^{(1)}$ is the residual estimator of T_1 (the excluded periods in the test), and $\widetilde{\Sigma}_u$ is the residual covariance matrix, K are endogenous variables (5 in total). Given that the asymptotic λ can differ from the λ based on small sample (Candelon and Lütkepohl, 2001), we calculated bootstrap p-values that are shown in Figure 11. Since the null hypothesis is that there are constant parameters for the sample considered, it is shown that the model is structurally stable.

Figure 11. Chow forecast test: bootstrap p-values for VAR 3

4. Conclusions

There are a plethora of theories and variables that are imputed as the causes of crime and homicides. Among those are, for example, many psychiatric and biological theories that cannot explain in their own methodologies the changes in homicide incidence over time (e.g., temperature levels).

The punishment approach does not completely account for the high homicide incidence in this country: both the incarceration rate and the variable of police per 100,000 inhabitants are relatively high. The socioeconomic approach appears to be an appropriate framework to map the changes in homicide incidence, especially for countries like this where the social environment has changed significantly in terms of the labor market, economic performance, urbanization, family composition, and population growth.

While the economic inequalities are very high in this country, they cannot monotonically explain the changes in homicide rates. For this high-middle income country, three VARs were applied to test structural socioeconomic determinants that could explain a high change in the homicide rates over time. Based on the empirical tests, we conclude that the population growth and the proportion of men aged 16-19 did not caused the high homicides and that a jobless growth was insufficient to decrease the high level of murders. Instead, a reduction in employment and increases in single heads of households and in urbanization were more correlated with the surge in homicide incidence. Also, there

is some evidence that homicide incidence was also a self-propelled phenomenon, in the sense that past homicides induce more homicides in the following periods.

Although more research is needed, some conclusions to be drawn are that a significant improvement in the socioeconomic environment, especially in job creation, for the whole country is necessary to reduce the high level of homicides and to ensure a low or "natural" rate of crime. The failures of these governments to correctly address their homicide incidence are meaningful for other countries and jurisdictions.

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Appendix I:

VARIABLES	SOURCES
Labor market statistics like participation rate, employment, population 16 and older, G	US Bureau of Labour Statistics and by the Bureau of Labour Statistics, Department of Labour and Human Resources of Puerto Rico
Men in ages 16-19	Bureau of Labour Statistics of the US and in the Department of Labour and Human Resources of Puerto Rico
Homicides data	Police of Puerto Rico, Statistics Division, University of Puerto Rico (2014)
Total Population and GNI per capita	Maddison (2010)

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