Business Administration and Business Economic

Empirical Investigation into the Determinants of Compliance with IFRS 7 Disclosure Requirements

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Abstract: The purpose of this paper is to assess the quality of disclosures related to financial instruments provided in annual financial statements of Macedonian listed companies and empirically investigate factors that have the potential to influence the quality of these disclosures in accordance with IFRS 7 requirements. Based on the postulates and the results of the empirical investigations of prior IAS compliance studies I have constructed a disclosure index for each listed company and performed regression analysis with independent variables representing some characteristics of listed companies investigated, such as their size, industry, type of auditor engaged, ownership concentration, profitability and leverage. My regression analysis results supported the conclusion that the level of compliance with IFRS 7 requirements is related to the type of auditor engaged and ownership concentration in investigated companies. The results of my research will contribute the large body of empirical studies on IFRS disclosure and compliance, providing evidence from South-East European Transitional Economy that adopted IFRS as national financial reporting framework.

Keywords: company characteristics; disclosure indices; financial instruments; financial risks

JEL Classification: M41

1. Introduction

The purpose of this paper is to study the level of disclosure quality in the financial statements of listed companies in Macedonia in accordance with IFRS 7 disclosure requirements and provide empirical evidence in support of possible determinants of disclosure. Several accounting theories provide postulates that can be used to explain the rationale behind increased disclosure of information related to financial instruments. The information asymmetry and agency theory place the demand for better information disclosure in the hands of outside investors. Information asymmetry, as described by Akerlof (1970), means that the management in all cases

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has better information about the business than outside investors. Disclosing more information about financial instruments results in decrease of the information asymmetry, which from the point of view of investors decreases risks and improves decision making process. Jensen and Meckling (1976) described the agency problem as the difference in the motivation and interest between the management (agent) and the principal (shareholder). In our case could be interpreted as disclosing less information by the management if it is not in its best interest. According to the political cost theory by Watts and Zimmerman (1986) companies will disclose more information in order not to attract unnecessary interest by regulatory bodies, in our case the Securities and Exchange Commission. From the signaling perspective, companies will be motivated to disclose more information in order to distinguish themselves from the others. (Ross, 1977)

The postulates of these theories have been used to identify determinants of disclosures related to financial instruments, however, these theories could not be used to full extent in an environment such as Republic of Macedonia where there is large ownership concentration in listed companies (often family owned) and there is a lack of genuine interest or need among investors for financial statements prepared to full extent in accordance with IFRS requirements.

My main research question is: What are the determinants of superior disclosure of information related to financial instruments in the financial statements of Macedonian listed companies?

The main finding of this study is that Macedonian listed companies provide appropriate level and quality of disclosures in relation to financial instruments in their annual financial statements. I have also identified the ownership structure and the type of engaged auditor as statistically significant determinants of the quality of disclosures provided.

2. Literature Review and Hypotheses Development

In the past 20 years many researchers have examined the mandatory disclosures in the financial statements prepared in accordance with IAS/IFRS. Most of these are archival studies examining the determinants of disclosure quality, in terms of overall compliance or compliance in accordance with specific IFRS (Bischof, 2009; Dumontier & Raffournier, 1998; Glaum & Street, 2003; Lopes & Rodrigues, 2007; Street & Gray, 2002). Most of the studies use self-constructed disclosure indices to quantify the degree of compliance with accounting standard(s) requirements and explore factors that influence this degree of compliance. The characteristics usually considered include the size, industry, listing status, leverage or gearing of the company, ownership structure and concentration, profitability, type of auditor and

some corporate governance characteristics such as the existence of an independent audit committee. A lot of studies have provided both supportive and non-supportive evidence in favor of these determinants. Also, a great number of studies are comparative in nature and examine the country level determinants that influence the compliance with accounting standard requirements such as legal systems, culture, securities regulation, capital market supervision and existence or inexistence of rigorous enforcement of accounting standards. For example, Glaum and Street (2003) investigate the compliance level of companies listed on Germany's New Market with both IAS and U.S. GAAP disclosure requirements. Their univariate analysis indicated that the average compliance level is significantly lower for companies that apply IAS than those that apply U.S. GAAP. They also provided evidence that the overall level of compliance with IAS and US GAAP disclosures is positively related to the type of engaged auditor, being part of "Big 5" group. Street & Gray (2002) reported positive association between the level of compliance with IAS disclosures and having US or International listing status, the type of industry the reporting entity belongs to (commerce or transportation) and being audited by "Big 5" audit firm at that time. Dumontier and Raffournier (1998), in their research on swiss data, revealed that firms which comply with IAS are larger in size, with greater international diversification and wider shareholders' structure. They also find the listing status and auditor type also influence the level of compliance with IAS requirements.

When it comes to compliance with IAS/IFRS disclosure requirements for financial instruments, there are few good quality studies that are investigating specifically compliance with IFRS 7 and effect of its adoption on disclosure quality. Bischof (2009) investigated the effects of IFRS 7 adoption on disclosure practice of 171 European banks in 28 countries. He provided evidence that the level of disclosure significantly increased in the year of standard's first-time adoption, where the focus in disclosures shifted from market risk to credit risk. Before the issuance of IFRS 7, Lopes & Rodrigues (2007) investigated compliance of Portuguese companies with IAS 32 and IAS 39 disclosure requirements and identified some of the characteristics immanent for companies that were demonstrating greater compliance. Despite the difficulties in data availability and consistency among analysed companies, the authors concluded that disclosure degree is significantly related to the size, type of auditor, international listing status and respective industry.

Based on theoretical explanations and review of relevant empirical research, I have placed several hypotheses regarding company-specific characteristics and their relation to IFRS 7 disclosure practices of Macedonian listed entities.

First, the degree of disclosure is expected to be greater for large size listed companies, and the reasons for this expectation can be found in the postulates of the agency theory and political cost theory. Larger firms have higher agency costs than

smaller firms, since monitoring is more difficult and costly in larger organizations (Jensen and Meckling, 1976). Accordingly, this paper hypotheses that:

H_1. It is expected that large size listed companies will have greater compliance with IFRS 7 disclosure requirements in comparison to smaller listed companies.

Companies operate in different industries and often share common regulatory compliance attitudes and practices within the same industry. A lot of empirical studies provide empirical evidence in support of positive relationship between the type of industry and level of compliance with IFRS/IAs reporting requirements, but also there are studies supporting opposite claims. Glaum & Street (2003) for listed German companies found that industry has no significant effect on IAS mandatory disclosures. In contrast, Street & Gray (2002) report a positive association between compliance with IAS requirements and being in commerce and transportation industry. Lopes & Rodriges (2007) argued that firms from the same economic sector are interested in providing the same level of disclosures as the competition, in order to avoid negative market reactions and adverse opinion about their business behavior. Therefore, I make the following hypothesis:

H_2. The level of compliance with IFRS 7 requirements is expected to be greater for listed companies operating in the financial sector.

The ownership structure of the company can also motivate the management to comply in greater or lesser extent to financial reporting requirements. According to the principle arguments of the agency theory when there is less concentrated ownership structure (the company is without a dominant shareholder) the management is motivated to disclose more information in order to better dispose its obligations to enable better monitoring by large number of small shareholders (Jensen & Meckling, 1976). Several research studies provide empirical evidence supporting these claims. The research results verify the positive relationship between the level of information disclosure and the level of distribution of ownership structure, non-familiarity in ownership or the independence of the majority represented at board of directors (Chau & Gray, 2002; Prencipe, 2004). Therefore, I formulate H_3 as follows:

H_3. The level of compliance with IFRS 7 requirements is expected to be lower for companies with greater ownership concentration.

Alsaeed (2006) argues that firms which are more in debt are influenced by higher agency costs. Managers are motivated to reduce agency costs and disclose more information to satisfy the needs of debt holders. Consequently, this paper hypothesis that:

H_4. The level of compliance with IFRS 7 disclosure requirements is positively associated with company's financial leverage.

Previous research studies on determinants of corporate disclosure practices have also investigated the role of profitability of related companies (Ali et al., 2004; Gallery et al., 2008; Wallace and Naser, 1995; Wallace et al., 1994). Most of these researchers claim that managers are motivated to provide better disclosures when the company has better profitability in order to better present their ability to manage the company. The empirical findings of prior research are mixed. For example, Ali et al. (2004) and Gallery et al. (2008) in their investigation found a significant positive relationship between profitability and disclosure. In contrast Street & Gray (2002) and Glaum & Street (2003) provided empirical evidence that there is no significant association between profitability and disclosure. Despite the opposite findings of different researchers, the fifth hypothesis was formulated:

H_5. The level of compliance with IFRS 7 disclosure requirements is positively associated with firm's profitability.

IFRS disclosure studies regularly investigate the relationship between a firm's disclosure level and the type of external audit firm engaged. DeAngelo (1981) argued that larger auditing firms are worried more about their long-term established reputations and, therefore, have more to lose if they fail to report errors or misrepresentations in the financial statements. Thus, larger auditing firms have greater motivation to report non-compliance and maintain audit independence from their clients. Therefore, for this independent variable I have formulated the following hypothesis:

H_6. Listed companies audited by an audit firm member of international network are better complied with IFRS 7 reporting requirements.

3. Research Methodology and Sample Selection

The initial sample considered for the empirical investigation consisted of 116 companies listed on the official market of the Macedonian Stock Exchange as of 31 December 2013. However, the sample was reduced since only 104 companies have made their audited financial statements for 2013 publicly available at the time of the completion of the analysis.

In order to test the determinants of disclosure quality, I've used a model in which the dependent variable is the disclosure index constructed on the basis of relevant requirements of IFRS 7 for disclosure of information related to financial instruments. The index was comprised of 55 different pieces of mandatory information, and was calculated as a dichotomous, unweighted and adjusted for disclosures which are not applicable for respective. Dichotomous means that each disclosure included in the financial statements takes the score 1 in the total sum for the index, and non

disclosing the required information is scored 0 in the calculation of the index result. The total of the index for a certain company is calculated as:

$$T = \sum_{i=1}^{m} d_i$$

where d_i is 1, if the information i is disclosed, otherwise 0; m being the maximum number of disclosures (m=55).

The total score is computed as the unweighted sum of the scores of each item. The weighting is not performed for the reason of giving equal importance to all information for all user groups. The majority of disclosure studies use this approach of unweighted indices (Chalmers & Godfrey, 2004; Cooke, 1989; Raffournier, 1997). The weighting becomes insignificant, since different users of financial statements will choose different weighting factors for different disclosures dependent on their different needs.

The disclosure index specifies the maximum number of information pieces to be included in the financial statements, if the company is involved in transactions with all classes of financial instruments and exposed to all possible risks. As a condition, this is not realistic to be the case for all listed companies analysed in the sample, therefore I've applied procedure for adjustment of the index, applied in other relevant disclosure research studies by Cooke (1989) and Raffournier (1997).

As it was summarized in the hypotheses presented above, possible determinants of disclosure practice investigated in this paper are: size of the company, predominant industry, ownership concentration, leverage, profitability and the type of engaged auditor. The size of the company as determinant and independent variable can be measured according to different criteria, usually measured through the total assets (TotAss) or total income (TotInc) in other disclosure studies.

I've defined the independent variable, the industry to which the company belongs, as dummy variable (IND) that can take score 1 if the company belongs to the financial sector or 0 if the company belongs to non-financial sector. In the literature there is no unique way to categorize industries in order to make the best exploration of their effect on the quality of financial reporting. Most of the studies coded the industry variable through several categories representing different industries (Lopes & Rodrigues, 2007; Street & Gray, 2002; Tower et al., 1999), however I believe that classifying all entities in two groups of financial and non-financial companies is best suited for the circumstances and the environment of the financial reporting process in Macedonia. The approach considers the significant role of the Central bank of Republic of Macedonia and the Agency for Insurance Supervison as an effective regulators of the overall financial sector.

Concentration of ownership (OWN) as independent continuous variable can inversely influence the degree of disclosures in financial statements. The ownership concentration is one of the immanent characteristics of the Macedonian capital market, in addition, considerable number of listed entities often act as family owned firms. Other independent continuous variables included in the study were the leverage of the company (LEV), profitability (PROFIT) and type of engaged auditor (AUD). I have measured the leverage variable through the debt to equity ratio. The profitability (PROFIT) is measured through the ROE (return on equity) and the type of engaged audit firm is considered as dummy variable (AUD), in this case scored 1 if the audit firm belongs to international network or 0 if it is another audit firm.
Based on explanations presented above regarding dependent and independent variables, the research model is presented as follows:

$$\text{IndexOb} = \alpha_0 + \alpha_1 \text{SIZE} + \alpha_2 \text{IND} + + \alpha_3 \text{OWN} + \alpha_4 \text{LEV} + \alpha_5 \text{PROFIT} + \alpha_6 \text{AUD}$$

where

IndexOb= is the disclosure index result of the company;

SIZE = log of total assets or log of total income;

IND= dummy variable for the industry; 1 for financial companies, 0 for non-financial companies;

OWN= percentage of ownership concentration for shareholders in possession of more than 5% of common shares;

LEV= ratio total debt/ book value of equity;

PROFIT= ratio of net income/ average shareholders' equity;

AUD= dummy variable for the audit firm; 1 for International network firm, 0 for other audit firms;

4. Descriptive Statistics

The descriptive statistics for the sample is presented in table 1. The analysed data is subtracted from the 2013 audited financial statements of companies listed on Macedonian Stock Exchange.

Table 1. Sample descriptive statistics

	N	Maximum	Minimum	Mean	S.D.
Total assets	104	86,832,539	141,476	7,683,922	18,279,814
Total income	104	25,997,931	25,765	1,848,447	4,088,264
Ownership concentration	104	98.40	7.62	67.40	25.39
Leverage	104	13.01	0.00	1.56	2.90
Profit	104	1,990,378	-150,078	150,366	381,538
	N	%			
Industry					
Financial	13	12.50%			
Non-financial	91	87.50%			
Auditor type					
International network	61	58.65%			
Local firm	43	41.35%			

Listed companies included in the sample were predominantly from the non-financial sector (87.5%) and majority of them were audited by an audit firm which is part of international network (58.65%). On average listed companies were in compliance with 62.75% of the relevant disclosure requirements of IFRS 7. The results were rather disappointing when average disclosure compliance was analysed between companies audited by local audit firm (24.89%), and those audited by an audit firm member of international network (85.95%).

Table 2. Dependent variable means by auditor type, industry and ownership concentration

	Disclosure index	
	Mean	S.D.
	0.6275	0.04
Auditor type		
International network	0.8595	0.1755
Local firm	0.2489	0.0478
Industry		
Financial	0.9304	0.0224

Non-financial	0.5514	0.3310
Ownership concentration		
Dominant	0.5994	0.3414
Non-dominant	0.7272	0.2804

The highest level of compliance disclosure requirements was demonstrated by financial sector companies (93.04%), with significantly lesser standard deviation in comparison to non-financial sector companies. This means that in Macedonia financial regulators are more successful in developing stricter IFRS enforcement environment in comparison to the Securities and Exchange Commission and the Stock Exchange and their actual enforcement power over listed companies.

5. Regression Results

I have performed linear regression analysis in order to examine the relationship between the dependent variable measured as index of disclosure compliance with IFRS 7 reporting requirements and the explanatory independent variables considered in the model. The different measures for size were highly correlated (correlations between independent variables are shown in table 3), therefore I've decided to use the approach applied also by Cooke (1989) and use both measures in separate models. In each regression model White's heteroscedasticity consistent variance and standard errors were used (White, 1980). The results of the regression analysis have statistically validated two of the six hypotheses.

Table 3. Correlation Matrix for Independent Variables

	TotalAss	*Total Inc*	*Industry*	*Ownercon*	*Leverage*	*Profit*	*Auditor*	*Index*
TotalAss	1							
Total Inc	0.88413	1						
Industry	0.59224	-0.04882	1					
Ownercon	-0.06014	0.11172	0.02079	1				
Leverage	0.65918	-0.03363	-0.79403	-0.02073	1			
Profit	0.40331	0.30225	0.09218	0.15189	0.07253	1		
Auditor	0.31687	0.25869	0.42548	-0.21674	0.34115	0.30242	1	
Index	0.33204	0.28248	0.4302	-0.13591	0.37117	0.32614	0.97174	1

The H_3 hypothesis which states that compliance with IFRS 7 is in inverse relationship with the ownership concentration is supported by the regression results at the 5%

significance level. Although statistically significant the regression coefficient is very small and positive which is not consistent with the findings in the literature, namely Glaum *et al* (2013) who provided evidence that increase in ownership concentration decreases the quality of IAS compliance in financial statements. H_5 which states that the degree of compliance with IFRS 7 requirements is dependent on the audit firm engaged is also confirmed by the regression results at 1% significance level. This is consistent with Glaum & Street (2003) and Lopes & Rodriques (2007) who find positive relationship between compliance with IFRS requirements and the type of audit firm engaged.

My analysis did not show any significant relationship between the size of the companies and the degree of compliance with IFRS 7 requirements, which is consistent with the findings of the work of Street and Gray (2002), Glaum & Street (2003) and Tower et al (1999). Also, the regression analysis did not support the usual claim of disclosure studies that the companies operating in the same industry show similar levels of compliance with IAS/IFRS requirements (Lopes & Rodriques 2007).

Table 5. Regression results

	Model 1		Model 2		
Independent variable	Coefficient	(*t*-statistic)	Coefficient	(*t*-statistic)	
Auditor	0.555677	24.13038	0.552449	23.26123	*
Industry	-0.03574	-0.877	-0.03332	-0.8247	
Leverage	0.007927	1.345307	0.00766	1.441322	
Ownerconcent	0.000842	2.096764	0.000816	2.04892	**
Profit	1.46E-08	0.476769	1.05E-08	0.38602	
Totalass	-6.9E-11	-0.08641			
Totalinc			1.32E-09	0.523241	
Observations	104		104		
Adj R2	0.946225		0.946556		

Note: * significant at 1%; ** significant at 5%

6. Discussion and Conclusions

The Macedonian financial reporting environment has been aligned to the requirements of IFRS, since these are translated and adopted as published by IASB. Separate national accounting standards have not been developed and are not applicable for any reporting entity that needs to prepare general purpose financial

statements. Currently, IFRS as effective from 1 January 2009 and IFRS for SME are applicable for all preparers depending on their size classification.

Regardless of the aspects related to the regulatory environment and enforcement of application of IFRS, the central focus of this study was the actual compliance with IFRS 7 requirements by Macedonian preparers such as listed companies. In order to analyze the level of compliance achieved, I've constructed a disclosure index consisted of 55 pieces of information related to financial instruments. I've performed qualitative content analysis based on audited financial statements of Macedonian listed entities and concluded that on average companies were providing 62.75% of mandatory information for financial instruments as required by relevant IFRS 7 requirements.

My empirical investigation into IFRS compliance determinants for the disclosure practices of Macedonian listed companies revealed that ownership concentration and type of engaged auditors are statistically significant. Opposite to the common findings of disclosure studies (Alsaeed, 2006; Glaum et al., 2013; Lopes & Rodrigues, 2007; Street & Gray, 2002; Tower et al., 1999), size, profitability, financing structure and companies' industry have no significant relationship with the degree of their compliance with IFRS 7 requirements. My investigation has provided some interesting clues about the state of corporate governance and transparency practices in Macedonian listed companies. However, the study has its limitations, mainly related to the construction of the index of disclosure as dependent variable.

As in other disclosure studies that are using self-constructed indices the coding of the disclosed and non-disclosed information can be problematic, even for experience researchers familiar with financial reporting requirements. I've used only data from single year financial statements (financial 2013), but additional research of longitudinal nature covering several financial years could provide interesting facts about the trends in the relative quality of financial reporting practices of Macedonian listed companies. Despite these limitations, I believe that the research revealed interesting relations between the quality of disclosure practices and several characteristics of Macedonian listed companies.

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The Long-Run Relationship between Foreign Reserves Inflows and Domestic Credit: Evidence from a Small Open Economy

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Abstract: This paper investigates whether the Balance of Payments disequilibrium is a monetary phenomenon. The money demand function was formulated and utilised in the empirical testing of the monetary approach to balance of payments in Nigeria. The study applied the Johansen cointegration test, Pantula principle and Error Correction Mechanism (ECM) estimation techniques in the determination of the long and short-run relationships between foreign reserves inflows and domestic credit. The study found that BOP is a monetary phenomenon depending on the nature of the specification of the money demand function. The study recommends that the monetary authorities should impose stringent ceilings on domestic credit as excessive borrowing could cause drastic reduction in the inflows of foreign reserves.

Keywords: Monetary Approach; Pantula Principle; Balance of Payments; Nigeria.

JEL Classification: F40; C33; E51

1. Introduction

Economies (whether small or large) interact with the rest of the world through the exchange of goods and services culminating into economic transactions. These transactions are either in form of receipts or payments made in response to imports purchased or export (tangible or non-tangible) received by the other countries or the rest of the world. These transactions are recorded annually in the Balance of Payment accounts of every economy. Due to the strategic nature of the Balance of Payment accounts to the management and administration of every economy in the world; it was stipulated as one of the traditional macroeconomic goals in Keynesian economics: attainment of balance of payment equilibrium. However, as important as the BOP is, series of questions have trailed its true nature; whether it is a monetary phenomenon or not. The origin of this debate could be traced to the surge in international macroeconomics and monetary economics; with the resultant divergence in the perspectives/approaches to the analysis of the BOP phenomenon in the economic and econometric literature. From the macroeconomic perspective, it has been posited by several macroeconomic scholars that the balance of payments is

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linked to the domestic demand for money function. This is why, it has been argued that the disequilibrium of the BOP is a monetary phenomenon; that is, it is fundamentally determined by the disequilibrium in the domestic money market. This has led to endless economy-specific search for the one description of BOP as a monetary phenomenon for both developed and less developed countries (LDCs).

Also, scholars have reached a general consensus that the new monetarism of the new international monetarists has made significant contributions to the adjustment theory and school of thought. The monetary approach emphasized the role of money in the adjustment process of the balance of payments contrary to the previous pragmatic practice where the role of money was completely ignored. Based on this microcosm, the adjustment and disequilibrium processes of the BOP are now related and associated with to either money supply or external sector money growth or both.

Hence, in this study, we formulated and applied a money demand function in exploring the role of money and of its aggregates in the adjustment process of the BOP. This has formed the thematic interest and focus of the current study. The monetary approach to BOP has formed the bedrock of our study because it has the advantage of adopting an elaborate perspective of the adjustment process of the BOP through it affinity to both demand for and supply of money functions. Furthermore, the monetary approach gives insight into the BOP adjustment process under the flexible exchange rate system. In the context of flexible exchange rate, the difference between money demand and money supply acts as a determinant of exchange rate. For instance, an increase in money supply results to the depreciation of the exchange rate while an increase in real income associated with constant nominal money supply drags the price level downwards culminating into appreciation of the exchange rate. Therefore the major objective of this study is to assess the Balance of Payments in the context of the monetary approach and to ascertain whether it is a monetary phenomenon using the case of a small open economy (Nigeria). The rest of the paper is organised as follows: Section two presents the literature review while section three focuses on the theoretical framework of the model. Section four consists of the materials and methods (data issue, model specification and estimation techniques); section five presents the analysis and evaluation of the empirical results. Section six concludes the paper.

2. Literature Review

Adouka *et al*., (2013) conducted a study on the balance of payments in Algeria using the monetary approach for the period 1980 to 2010. The Edward model of 1989 was adopted. Terms of trade, External debts, International Reserves, Real Exchange rate, government expenditure, budget deficit and money supply were augmented into the

Edward model. These variables were categorized as external and internal variables. The study applied the unit root tests, cointegration tests(Engle and Granger and Johansen); and Error Correction Mechanism (ECM estimation techniques.The long-run and short-run relationships among real exchange rates, domestic credit and international reserves were investigated. The study found that an increase in international reserves results in a relative appreciation of the exchange rate. Also, the study found a positive relationship between exchange rate and domestic credit. This means that an increase in domestic credit causes an appreciation of real exchange rate. This finding is counter-intuitive. The weaknesses of this study are that it failed to explain the reason for the converse results.

Adamu and Itsede (2009) investigated the balance of payments adjustment for the period 1975 to 2008 using panel data estimation technique involving both the within and cross-country effects for countries in the West African Monetary Zone (WAMZ). (The Gambia,Ghana,Guinea,Liberia,Nigeria and Sierra Leone).The study categorised the balance of payments disequilibrium as either temporary or fundamental. It found that a strong negative relationship exists between domestic credit and net foreign assets. The study also found that interest rate and growth rate of GDP have significant impacts on the balance of payments for the WAMZ countries.

Chaudhary and Shabbir (2004) explored the nature and implications of the specification of money demand function on the performance of the monetary approach to Balance of Payments for Pakistan. The study adopted the traditional money demand function as the benchmark for deriving the reserve-flows equation. The traditional money demand function according to this study depends on real exchange rate, real income, domestic interest rate and the rate of inflation. The study found that an increase in the allocation of domestic credit leads to a corresponding increase in foreign reserves inflows.

Leon (1987) studied the monetary approach to the balance of payment for the Jamaican economy. Annual data was used in the estimation of the nature of the relationship between domestic credit and international reserves flows. It adopted the reserve flows and sterilization models.

Khan (2008) examined the monetary approach to balance of payments using currency substitution version of the money demand function for Pakistan with annual data spanning 1962 to 2005. The Johansen and Juselius cointegration technique was applied with results suggesting that real output, real exchange rate and domestic credit play an important long-run role in the determination of foreign reserves inflows in Pakistan.

Obadan (2012) observed that while the monetary approach to balance of payments analysis has been prominent, the findings are mixed and somewhat inconclusive.

According to Obadan (2012), the estimates of the reserve-inflows perspective are more prominent with most profound empirical findings. Most of these studies such as Aghevli and Khan (1977) and Bhatia (1982) upheld the view that money is a major determinant of balance of payments disequilibrium and adjustment process (Adamu and Itsede, 2009).

Akpansung (2013) attempted a theoretical appraisal of the empirical literature on the monetary approach to Balance of payments. The review covers studies on both developed and less developed countries. The empirical studies on Australia, Malaysia, Japan, Nigeria, Panama, Spain, Sweden and the United Kingdom were reviewed. A common consensus and inference drawn from the review indicated/revealed that major disequilibrium in the BOP are often occasioned by distortions in the economy's monetary aggregates. It also lends support to the view that the demand for domestic credit can either be used to correct the BOP disequilibrium or to aggravate it.

Spanos and Taylor (1984), investigated the validity of the monetary approach to the balance of payments for the United Kingdom using quarterly data from 1965:I to 1971:IV. The study adopted the fixed exchange rates regime and specified a reserve flow equation using the real Gross Domestic Product, implicit GDP deflator, and a proxy for interest rate defined as the gross redemption return on government bonds (issued at par with 20 years maturity period). The findings of the study found somewhat support for the monetary approach to balance of payments as being a monetary phenomenon but using a reserve - flow model is more appropriate when considered in the context adjustment/or disequilibrium.

Calvo and Mendoza (1996) examined the causes of the Balance of Payments crises in Mexico with the focus on shifts in the flows of foreign capital and the expectant financial system bailout. The study evaluated the sources of the December 1994 financial crash in Mexico and attempted an investigation of the five (5) previous separate steps taken since 1945 towards restoring/resolving the BOP crises. In order to explain the nature, sources and dimension of the crises, a link between banking fragility and world capital flows was established using the classic models of BOP crises proposed by Krugman (1979) and Obstfeld (1986). Furthermore, the study used the following questions as guide towards realising the main objectives of the study; first, why did Mexico lost its accumulated foreign reserves during the crises? Second, why did the devaluation strategy adopted by Mexico undermined Mexican's investment and propelled the worst recession ever experienced by the Mexican economy? Third, why was the multiplier effects of the Mexican crash felt by almost all the economies in the World? The BOP model formulated by this study relies on a monetary transmission mechanism in which expenditures and capital flows affect the demand (M_2). The Error Correction Mechanism (ECM) was applied in the estimation of the single-equation model of M_2 and predicted M_2.

Also, the study conducted multivariate Granger Causality test using two and four lag structures of the following variables; lagged GDP, real M_2, Interest rates, expenditures (consumption expenditure, investment expenditure and net exports), the terms of trade and exchange rate.

The study found a strong link between money and private expenditure; and the effects of the world capital markets on Mexico's M_2 was established.

Khvostova *et al.*,(2013) analysed the determinants of balance of payments changes for seventy-eight (78) countries with different exchange rates regimes(free floating, currency board, conventional fixed peg, crawling peg, currency band, managed floating) from 2006 to 2010. The modelling approach adopted by this study is after the pragmatic practices of Ross (1991), Lee and Chinn (1998), Boyd *et al*; (2001) and Gomez and Paz (2005) who applied the traditional approach to modelling the dynamics of the Balance of Payments. The variables included in the traditional approach include trade balance, price level in the country, foreign price level, volume of imports, nominal exchange rate, exports and real effective exchange rate. The study considered balance of payments as an intermediate target of monetary policy. Furthermore, the role of capital account in the evaluation of the adjustment process of the BOP was considered; and the study found two avenues in which monetary authorities would prefer to influence the establishment of BOP. In the face of negative shock of capital outflows, the monetary authorities have two alternatives; first either reduce production in response to decline in investment, or second, use external reserves to forestall the overwhelming impact of domestic demand. Regulating capital flows by using interest rate could compound the problem by producing negative consequences and escalate the problems in the financial sector. The study applied the unit root tests, structural breaks tests, and Ordinary Least Squares estimation techniques. The study found that Central Banks policies are highly influenced by the type of exchange rate regime of the country.

3. Theoretical Framework of the Model

According to Khan (2008) and more recently Obadan (2012), the Monetary Approach to Balance of Payment can be traced to the studies of David Hume (1752) and the revival of the classical price-specie-flow mechanism. However, two principal developments spurred the uncommon upsurge in the application of MABP approach. These include the research team of the University of Chicago led by Milton Friedman and the Polak-led team of the International Monetary Fund (IMF) with a special interest in proffering solution to the monetary policy crises experienced by most central banks globally especially among the LDCs..In the late 1960s and early 1970s, Mundell (1968) and Johnson (1972a, 1972b, 1972c)

contributed to and developed some essential aspects of the MABP.Since then, there has been a torrent of contributions to this important theory of the balance of payment.

Obadan (2012) identified the following assumptions of the MABP.

First is the assumption of a small and open economy that is both an international prices of goods and interest rate taker. This implies that the small open economy is an active participant in global economic transactions and relations.

Second is the assumption of perfect capital mobility and perfect currency substitution among economies involved in the global international economic relations. This assumes that the domestic and international interest rates equilibrate but only diverge at disequilibrium. The law of one price which applies here connotes that the MABP relies on efficient global markets.

Third, the MABP assumes a stable demand for money function. An addendum to this assumption is that money demand and its determinants (income, prices etc) are fixed overtime; and

Fourth is the assumption that exchange rates ensures that external reserves flows between countries in order to adjust to payment disequilibrium.

Essentially, the MABP is a theory of the overall balance of payments which rejects separate evaluation of the current and capital accounts. The overall BOP surplus is:

$$(EX - IM) + i^* I_f + Ks = \Delta R = \Delta BM - \Delta Ds \quad (1)$$

where $(EX - IM)$ is net imports, $i^* I_f$ represents investment income from overseas, (i^* is the foreign interest rate, I_f is foreign investment by residents of the domestic economy). ΔR is the change in foreign reserves while ΔDs connotes the additions to foreign exchange reserves and domestic assets which form the bedrock for monetary expansion by the banking system ΔBM . Hence both domestic and foreign assets are assumed to be perfect substitutes.

Also, the MABP assumes that the balance of payment is a monetary process that hypothesizes that the disequilibrium in the BOP is a reflection of a similar imbalance existing between domestic supply of and demand for money (see Khan, 2008).Owing to the hypothesized disequilibrium in the BOP, an automatic adjustment process is expected. Obadan (2012) aptly summarises the nature of the adjustment process. First, when money supply is greater than the demand for money, the following outcomes are expected: residents in the economy that is experiencing the adjustment process are expected to experience an increase in their expenditure on foreign goods, financial assets and services with a deficit in the BOP that leads to a fall in foreign

exchange reserves with an associated decrease in money supply that eventually culminates into money supply equilibrating the demand for money.

Second, when the demand for money is greater than the supply of money, the followings are the obvious occurrence. Residents will experience a drastic reduction in their expenditures on foreign assets, goods and services. The BOP will experience a surplus with increase in both foreign exchange reserves and money supply leading to equilibrium between the demand for and supply of money.

The model of the MABP according to Obadan (2012) and Khan (2008) relates the money demand and money supply components, the BOP and exchange rates. The demand for money component in its fundamental formulation represents a money demand function in which the demand for real money balances is assumed to be a stable but linearly homogeneous function of a number of macroeconomic factors expressed below:

$$M_d = M_d(P, Y, r) \quad (2a)$$

$$M_d = L(P, Y, r) \quad (2b)$$

With $L_p > 0, L_y > 0, L_r < 0$

Where M_d is nominal demand of money balances,

P is price level,

Y represents wealth (real income), and

r represents interest rate.

Equation (2a and 2b) mean that the demand for money is a function of prices, wealth or real income and interest rate. Prices and real income are hypothesized to be positively related to M_d .This implies that the more the income that is available in the economy, the more the money that the residents will have to purchase more goods and the higher the price level, the more the money that would be required to purchase any desired asset, good or service. Conversely, interest rate is hypothesized to be negatively related to M_d .This implies that higher interest rates lower the volume of money people hold for transactionary and precautionary purposes.

Assuming that the income velocity of money is a function of only interest rate and has invariant tendencies towards the changes in income; the demand for money balances becomes:

$$M_d = k(i)PY \quad (3)$$

Where $k(i)$ represents the inverse of velocity as a function of the interest rate and PY is defined as nominal income. If the income velocity $\left[\frac{1}{k}\right]$ is hypothesized to be insensitive to the interest rate. The Cambridge version of equation (3) is stated as:

$$M_d^* = kPY \qquad (4)$$

Where k represents the ratio of the desired nominal money balances nominal income. k connotes a constant fraction showing how money demand will behave given a change in either P or Y. Equation (4) says that the demand for money is a function of price and real income. Dividing both sides of equation (4) by P gives the demand for the stock of real money balances as a stable, linearly homogeneous function of real income.

$$M_d^* = kY \qquad (5)$$

The demand for money function expressed in equation (5) represents the domestic demand for money.

The second component of the MABP model represents the supply of money function in which the supply of money (M_s) is depicted as the product of the money multiplier (m) and the monetary base (B) (also known as high-powered money).

$$M_s = m.B \qquad (6)$$

The monetary base has two components: the domestic component (D) consisting of domestic credit and the other component is the international component(R) which is the domestic currency value of the monetary authority's external reserves accumulation. The monetary base is expected to change as the lending capacity of commercial banks changes, in which case the increase in base money has the tendencies to expand M_s while the reduction in base money reduces the supply of money.

Hence, the base money identity is written as:

$$B = D + R \qquad (7)$$

Substituting (7) into (6) above, the money supply equation can be redefined as:

$$M_s = m(D + R) \qquad (8)$$

The final component of the MABP is the money market equilibrium condition often stated as:

$$M_s = M_d \quad (9)$$

Obadan (2012) critically analysed the conditions that almost always necessitate the adjustment mechanism that cause the condition in (8) above to occur. The adjustment mechanism varies with the different exchange rates regimes. Under the fixed exchange rate regime, money supply adjusts to equilibrium with money demand using the channel of international flows of money via BOP imbalances. During the flexible exchange rates regime, money demand will adjust to an equilibrium position with exogenous money supply through the channel of exchange rate changes while where the exchange rate system is flexible but with intervention from the apex bank or regulatory authorities to keep exchange rate (dirty float or managed float) at a determined level, both the exchange rate and the international money flows experience a change.

4. Materials and Methods

4.1 Source and Description of Data

Annual time series data for the Nigerian economy were used for the estimation of our models. Data were sourced from the Central Bank of Nigeria (CBN) Statistical Bulletin for various years. The study covers the period 1970 to 2012.

4.2 Specification of Model.

From the theoretical framework, the model representing the first component of MABP is specified as:

$$M_d = \beta_0 + \beta_1 RGDP_t + \beta_2 ITR_t + \beta_3 RPL_t + \beta_4 REER_t + \Sigma_t \quad (10)$$

$\beta_1, \beta_3, \beta_4 > 0.\ \beta_2 < 0$

Where M_d (money balances), $RGDP_t$ (wealth or real income), ITR_t (domestic interest rate), RPL_t (real price level) and $REER_t$ (real exchange rate) are similar to M_d, P, Y and r in model (2) above but represents the logarithm of nominal money balances, domestic interest rate, price level, real income and real exchange rate in equation (10). Σ_t represents the stochastic term. Equation (10) similar to equation (2) because it hypothesizes that real money balances are positively related to real income being an increasing function of real income. Domestic interest rate (ITR_t) being the opportunity cost of holding money relative to financial assets is expected to be negatively related to real money balances. $REER_t$ is expected to be positively related to nominal money balances. Obadan (2012), Khan (2008) and,

Arango and Nadiri (1981) have argued that a depreciation of the domestic currency is expected to increase the financial worth of foreign financial assets held by domestic or resident portfolio holder if they perceive this to mean an increase in their wealth. This would eventually increase the demand for money. Hence an increase in real exchange rate is hypothesized to increase the demand for money. But if the exchange rate depreciation occurs in a debtor country such as Nigeria, the Naira value of wealth is expected to decrease and this is expected to reduce the demand for money. Therefore, exchange rate is hypothesized to be negative (see Khan and Sajjid, 2005 and Khan, 2008).

The second component of the MABP can be expressed mathematically in terms of money supply as:

$$M_s = P_t + FRS_t + DMc_t \tag{11}$$

Equation (11) expresses money supply as equal to the sum of prices, foreign reserves and domestic credit to the economy. This also expresses money supply as consisting of external (foreign reserves) and domestic (credit to the domestic economy) components. In equation (11), M_s, P, FRS and DMc represent the logarithm of base money, price level, foreign reserves and credit to the domestic economy and are written in real terms. From equation (11), we obtain the foreign reserves function as: $FRS_t = M_s - P_t - DMc_t$. Assuming that the equilibrium condition holds such that $M_d = M_s$ then,

$$FRS_t = M_d - P_t - DMc_t \tag{12}$$

Substituting equation (2) into equation (12) akin to Khan (2008) and, Otane and Sassanpour (1988), we obtain:

$$FRS_t = L(Y_t, r_t, -DMc_t) \tag{13}$$

Equation (13) can be written in an econometric form for foreign reserves as:

$$FRS_t = \phi_0 + \phi_1 RGDP_t + \phi_2 ITR_t + \phi_3 REER_t - \phi_4 DMc_t + \Sigma_t \tag{14}$$

$$\phi_1, \phi_3 > 0;\ \phi_2, \phi_4 < 0$$

Equation (13) implicitly expresses two conditions that relate money demand, credit to the domestic economy and foreign reserves inflows. First; if money demand exceeds credit to the domestic economy then foreign reserves is expected to be positive. Second, if the credit to the domestic economy is greater than the demand for money then foreign reserves is hypothesized to be negative.

4.4. Estimation Technique

4.4.1 Unit Root Test

Recent advances in econometrics have noted that testing and ascertaining the unit root and order of integration of time series data is a pre-condition for obtaining reliable and consistent results (Gujarati, 2011 for instance).Fuller (1976) and, Dickey and Fuller (1979,1980) developed a parametric test for the determination of the stationarity and order of integration of time series data. Dickey and Fuller (1980) adopted three basic types of models in the process of testing for the stationarity of variables in a model.

The first model:

$$X_t = \phi X_{t-1} + \varepsilon_t \quad (15)$$

consists of models without intercept or trend.

The second model:

$$X_t = \phi X_{t-1} + \alpha + \varepsilon_t \quad (16)$$

comprises of models with intercept without Trend.

The third model

$$X_t = \alpha + \beta_t + \phi X_{t-1} + + \varepsilon_t \quad (17)$$

consists of models with intercept and trend. The hypotheses are stated in consonance with the three models above as:

$H_0 : \phi = 1$: This implies that the series is non-stationary connoting the presence of a unit root.

$H_1 : |\phi| < 1$: This implies that the series is stationary depicting the absence of unit root.

The null hypothesis states that the series is non –stationary and as a result has a unit root.

The alternative hypothesis states that the series in its absolute value is stationary and as such unit root is absent.

If the null hypothesis holds, we fail to reject the null hypothesis but if the null hypothesis is violated, we do not reject the alternative hypothesis. The null hypothesis is usually tested using the three models above but starting from the third equation (17) to the first equation (15).

4.2.2 Pantula Principle

The determination of the long-run relationship using the Johansen cointegration test is not adequate in itself. The Johansen cointegration test uses three (3) most accepted models: model 2, model 3 and model 4 respectively. Of the three (3) models, there is need to select the most suitable and appropriate. This selection is done using the Pantula principle. The Pantula principle is described in some reasonable details below in table (1). Our model contains five(5) series: FRS,RGDP,PSC,REER and ITR.Therefore, $n = 5$. There are five (5) trace-test statistics and five (5) maximum Eigen value-test statistics for each of the models. Using the trace-test statistics, there are $tr_{i,j}$ estimated trace statistics with i representing model i and $i = 3$ for model 2, 3 and 4 respectively. r represents the cointegrating vectors. The implementation of the Pantula principle starts by evaluating model 2 row one with $r = 0$, that is, using trace statistic ($tr_{2,0}$). If the trace statistic ($tr_{2,0}$) exceeds its critical value. Then proceed to model 3 using $r = 0$ for trace statistics($tr_{3,0}$).If the trace statistics($tr_{3,0}$) exceeds its critical value; continue with the other model and with other rows until you get to model whose trace statistics does not exceed its critical value. This model is selected using the trace statistic of that row. This is the rudimental description of the Pantula principle of cointegration best model selection.

Table 1. Cointegration Model Selection using the Pantula Principle

H_0: r	n – r	Model 2	Model 3	Model 4
0	5	$tr_{2,0}$	$tr_{3,0}$	$tr_{4,0}$
1	4	$tr_{2,1}$	$tr_{3,1}$	$\rightarrow tr_{4,1}$
2	3	$tr_{2,2}$	$\rightarrow tr_{3,2}$	$\rightarrow tr_{4,2}$
3	2	$\rightarrow tr_{2,3}$	$\rightarrow tr_{3,3}$	$\rightarrow tr_{4,3}$
4	1	$\rightarrow tr_{2,4}$	$\rightarrow tr_{3,4}$	$\rightarrow tr_{4,4}$

4.4.3 Johansen Cointegration and Error Correction Mechanism (ECM)

4.4.3.1 Johansen Cointegration

Several methods for testing for cointegration have been proposed and applied in the econometric literature. But in this study, we are interested in the Johansen cointegration test. Cointegration test is conducted in this study because Granger (1986) observed that:

"A test for cointegration can be considered or thought of as a pre-test to avoid spurious regression" Granger (1986, p. 226).

While unit root test is a pre-cointegration test; cointegration is a pre-ECM test (as it is a necessary condition for the application of ECM).Also, it is appropriate to differentiate the tests for unit root from the test for cointegration. As Dickey, Jansen and Thornton (1991) aptly observed:

"*Tests for unit roots are performed on univariate (i.e. single) time series. In contrast, cointegration deals with the relationship among a group of variables, where (unconditionally) each has a unit root*". Dickey, Jansen and Thornton (1991, p. 59)

This means that unit root tests are usually always performed on individual time series while cointegration tests are applied on a group of variables or series. The Johansen cointegration test is unique because its application requires that the number of cointegrating vectors be detected using the trace statistic. Hence, the statement of null and alternative hypotheses are required. The null and alternative hypotheses are:

$H_0 : r = 0$: The null hypothesis states that there are at most *r* cointegrating vectors.

$H_A : r = k - 1$: The alternative hypothesis states that there are at least *r* cointegrating vectors.

The rule of thumb for the rejection of the null hypothesis which connotes the non-rejection of the alternative hypothesis is: If the trace statistic is lower (in value) than the critical values at a chosen significance level, we do not reject the null hypothesis BUT otherwise, we reject the null hypothesis. However, in line with the hypothesis, the following steps are required for the estimation of the long-run relationship:

Step One: Test the hypothesis that the number of cointegrating vectors is strictly zero, implying that $r = 0$.

Step Two: Test the hypothesis that the number of cointegrating vectors is strictly equal to unity which implies that $r = 1$.

Final Step: Test the hypothesis that the number of cointegrating vectors is strictly k coefficient minus unity, that is, $r = k - 1$.

Inferences relating to the number of cointegrating vectors are drawn based on the hypothesis and the steps outlined above.

The Johansen cointegration test is adopted in this study because the test is adjudged to be superior to other tests (such as the Engle - Granger cointegration test), because it has the requisite/desirable statistical properties. Assumption of Johansen cointegration test: It is assumed that the system is integrated of order one (I(1)). A major advantage of the Johansen cointegration test is that if there are variables that

are integrated of order two (I(2)), provision is made for their transformation. The difference operator ∆ =1-L, or L=1-∆ is used to transform the variables that are integrated of order two to order one. After transforming the model using L=1-∆ , a lag is lost resulting to K-1 lags (where K represents the lags on each variable). The Johansen and Juselius procedure is based on a maximum likelihood estimation of the ECM (Dhliwayo, 1996)

$$\Delta X_t = \lambda_0 + \mu_i \Delta X_{t-1} + ... + \mu_{k-1} \Delta X_{t-k-1} + \pi x_{t-1} + \varepsilon_t \quad (18)$$

X_t is defined as $(nX1)$ of vector I(1) variables, λ represents an n-dimensional vector of parameters (μ_1,... μ_{k-1}). π are (nxn) matrices of parameters. ε_t is defined as an $(nX1)$ vectors of stochastic error term.

The major focus of this study is the investigation of the long and short-run relationships between foreign reserves and domestic credit. The information about the long and the short-run equilibrium is found in the error-correction term and the cointegration analysis (Engle and Granger , 1987; Engle and Yoo, 1987; and Banerjee *et al*. , 1993).

4.4.3.2 Error Correction Mechanism (ECM) Estimation Technique

According to Sjo (2008), a *prori* information can be used to estimate an error correction mechanism first and then proceed to include it in an equation of variables in their first differences. Generally, this is specified as;

$$\Delta X_{it} = \beta_0 + \sum_{i=1}^{k} \gamma_{1,i} \Delta x_{i,t-i} + ... + \sum_{i=1}^{k} \gamma_{n,i} \Delta x_{n,t-1} + \theta \varepsilon_{t-1} + u_t \quad (19)$$

In the above ECM general equation, the error term(ε_{t-1}) can be used as error correction mechanism. If these are *n* variables involved in the ECM, the lag length selection is done so that u_t in the above equation in $\text{NID}(0,\sigma^2)$ stochastic term. Specifically, the ECM above can be written as:

$$\Delta FRS_t = \beta_0 + \sum_{i=1}^{k-1} \delta_{1,i} \Delta FRS_{t-1} + \sum_{i=0}^{k-1} \delta_{2,i} \Delta RGDP_{t-1} + \sum_{i=0}^{k-1} \delta_{3,i} \Delta ITR_{t-1} + \sum_{i=0}^{k-1} \delta_{4,i} \Delta PSC_{t-1} + \sum_{i=0}^{k-1} \delta_{5,i} \Delta REER_{t-1} + \theta \varepsilon_{t-i} + u_t$$

(20)

In both the general and specific forms of the ECM above, ∆ represents the first difference operator; θ represents the speed of adjustment towards long-run

equilibrium as suggested in Sjo (2008); ε_{t-1} represents the lagged value of the error correction and u_t is as previously defined.

The specific form of the ECM postulates that as the growth rate of real income increases, it will necessarily lead to the improvement of the Balance of Payment position of the economy. Also, the change in real exchange rate is hypothesized to enlarge foreign reserves through the increase in money demand.

5. Empirical Results

The empirical results presented below include the results of the unit root test, Pantula principle, Johansen cointegration test and error correction mechanism.

5.1 Order of Integration/Unit Root Test

The results of the ADF unit root / order of integration test are reported below in table 2.The ADF statistic were compared with the Mackinnon critical values at the 1 percent, 5 percent and at the conservative 10 percent level of significance. The result of the comparison of the ADF statistic with Mackinnon critical values shows that all the series (FRS,RGDP,PSC,REER and ITR) were non-stationary at levels; which implies that we do not reject the null hypothesis of the presence of unit root or non-stationarity at levels. However, the null hypothesis was rejected for these series at first difference except for two of the series (PSC and REER). The results show that all the series are not integrated of order zero at levels but are integrated of order one (I(1)) and order two (I(2)) respectively. We therefore proceed to test for the long-run relationship among the variables using the Johansen cointegration test.

Table 2. Order of Integration Tests of the Series

Series	ADF LEVEL		ADF FIRST DIFFERENCE		ADF SECOND DIFFERENCE		Order Of integration
	Intercept	Intercept / Trend	Intercept	Intercept / trend	Intercept	Intercept / trend	
LFRS	-0.1731	-1.7228	-3.7851*	-3.7413**	-	-	I(1)
LRGDP	-1.2154	-0.3268	-5.5711*	-5.6826*	-	-	I(1)
LPSC	-0.8154	-2.0870	-2.4853	-2.4801	-4.4272*	-4.4638*	I(2)
REER	-1.5484	-1.2730	-2.6626***	-2.8496	-4.6706*	-4.5864*	I(2)
ITR	-0.2043	-1.1631	-3.3270**	-3.7692*	-	-	I(1)

Source: Author's Calculation.

NOTE: * , ** and *** connote 1 , 5 and 10 percent significance levels.

5.2 The Pantula Principle:Test of the cointegration Models

Table 3. The Pantula Principle Test Results for Model 2, 3 and 4

r	n – r	Model 2	Model 3	Model 4
0	5	122.6835	107.0305	126.1172
1	4	64.3757	56.1049	75.1915
2	3	33.3340*	27.7069	46.1655
3	2	12.7160	7.3541	24.8980
4	1	4.5987	0.2698	6.9820

Source: Author's Calculation

NOTE: Trace statistic values are reported for each model

From Table 3 that shows the results of the Pantula principle test, we compared the trace statistics for the three models with their respective critical values. This is to enable us to choose which of the three models is more appropriate. We started with the smallest number of cointegrating vectors **r = 0**, we checked whether the trace statistic for model 2 rejects the null hypothesis. It was found to be yes. So we proceeded to the next model 3 and model 4; we found that both model 3 and 4 rejected the null hypotheses also. At **r = 2**, we found that the Pantula principle holds for model two because its trace statistic was less than the 5% critical value (reported in this study).

5.3 Cointegration Tests

Table 4. Results of the Cointegration Tests

Hypothesized No. of CE(s)	Eigen Values	Trace Statistics	5% Critical Values	1% Critical Values
None**	0.8200	122.6835	76.07	84.45
At most 1**	0.5988	64.3757	53.12	60.16
At most 2	0.4547	33.3340	34.91	41.07
At most 3	0.2124	12.7160	19.96	24.60
At most 4	0.1265	4.5987	9.45	12.97

Source: Author's Calculations

NOTE :*(**) denotes rejection of the hypothesis at 5 percent (1 percent) significance level. Trace statistics indicates two cointegrating equations at 5 percent level of significance.

We reported the results of the cointegration tests of equation 2 based on the **Pantula** principle. For $r = 0$ (none), the trace statistic (122.684) is greater than the critical values at both 1 and 5 percent significance levels. Thus, we reject the null hypothesis that there are at most r cointegrating vectors or equations. This is **step one**.

Second Step; for $r \leq 1$ (at most 1), the trace statistic (64.3757) is greater than the critical value (53.12) at 5 percent level of significance and (60.16) at 1 percent level of significance. Hence, we reject the null hypothesis that there are at most $r = 1$ cointegrating vectors or equations.

Third Step: For $r \leq 2$ (at most 2), the trace statistic (33.3340) is less than the critical values (34.91 and 41.07) at both 5 and 1 percent levels of significance respectively. In this case, we do not fail to reject the alternative hypothesis (we do not reject the null hypothesis).The result of this third step applies to $r \leq 3$ (at most 3) and $r \leq 4$ (at most 4) respectively. The results shown in table 3 above indicated that there are 2 cointegrating equations. This implies that there is a long-run relationship among FRS, RGDP, PSC, REER and ITR.

5.4 Results of the Error Correction Mechanism

The results of the ECM are presented below in table (5) and (6) respectively.

Table 5. Results of the Error Correction Mechanism(FRS as Dependent Variable)

Variable	Coefficient	Standard Errors	t -Statistics	Probability
C	0.458	0.418	2.0962	0.012
FRS(-1)	0.0619	0.2330	0.2657	0.793
ITR	-0.6054	0.2083	3.6410	0.003
LRGDP	0.3840	0.3074	2.8483	0.008
LPSC	-0.0402	1.918	4.0172	0.001
REER	3.1001	0.0741	2.1391	0.012
ECM(-1)	-0.3780	0.6230	3.2103	0.0032
$R^2 = 0.42$	$Adj.R^2 = 0.38$	$D.W. = 1.96$	$\Pr ob = 0.000$	

The coefficient of real Gross Domestic Product (GDP) had a positive and statistically significant sign. This deserves some explanation because the relationship between real GDP and foreign reserves is linked to money demand, domestic currency (the naira) and the Nigerian exports. The positive sign of the coefficient of real GDP signifies that as real GDP grows, the domestic currency appreciates through the expansion in the demand for money; the multiplier effects of the appreciation of the domestic currency is reflected or shown in the expansion of foreign reserves and exports.

The coefficient of interest rate (ITR) is negative but with very strong impact (0.60) on foreign reserves inflows. The negative sign implies that as interest rate increases foreign reserves inflows reduces. This simply portrays interest rate as a major determinant of foreign reserves inflows in Nigeria.The results presented in table (5) shows that the coefficient of domestic credit is -0.040 instead of -1.00.This means that the coefficient is not close to unity as posited by the monetary approach to BOP. The implication of this is that the expansion of domestic credit was an important determinant of the worsening BOP condition in Nigeria. This finding corroborates the results of Nyong and Johnson (1995) for the Nigerian economy and Khan (2008) for Pakistan. The negative sign of the coefficient of domestic credit (-0.040) connotes the existence of inverse relationship between foreign reserves inflows and domestic credit. The coefficient (-0.040) suggests that a rise in domestic credit would lead to outflow or decline of foreign reserves by about 4 percent in the long-run. This implies that although domestic credit policies are fundamental to the design of foreign reserves accumulation in Nigeria, its long-run effect is very weak. This is simply an indication of the weakness of monetary policies in the control and regulation of the demand for and supply of money in Nigeria.

Table 6. Results of the Error Correction Mechanism(PSC as Dependent Variable)

Variable	Coefficient	Standard Errors	t -Statistics	Probability
C	**0.816**	**0.0438**	**5.2863**	**0.000**
LPSC(-1)	**0.890**	**0.604**	**0.432**	**0.217**
FRS	**-0.320**	0.0216	2.463	0.019
ECM(-1)	**-0.194**	0.6230	0.2103	0.320
$R^2 = 0.35$ $Adj.R^2 = 0.30$ $\Pr ob = 0.004$ $D.W = 1.89$				

Source: Author's Computation

The results shown in table (6) indicated that all the variables had the expected signs (thus satisfying one of the fundamental test of robustness). The coefficient of the error-correction term is negative but statistically insignificant; which implies that about 20 percent of the disequilibrium of the previous period is adjusted and eliminated within the current period. The statistical insignificance of the coefficient of the error-correction term is an indication that there is no two-way causality between foreign reserves inflows and domestic credit. This implicitly suggests the existence of one way long-run causal linkage from domestic credit to foreign reserves.

5.5 Model Selection Criteria

Two versions of the error correction mechanism were specified and estimated in this study. There is need to select the most appropriate model. Model one was specified with FRS as dependent variable while model two was specified with PSC as the dependent variable (see table 7 below).

Table 7. Model Selection Criteria

Statistical Criteria	Model One	Model Two	Decision
$AdjustedR^2$	$Adj.R^2 = 0.38$	$Adj.R^2 = 0.30$	Model one has the highest adjusted R^2
AIC	-7.2240	-0.6143	Model one has the lower AIC
SC	-5.3022	-0.1132	Model one has the lower SC

Source: Author's Computation

NOTE: AIC denotes Akaike's Information Criteria while SC represents Schwartz Criteria

Using the above statistical criteria, the model with the highest adjusted R2 and lower AIC and SC values is adjudged the better specified model. From the statistical criteria shown in table 7 above, model one is selected as better specified.

6. Conclusion and Policy Implications

This study investigated the long and short-run relationships between foreign reserves inflows and domestic credit in a small open economy like Nigeria over the period 1970 to 2012. The major objective of the study is to determine whether the balance of payments disequilibrium is a monetary process; that is, to assess the theory of MABP and its implications for Nigeria. The money demand function was specified and estimated using the Johansen cointegration test, Pantula principle and error correction mechanism. These were applied as the major econometric techniques in the estimation of the long and short-run relationships between foreign reserves inflows and domestic credit. We found that the monetary approach to the balance of payments holds for Nigeria and a one-way long-run causal linkage exists/ runs from domestic credit to foreign reserves. This implies that domestic credit is a key determinant of the inflow of foreign reserves in Nigeria. Also, our results indicated that domestic credit is weakly and negatively related to foreign reserves inflows in Nigeria. This finding is important for the design and effective implementation of monetary policy in Nigeria. Since the expansion of domestic credit has a reducing effect on the inflows of foreign reserves, the monetary authorities should regulate domestic credit by imposing restrictions / ceiling on it.

Furthermore, our results showed that real GDP is positively related to the inflows of foreign reserves. This implies that the balance of payments is not entirely a monetary phenomenon as posited by most studies. Interest rate was found to be negatively related to the inflows of foreign reserves. This finding is a major validation of one of the assumptions of the MABP.

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Enhancement Approach in Well&Illness Tourism

Ruhet Genç[1]

Abstract: The component of tourism preparatory parties is to make tourists, whether they are medical or companion, feel more comfortable and bring back home good health attached to good memories. In order to lead a satisfactory discussion primarily wellness and illness tourism concepts are properly described. After explaining their dynamics, factors which are constitutive in these kind of touristic activities, mainly tourists' motivations are mentioned. As being a new era of medical tourism, it is shown that facilitators are of great significance. They offer medical value tourism by eliminating too many unknowns for the tourist. Not only empathy but queries also enable highlighting the tourists' expectations, experiences and showing the ways of understanding their situation better. New medical hubs and the future ones have to take into account, promote consumer researches that they can advance themselves in the light of new information. The best way to develop well&illness tourism is to make tourist, patient and their companion satisfied with their activities and/or treatment.

Keywords: health tourism; tourists; consumer's experience; medical value tourism

JEL Classification:

1. Introduction

Touristic activities are increasingly growing in variety of ways according to the needs, desires and changes in human life. Well&illness tourism is an expanding area. In tourism industry customer's needs and preferences gain prominence. Understanding the needs and interests of tourists become an important issue. Opportunities of the host place make possible the emergence of new medical hubs. As opposed to near past medical travel flows from Western countries to the Eastern countries with up-to-date medical services. Places which are famous with medical and/or healing techniques become the subject of the tourists who are after to keep their health or to prevent themselves from problems related with health. In that sense, well&illness tourism is divided into two categories as Illness Prevention Tourism and Medical Tourism. Well&illness tourism industry provides to the people medical and/or healing services.

In this expanding area of tourism there is a great potential for new contributions to our understanding of tourists' experience (Chen et al., 2008). Their motivation, psychology and problems are all need to be studied in order to improve the standards

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of well&illness tourism. What leads people to have touristic activities that would improve their health and what are their motivations? High-costs, long waiting lists, legal prohibitions of medical procedures, operations, and surgeries lead many patients to search for alternative health-care services abroad. Rejuvenating body, mind and spirit and cost saving are said to be the most important motivators of the well&illness travelers (Chen et al., 2008, Cormany & Baloglu, 2011). Health tourism is mostly understood as having a physical treatment but also tourists engage in an activity which will eventually bring about psychological well-being. Well&illness tourism includes tourists, patients and their accompanying person. The psychology of the patients throughout the whole travel, including before and after periods, must be taken into account. Facilitators emerge as new members of tourism profession for guiding patients. Aiming at looking through the eyes of the tourists must be in the provider's agenda. For a general perspective and a better understanding it is useful to look at the conceptualization and to emphasize related points.

2. Conceptualization of the Well&Illness Tourism

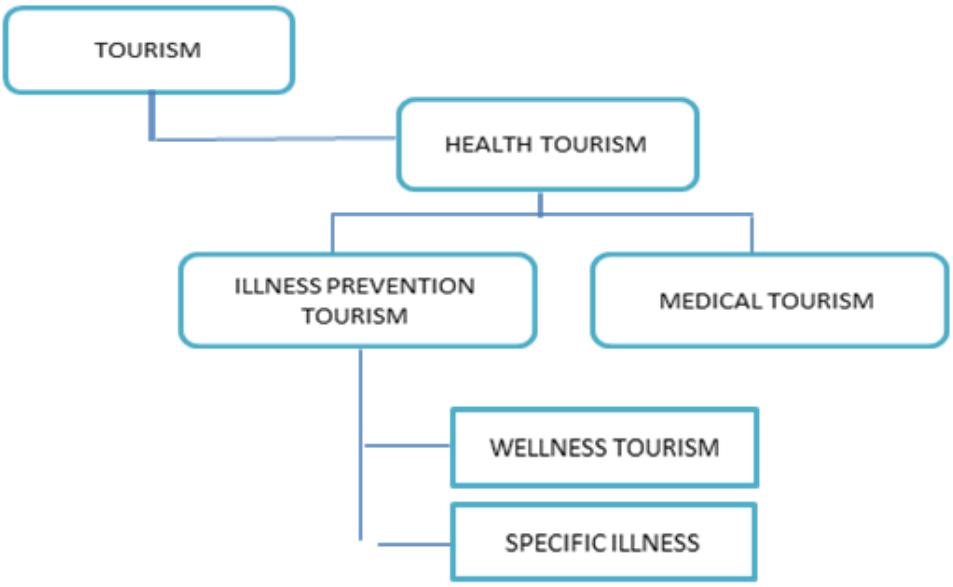
As an umbrella term, health tourism involves activities which are beneficial for the conditions of health. Health related travel and pilgrimage history can be traced backed to the Neolithic and Bronze Ages (Douglas, 2011), (Cook, 2012). The Ancient Mesopotamians, Ancient Romans considered the significance of climate, thermal waters onto health. This continued into the 18th and 19th centuries. The health cures and the sun became preferable and places with hot climate became popular touristic places for the ones who had been living in cold climatic conditions. With urbanization and industrialization, the concern for travelling to health developing places increased (Cook, 2012). The term widely used and became more popular and popular, spa, comes from three Latin words; namely Sanus Per Aquam.

There are divergent ideas for the definition of this kind of touristic activities. Health tourism is defined as "*any pleasure-oriented tourism which involves an element of stress relief*" (Bennett et al., 2004). From another point of view, it can be said to include touristic activities in which tourists' main motivation is utilizing health services by going to leisure settings. For an elaborate understanding, the divergence of medical tourism and illness prevention tourism has to be presented here. The needs and perspectives of both tourists' group will diverge as well as their intersection. Their expectations have major correlation with their needs.

Medical Tourism involves cosmetic surgery (breast, face, liposuction), dentistry (cosmetic, reconstruction), cardiology/cardiac surgery (by-pass, valve replacement), orthopedic surgery (hip replacement, resurfacing, knee replacement, joint surgery), bariatric surgery (gastric by-pass, gastric banding), In-Vitro

Fertilization/reproductive system (IVF, gender reassignment), organ and tissue transplantation (organ transplantation; stem cell), eye surgery, diagnostics and checkups (Lunt & Carrera, 2010) while wellness tourism involves sun, fresh air, water, spas and medicinal spas, mineral springs, the seaside within a therapeutic leisure setting. Acupuncture, meditation, yoga, spa and thallassotheraphy take attention of the tourists who wish to heal themselves or to keep their health. Market research shows that average three-to five-star hotels provide fairly comprehensive wellness facilities. Wellness hotels should therefore specialize in health information besides related facilities, individual care and a wide range of cultural and relaxation programmes (Mueller and Kaufmann, 2001).

Table 1. Medical tourism (adapted by Mueller and Kaufmann, 2001)



3. Motivations and Tourist Decision Making Process

Considering consumer experience brings about seeking the motivations behind touristic movement. There are both internal and external factors behind tourists' motivation. According to the circumstances and the different economical and cultural settings motivations differ. Subjective dynamics are vital also in the sense of decisions. Tourist health motivation can be seen as a position between individual values and lifestyles (Chen, Prebensen & Huan 2008). Also motivations of medical tourists are pertinent with the problems in their homeland. Primarily external problems will be shown in detail and the subjective dynamics will be paid attention

afterwards. Generally problems of medical tourists include increased bureaucratic work, issues with health insurance and remaining waiting list for medical procedures. Low cost and ascending quality of medical services in medical tourism destinations, the information technologies and enhanced communication with medical centers in other countries make favorable traveling abroad. In this general picture, low costs and accelerated quality of treatments in medical tourism destinations can be said to be the two important factors. As we know healing protocols are almost identical all over the world including medical equipment and medication.

Table 2. Medical tourism advertised prices in selected countries. (Hall 2013)

Procedure	*United States*	*United Kingdom*	*Singapore*	*India*	*Poland*	*Thailand*	*Mexico*
Heart bypass (CABG)	113,000	13,921	20,000	10,000	7,140	13,000	3,250
Heart-valve replacement	150,000		13,000	9,500	9,520	11,000	18,000
Angioplasty	47,000	8,000	13,000	11,000	7,300	10,000	15,000
Hip replacement	47,000	12,000	11,000	9,000	6,120	12,000	17,300
Knee replacement	48,000	10,162	13,000	8,500	6,375	10,000	14,650
Gastric bypass	35,000		20,000	11,000	11,069	15,000	8,000
Hip resurfacing	47,000		12,000	8,250	7,905	10,000	12,500
Spinal fusion	43,000		9,000	5,500		7,000	15,000
Mastectomy	17,000		12,400	7,500		9,000	7,500
Rhinoplasty	4,500	3,500	4,375	2,000	1,700	2,500	3,200
Tummy tuck	6,400	4,810	6,250	2,900	3,500	3,500	3,000
Breast reduction	5,200	5,075	8,000	2,500	3,146	3,750	3,000
Breast implants	6,000	4,350	8,000	2,200	5,243	2,600	2,500
Crown	385	330	400	180	246	243	300
Tooth whitening	289	500		100	174	100	350
Dental implants	1,188	1,600	1,500	1,100	953	1,429	950

Note: Prices are in U.S.A. dollar

Low costs are considered to be in the context of economic quality of life of medical tourists. The increase in the quality of treatments makes patients willing to involve in medical activities. Emerging and potential medical hubs consider potential of medical tourism for sustainable tourism and providers have tried to improve their standard of treatment, surgeries, medical practice and medical care. This realization and increase in both quality and quantity of medical treatment leads to a standardization. This process involves accreditation from internal health organizations (Turner, 2007).

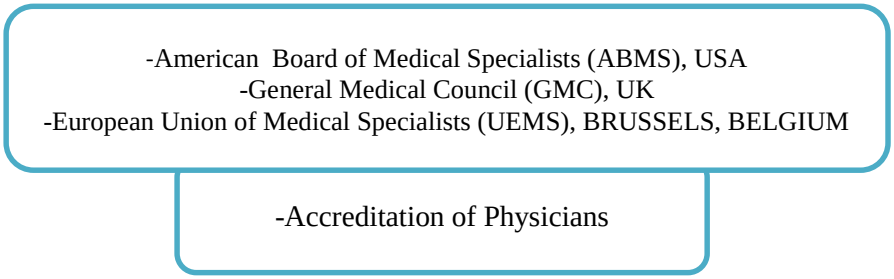
As much as other motivations, accreditation is a vital factor in the patients' decision making process. This is one of the dynamics of tourist satisfaction. Health is crucially

an important and sensitive point in the sense that the life of the people is at stake. Safety and trust are two prerequisite and essential points in that regard. Accreditation is the most significant assurance for receiving quality health care that tourists have to check the accreditations of the clinic or the hospital. When they are checking they have to rely on valid and credible norms. For an organization to be considered having genuinely high quality, it should be constantly seeking to maintain and ameliorate its level of standards. In health care, this will be achieved through: (a) maximizing safety by identifying and minimizing risks and (b) continually pushing up quality (Hodges, Turner & Kimball 2012). Patients can check whether the clinic or hospital that they prefer to go has a certification or has affiliations with reputable health providers and universities.

There are several international organizations for the accreditation of health-care facilities on an international basis. International Society for Quality in Health Care (ISQua) and The International Organization for Standardization (ISO) are some examples. There are also regional and country-based organizations that provide international accreditation to health-care facilities abroad. Joint Commission International (JCI) and Community Health Accreditation Program (CHAP) are well-known such organizations in the USA. JCI provides accreditation for health-care centers abroad which are particularly in service of medical tourism. In Europe, European Society for Quality in Healthcare (ESQH) is a similar organization. In Canada, Accreditation Canada, formerly called as Canadian Council on Health Services Accreditation (CCHSA); in UK, Trent Accreditation Scheme (TAS); and in Australia, The Australian Council on Healthcare Standards (ACHS) are other such institutions. Some organizations also provide certification in order to control the physicians' license. American Board of Medical Specialists (ABMS) is one of these accreditation organizations for physicians in the USA. ABMS involves several special boards, such as American Board of Family Medicine, American Board of Neurological Surgery, American Board of Ophthalmology, American Board of Plastic Surgery, and American Board of Surgery. These provide certificates to physicians who have proven their expertise in their specialty.

In Europe, there is European Union of Medical Specialists (UEMS) association for the standardization of the several European nations' medical organizations that provide certificate and license to physicians. In the UK, physicians' and doctors' licenses and certificates are controlled by the General Medical Council (GMC) in collaboration with UEMS. Many medical tourism destinations send their physicians or other medical specialists to USA or EU to obtain these certifications.

Table 3. International and regional organizations for the accreditation of health-care facilities and accreditation of physicians/surgeons


-American Board of Medical Specialists (ABMS), USA
-General Medical Council (GMC), UK
-European Union of Medical Specialists (UEMS), BRUSSELS, BELGIUM
-Accreditation of Physicians

The diversities in health problems and in their treatments may lead tourists find plausible solutions. Some problems need urgent denouement. When this is the case, waiting for medical procedures can affect the health condition of the patient negatively. In that situations health tourism enables the patient to be cured in a shorter period of time than s/he will be cured in her/his homeland. When this is not the case, going abroad to be cured can enhance the treatment according to the better conditions like temperature and fresh air of the touristic place. One study supported that cancer patients need touristic activities to "*bridge the gap between illness and everyday life, providing a mechanism for enabling a patient to return to a sense of normality even if only for a defined period of time*" (Hunter-Jones 2005).

When the patient needs an intensive health care, it will be better for her/him and companion to go in a foreign country for a change. In daily hassles, it will be harder to recover from the illness especially under worried looks of close friends and relatives but it is clearly stated in academic studies that tourism enables escaping from daily hassles so that touristic place will be much more suitable for a patient to recover and to relax. Touristic activity is an opportunity to relax and to get away from their daily routine lives (Genc, 2011).

The case is the same for the wellness travelers, as well. There is an indication that motivation of those tourists is not unidimensional. Findings reveal that the customers motivated to wellness facilities are apt to seek an environment that relaxes their body, mind and spirit while they are able to engage various programs and access to the nature (Chen et al., 2008). Another research confirms that wellness tourists are not homogenous but six benefits sought by wellness tourist can be labeled as; transcendence, physical health & appearance, escape & relaxation, novelty, re-establish self-esteem and indulgence (Voigt et al., 2011). Individuals who live in cold climate may wish to go to warmer places and the individuals who live in flat countries and on coasts may wish to go higher altitudes and mountains, vice versa.

Health tourism, in its several applications non-deliberately improves the health and psychological well-being of the individual (Genc, 2011). These travels have the potential to enhance the quality of life of individuals via psychological means. If consumer health benefits are essentially a product of the dissonance of contemporary lifestyles, then health destinations are valued as much for their psychological benefits as they are for their physiological effects (Chang & Beise-Zee, 2013). Variations of tourist's motivation about well&illness tourism causes differences in expectations and consequently problems about satisfaction will occur.

A further study shows that the individual health beliefs from the expectations of tourists regarding health-promoting destinations, and that a match between personal beliefs and the appearance of destination creates wellness and, ultimately, tourist satisfaction (Chang & Beise-Zee, 2013). Subjective dynamics are decisive in tourist satisfaction as motivation. Tourism activities have different meanings and

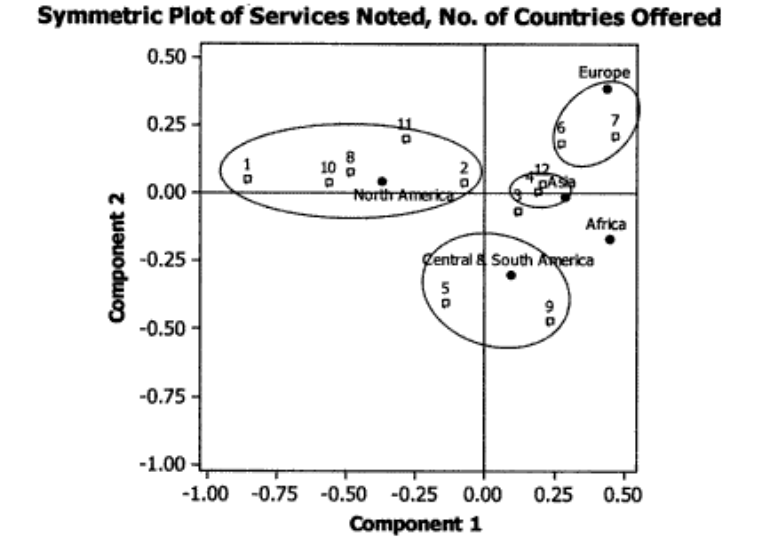
connotations for individual and these different are caused by subjective differences within individuals as well as their subjective experiences (Genc, 2011).

4. Aiming at Looking Through the Eyes of Tourists

Motivators are of factors that are active during destination choice. Studies emphasize essentiality for the wellness tourism industry to understand the profiles of their customers. For customers, learning the information and experience of the ones who have gone to a touristic activity is decisive. A review demonstrates the need for additional research on numerous issues, including understanding how multiple information sources are consulted and evaluated by patients before deciding upon medical tourism (Crooks et al. 2010).

For the need of it, facilitators as being a new profession in health tourism brought about. As well as industry of medical brokers, insurances, travel agencies; facilitators are crucial in the sense that they bridge the gap between the health center and the tourist. Facilitators support include email contact, telephone number, mailing address, information request form, maps of destinations served, hospital selection, notation of hospital accreditation, listing of medical procedures available, estimated treatment costs, past traveler testimonials, links to informational websites and whether the date of the last web page update was provided (Cormany & Baloglu 2011) This study demonstrates that facilitators differ in their treatments and they can learn from each other in order to advance themselves.

Table 4. The Analysis of Facilitators (Cormany & Baloglu 2011)



Circles represent continents; squares represent individual services offered;

1. One or Multiple Countries Served
2. Air Transportation
3. Ground Transportation
4. Translation Services
5. Concierge Services
6. Site-Seeing Options
7. Arrange Medical Appt.
8. Transfer Medical Records
9. Aftercare Services in Country
10. International Cell Phone/Calling Services
11. Financing Services
12. Hotel Accommodations

Table 2 – Services Offered

Axis of Services Noted	Inertia	Proportion	Cumulative
1	.1219	.6560 (65.60%)	.6560 (65.60%)
2	.0359	.1931 (19.31%)	.8491 (84.91%)
3	.0170	.0917 (9.17%)	.9408 (94.98%)
4	.0110	.0592 (5.92%)	1.000 (100%)

Organizing touristic travels throughout the healing process of the patients definitely help to improve the patient health both in physical and psychological terms. Cultural tourism, fresh air and discovering new places and cultures can enhance the healing process. Also patients need to be psychologically supported in the diagnosis and treatment stages of the illness. Dealing with severe symptoms of illness is the source of demoralization and depression for both the patient and her/his friends and family. In one sense medical problems generally lead to stress and anxiety for the person because of both physiological and treatment-related problems (Luebbert et al., 2001). Depending on the curing process, the period of travel can differ. The needs of the patients should be examined. Providing practical solutions when needed is an important task.

Psychological issues and attitudes toward people in the medical tourism destination might lead potential medical tourists not to select treatment abroad (Hunter-Jones 2005). Medical travel planners should be aware of demoralization-related and attitude-related hesitations about medical travel. The attitude-related hesitations mostly come about from cultural differences. Right at this point the role of facilitators becomes vital.

We need to keep in mind that medical tourists are also coming into a social setting. In order to progress the tourism, the facilitator may enlarge her/his agenda and try to look at the activity of health tourism from various respects. The souvenir that the tourist would take home is not a local cloth, food or ornament but would be her/his health in a better condition.

Based on results, consumer research about what is believed to be beneficial to health is important when designing and promoting a health place (Chang & Beise-Zee, 2013). The congruence between one's self-image and destination image seems to play an important role in destination choice process (Genc, 2011).

The method of this study is query and philosophical analysis about health tourism. Health problems get more common with increased rates of old population, and social security systems fall short of supplying this demand for health services. Many patients who prefer short-term medical treatment at low costs prefer medical tourism activities and medical travel (Genc, 2011). In this expanding area, patients, tourists and accompanying persons differ in their motivations, expectations and subjectivity. In this respect tourist's expectations and motivations are highlighted. Offering high standard medical value tourism must be the aim of host places. Facilitators are the key factors in the movement of health tourism. They need to reform themselves and to look at the issue through the eyes of the tourists. It is meaningful to boost the numbers of facilitators and increase their space of activity. They will help the tourist to make a thorough examination about the health hubs which is the target of their travel. The pleasant memories of the tourists importantly push forward the health tourism.

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The Economic Crisis and the Solidarity of Social Insurance Systems

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Abstract: In the first section we will briefly introduce the main impact of the global crisis on Romanian macroeconomics, financial markets with special focus on the pension systems, as well as the outlook of the international rating agencies and of the financial institutions regarding the reform solutions. The second section tackles the solidarity dimension of pension schemes, i.e. concepts like inter-generational, intra-generational, gender, and fiscal solidarity. The third section describes the pension reform measures tackled during the crisis providing also concise country profiles in CEE. These measures were mostly envisaged to mandate later retirement, reduce the deficit of Pillar I, change the pension indexation rules, eliminate privileged pension rights for special groups of workers, and improve benefits. The last section is to conclude with some policy implications.

Keywords: global crisis; Romanian macroeconomics; financial markets; pension systems

JEL Classification: H12; H19

1. Romania and the 2008 Global Crisis

Like all the CEE countries, Romania was hit dramatically by the global crisis. It was one of the hardest and longest in emerging Europe, with real GDP declining by 6.6 percent in 2009 and a further 1.1 percent in 2010. Gross fixed capital formation reached -27.8 in 2009 and -2.3 in 2010 (as compared to 16.1 in 2008), while household final consumption expenditure attained 71.9 in 2009 and 73.0 in 2010 (as compared to 74.0 in 2008). However, export sector was less striking than in other emerging economies in Europe and since 2010 export growth has constituted the main factor contributing to aggregate demand, triggering a mild economic recovery commenced in 2011.

The international rating agencies cut Romanian credit ratings significantly. Although the trade union movement accepted that some fiscal adjustment was required to stabilize the economy, it contested the scale of the contraction and the unequal distribution of the burden. The trade union organized a series of protests in 2010.

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The Romanian currency depreciated by around 20 percent against the euro between October 2008 and January 2009. The commercial banks in Romania experienced liquidity problems and interest rates increased sharply.

Given the large foreign currency loans in the years prior to the crisis, the Romanian authorities were concerned about a possible outburst of non-performing loans. Therefore, in early 2009 they negotiated and concluded another Stand-By Arrangement with the International Monetary Fund which involved additional financial support from the World Bank and European Commission. Access to support came with public-sector belt retrenchments.

In late 2008, the Government included in the 2009 budget a 3 percentage point reduction in the fiscal deficit by increases in social contributions, indirect taxes hikes and public wage bill cuts. The Stand-By Arrangement required further cut in public expenditure, yielding 1.1 percent of GDP in 2009. In 2010 a package of reforms was adopted and produced a fiscal contraction equal to 4.6 percent of GDP. The package included a 25 percent cut in public wages, the elimination of holiday bonuses and the 13th salary in the public sector, a 15 percent reduction in most social transfers and a 5 percentage point jump in VAT.

The crisis has affected differently the various types of pension schemes in Romania. The revenues of the public system of pensions – Pillar I declined as a result of lower employment and consequently of fewer contributors. By the end of 2009, the State Social Insurance Budget attained 1.5 billion RON (0.29% of GDP).

Due to volatility sensitivity of the financial markets during crisis, the pre-funded systems register smaller assets and rates of return. Notwithstanding, weighted average return of the Romanian private pension system – Pillar II was 8.56% during 2010-2011. Before entering the economic crisis, funds recorded significantly higher rates of return. However, because according to conservative investment rules much of pension fund assets were invested in bonds, the losses were relatively lower compared to systems whose investment portfolios were at risk because they were chiefly in shares. In August 2010, eight CEE reforming countries and Sweden requested that the EU allow their transition costs associated with the mandatory private pension systems to be deducted from their budget deficits. In December 2010, the Commission reached an agreement with Poland on allowing for temporary flexibility without changing the accounting rules of the EU. The Member States that do not overly exceed the EU's criteria (a Government deficit within 3 percent of GDP and a Government debt less than 60 percent of GDP) and are implementing pension reforms are permitted to deduct the transition costs from their deficits for up to five years.[1] 2010 marked the world economy out of recession, but the other side

[1] Pension reform in Central and Eastern Europe: in times of crisis, austerity and beyond, pg. 4.

of the crisis – financial, social, sovereign debt continued to show major frequencies different from one country to another.[1]

2. The Solidarity Dimension of Pension Schemes

Since the World Bank publication averting the old age crisis: policies to protect the old and promote growth[2], the main division of pension schemes has been made on the basis of a three-pillar system. Therefore, the 1994 report called for a multi-pillar system: the first mandatory publically managed, the second mandatory privately managed, and the third voluntary. The first pillar was originally meant to serve to alleviate poverty in old age, but has since simply been classified as a general public pension pillar. (Pension Schemes Study, p. 17)

The importance and size of each pillar is different, responding more or less to the solidarity and contributory principles. Nevertheless, the trend is the multiplication of sources of retirement insurance. State, trust, solidarity, and equity are prerequisites to support Pillar I. Pillar I features intra and inter-generational solidarity, and gender solidarity [3]. In the PAYG system, active members contribute to the generation of older people today and receive benefits from the next younger generation. This is the inter-generational solidarity.

Some authors elaborated on closely related concepts such as the inter-generational and the intra-generational equities.[4] In this view, the inter-generational equity concerns:

- the protection system (of pensions - Pillar 1) should be sustainable for today's active generation and the level of protection should be recognized as reasonable by the generation protected (retirees);
- the pension system (Pillar 1 and Pillar 2 contributions) should not cause long-term indebtedness. Here two mentions should be made: first, contributions to Pillar 2 are somewhat forced savings, capitalized and will produce a protective effect only after 2032. Until then they represent costs for the PAYG system, which are compensated either by budget subsidies or through a current lower net average pension or by increasing contributions to the social insurance system - impossible for Romania, given their current level. For the next 20 years the present value of the additional costs attributable to Pillar 2 should be at least offset by the investment returns of assets collected by Pillar 2 and managed by private

[1] The circumstances of World Economy, 2011, p. 1.
[2] World Bank, 1994.
[3] Social solidarity in the context of pension reforms, pg.5.
[4] Alternative compromises Romanian pension system for the next 20 years, pg.18-19

pension funds. The figures to date of investment returns of Pillar 2 assets suggests that this really happens (even with a significant margin of 4% - 5%), but a change of trend as regards deficit increase, which would result in higher financing costs (interest) may adversely affect the process described. Second, unsustainable growth of the consolidated budget deficit and public debt and hence its share in GDP would lead to a growing financial burden on the shoulders of the next active generation which would thus be less able and less willing to respect the basic consensus of the PAYG system;

- the ratio between resources allocated to Pillars 1 and 2 also affects inter-generational equity: greater resources allocated to Pillar 1 favors the generation of current pensioners (because through this pillar the pensions of the current generation of retirees are covered based on PAYG principle) rather than the current active generation (because less resources will accumulate in Pillar 2 of which a part of pensions of the future generations of retirees will be paid depending strictly on funded individual contributions); and greater resources directed to Pillar 2 have a reverse effect;
- the rate between the employees and pensioners on the one hand and the net replacement rate on the other hand should be kept in a dynamic balance so that work incentives would not disappear and private and public investment would support a sufficient economic growth. For Romania, this means at least 2.5% per year, preferably more than 3%, in order to reduce the differences in development compared to the average EU 27 and EU 15.

Along with the inter-generational solidarity, there is also an *intra-generational solidarity* – solidarity within generations.

The Romanian Pension Law No. 263/2010 provides for the non-contributory periods (Art. 49 – Figure 1). By taking into account these non-contributory periods the society demonstrates solidarity and agrees to compensate the sacrifices of beneficiaries for the State.

Non-contributory credited periods in the Romanian Pillar I:

- short-term benefit payment from 1 January 2005 onwards: e.g. Temporary Working Incapacity Indemnity due to accidents at work and occupational diseases etc.;
- full-time university courses attendance under graduation condition;
- attendance of an educational institution in the field of defense, public order and national security;
- conscript service or periods served as drafted, mobilized or prisoner of war,
- other periods, stipulated by special legislation.

Figure 1

Moreover, certain categories of workers (e.g., military etc.) contribute a shorter period of time, because their work can not be accomplished by people of a certain age, below the statutory retirement age. Additionally, the intra-generational equity concerns:

- a protective system (of pensions - Pillar 1) transparent, stable and predictable, where the level of protection (of pension) is directly proportional to the level and contribution period - in the broad sense;
- a pension system (Pillar 1) as unitary as possible and with as few "special cases" (or special retirement scheme);
- the difference between the minimum and maximum protection should be socially acceptable – here the authors discuss about pillar 1 (PAYG) and not about pillars 2 (in bulk) or 3 (total) where the benefit is directly proportional to the level of contribution, period and investment return. Pillar 1 is based on a social consensus for intra-generational protection and not on individual investment decisions.[1]

On the other hand, there are proposals for enlarging the scope of solidarity. Therefore, it is stated that the PAYG system may be (re)balanced by instituting an articulated and transparent system of contributions-benefits by solidarity participation of those with high and very high incomes. To this end, the authors propose the additional taxation and taxation in installments of wages over the average level at quotas exceeding 16%, and directing this tax for diminishing the deficit and gradually balancing Pillar I[2].

Gender solidarity is based on life expectancy differences between men and women. Consequently, according to Pension Law No. 263/2010, retirement ages are different. But even if it will achieve equalization of retirement age of women with men, women will continue to enjoy further for a longer period of retirement because of their higher life expectancy. In the period 2000-2010, life expectancy at 65 years and over increased by 1.3 years for women and 0.7 years for men.[3]

Pillars II and III are pre-funded and operate through individual accounts and individual contributions. Pensions will depend on the individual contributions and returns on investment of the pension funds; therefore there is no redistributive feature to these pillars. However, another type of solidarity could be found in the tax

[1] See also Alternative compromises Romanian pension system for the next 20 years, pg.18.
[2] Strategy and Policy Studies - SPOS 2011 study no. 4, pp. 322.
[3] EHLEIS National Report. In the period 1995-2001 the life expectancy of men and women was below the EU15 average European countries and by 2010 the life expectancy at 65 years and above for both men and women (21.3 years for women and 17.8 years for men) recorded values below the EU25 average European countries.

deductions for contributions to the private pillars. In this case, there is a kind of solidarity between society at large and members of the private pillars. This is described as fiscal solidarity[1].

3. The Pension System Reform Measures During The Crisis

In order to improve their fiscal position, many states have imposed fiscal austerity measures. Pension systems were particularly vulnerable to the State spending cuts due to their great dependence on State budgets to cover their deficits. CEE countries have implemented, or have begun to plan, pension reforms since 2009. The following description is a summary of the main features of these reform measures in Romania and the other CEE countries during the crisis (the other CEE countries reforms are delivered in Figures 2-6).

3.1. Measures Increasing Retirement Ages

Romania legislated the normal retirement age for women at 63 years by 2030 and tightened the reduction rates for early retirement pensions.

- Croatia and Hungary will increase the normal retirement age for women to 65 years and Bulgaria to 63 years by 2030. Poland did not change the normal pensionable age for women, leaving it at 60 years.
- The Czech Republic has adopted a new schedule for increasing the normal pensionable age. This schedule accelerates the increase in the normal pensionable age for women as set out in the previous schedule. Moreover, the increase in the normal pensionable age for both sexes will further continue beyond 65 years without any maximum.
- In the Slovak Republic, the normal pensionable age for both sexes is 62 years, but it had been proposed that the normal pensionable age be increased in line with the life expectancy.
- The qualifying conditions for early retirement pensions were further tightened in Bulgaria (for women), Croatia (for women), Poland and the Slovak Republic.
- Croatia and Hungary modified the reduction rates for early retirement pensions.

Figure 2

[1] Social solidarity in the context of pension reforms, pg.6.

3.2. Measures to Reduce the Deficit of Pillar I by Increasing Contribution Rates or by Adjusting the Contributions of Pillar II

Romania increased its pension contribution rate by 3.8 percentage-points in 2009. The scheduled phased increase in Pillar II contribution rate was temporarily frozen in 2009, but resumed in 2010.

- Bulgaria decreased its pension contribution rate by 4 percentage-points in 2009 and by an additional 2 percentage-points in 2010. Since 2009, the State has become a "third insurer" that pays statutory contributions of 12 percent of the total contributory base. In 2011, the combined contribution rate of employers and employees was increased by 1.8 percentage-points. Starting in 2017, the contribution rate for the second-pillar system will be increased by 2 percentage-points.
- Poland has decreased the contribution rate of the second pillar from 7.3 percent to 2.3 percent. Since 2012, is gradually increasing to 3.5 percent by 2017. The difference in the contributions has been retained by the state pension system to finance its deficit.
- The re-nationalization of the second-pillar pensions in Hungary may represent an extreme case. It was first decided that, from November 2010 until December 2011, the 8 percent contribution rate paid into the second-pillar pension will cease and be used to finance the state pension system. The Government next proposed to restore full state pension rights for members of private pension funds in exchange for the balances that had accrued in their individual accounts. By the end of January 2011, only 3 percent of the members had declared their intention to voluntarily remain in the private pension funds. The process of switching back to the state pension system, including the transfer of assets from the private pension funds (worth HUF 2.8 trillion or 10 percent of GDP) was taking place in 2011.
- In contrast, the Czech Republic decided to introduce a new voluntary funded pillar financed by a 2 percent contribution rate paid by employees and supplemented by a 3 percent contribution rate redirected from employees' contributions to the state pension system.

Figure 3

3.3. Measures Eliminating Privileged Pension Rights For Special Groups Of Workers

In Romania, the special pension schemes for military, police, and national security officials and some other smaller schemes (except for the special pension scheme for

magistrates) have been integrated into the public pension system. These pensions were recalculated based on the individual's average salary during their whole career and were paid by Pillar 1.

- Croatia decreased the amount of pension benefits obtained under special conditions by 10 percent. However, it postponed the gradual suspension of privileged pensions, including the pensions for parliamentary deputies, military and police officers, and war veterans.
- The Slovak Republic and Hungary were considering reforming their army pension systems.

Figure 4

3.4. Measures Changing the Pension Indexation Rules

In Romania, pension indexation was frozen for 2011. From 2012 to 2020, pensions will be indexed according to full price increases plus 50 percent of real wage growth. Starting in 2021, the partial wage indexation will gradually taper off until pensions are indexed according to prices only from 2030 onwards.

- Hungary abolished the 13th pension and introduced indexation rules linked to GDP growth. Price indexation shall be applied if GDP growth is less than 3 percent, while the Swiss formula i.e. the weighted average of prices and wages shall be applied if GDP growth is more than 5 percent.
- The Czech Republic strictly adhered to the statutory minimum rate of indexation (full price increases plus one-third of real wage growth) and ceased making discretionary increments to the statutory rates of indexation.
- According to its draft Law on pension reform, the Slovak Republic proposed to change its indexation rules to reflect changes in the ratio of contributors to pensioners.
- As an emergency measure, Slovenia indexed pensions only by 50 percent of the average nominal wage growth in 2010, and by 25 percent of the average nominal wage growth in 2011. The Government proposed a freeze on pension indexation for 2012.
- As an emergency measure, Bulgaria suspended pension indexation from 2000 until the end of 2012.
- Croatia also suspended its pension indexation in 2010 and 2011.

Figure 5

3.5. Measures Improving Benefits

Romania introduced a tax-financed minimum pension. The amount of the minimum pension was RON 300 in March 2009 and increased to RON 350 in September 2009.[1]

- Bulgaria was to increase the accrual rate used in the pension formula from 1.1 percent to 1.2 percent in 2017, abolish the maximum pension for pensions granted after 2014, and increase pension supplements for surviving spouses from 20 percent to 26.5 percent of the deceased spouse's pension starting in September 2011.

Figure 6

4. Conclusions

The global financial crisis has affected everyone. No country or pension system is immune. Yet, there is no panacea or one-size-fits-all solution to a crisis challenge. Reforms cannot prevent another crisis. Crises are cyclical in nature and may recur.

The challenge is to make pension systems financially sustainable and trustworthy for future generations in the long term. A well-functioning pension system is an important social system that today's generations have an ethical obligation to preserve and hand it over to the next generations in good shape.

To effectively lead and manage the reform process, the Romanian Government and the resort ministry must strengthen their policymaking capacity. The central focus of the social debate should be on how to strike a balance between solidarity and contributory principles, in order to be more resilient to crisis, on policies that create opportunities for working longer, whilst also ensuring solidarity with those who are unable to do so. Social dialogue plays a vital role in this process, as the different social partners seek solutions that are broadly appealing to all parties concerned. Member States, European institutions and all stakeholders need to respond together and within their respective roles, to the challenges that population ageing represents. Indeed, pension systems must contribute to growth in Europe by promoting active ageing, while remaining an adequate and sustainable instrument at the core of the European social model to sustain the living standards of elderly Europeans.[2]

[1] For figures 1-5 see Pension reform in Central and Eastern Europe: in times of crisis, austerity and beyond, pg. 8-11.
[2] White Paper, p. 15.

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Approaches to Bioeconomic Modelling in correlation with Consumer Model and Biodiversity Indicators

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Abstract: In this study we analysed the characteristics of bio-economic models in agricultural systems and agro-biodiversity indicators. The classical bioeconomic models are used to analyze the human consumption of ecosystems for production. The analysis focuses on changes in a limited set of agro-biodiversity indicators that matter to human beings. In existing bioeconomic models incorporate ecological complexities and dynamics is limited. Although bioeconomic model provides useful methods to integrate economic values into environmental analyses, improved the dynamic interrelationships between natural processes and socio-economic systems is needed to allow an integrated assessment of multiple values. The overview will enable a more informed decision about whether and how bio-economic models/modeling can contribute to the development of integrated environmental decision support tools. The bio economic modeling it is important for evaluating the costs and benefits associated with environmental resource use.

Keywords: bio-economy; agro-biodiversity; modeling

JEL Classification: HI15

1. Introduction

In the economics literature, bioeconomic modeling is widely advocated as the paradigm to support integrated environmental management and the level of human consumes. The Commission Communication to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, the theme Innovating for Sustainable Growth: A Bioeconomy for Europe of 13 February 2012, stated that Europe is facing an unprecedented and unsustainable exploitation of its resources natural, with significant and potentially irreversible climate change and continuous decline of biodiversity, which threatens the stability of living systems depends. These phenomena are exacerbated by the increasing world population, estimated at over 30% over the next 40 years, and from 7 billion in 2012 to over 9 billion in 2050. Overcoming these complex and interrelated challenges requires research and innovation, to achieve, at all levels of society and economy, the rapid changes, concerted and sustainable lifestyle and the use of

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resources. Welfare and comfort of European citizens and future generations will depend on how the necessary changes will be made. European Strategic Action Plan for the bio-economy and are intended to pave the way towards a society more innovative, more efficient in terms of resource use and more competitive, which reconciles food security with the sustainable use of renewable resources for industrial purposes, ensuring at the same time, environmental protection. Strategy and Action Plan will provide content and innovative research programs in bio sectors and will help create a more coherent policy framework to better match the existing bio-economy policies at national, EU and global and the establishment of a more engaged public dialogue.

The bioeconomy strategy is that by 2050, biodiversity and ecosystem services provided - its natural capital - are protected, valued and appropriately restored for biodiversity's intrinsic value and for their essential contribution to human wellbeing and economic prosperity. The term bioeconomic is used to indicate that a model has both economic and biophysical components (Knowler, 2002). Bioeconomic models are extensions of traditional mono-disciplinary economic models, which typically aim to quantify human uses of ecosystems for production and consumption activities (Braat & van Lierop 1987). Successful integration of biological analyses and economics still constitutes a major challenge, both from the perspective of economic models incorporating biological data, and biological models integrating sound economic analyses. Economic theory stresses that the needs and wishes of the people (consumers) are allocated to "shaping" all economic activities. This idea is expressed in the literature as 'consumer sovereignty' in the sense that individuals, ie those who consume, are important for the economy. There are two types of response rather different question why consumers are important in an economy. One assumes traditional expressed by A. Smith, that final consumption is the ultimate goal of all economic activities; production and distribution takes place only to increase consumer welfare. In this view, consumers are justifying economic activity and, thereby, and economic theory. The other answer is the fact that people who say the economy because it generates demand for goods and services. Without this application, offer (production) in the economy would dilute or disappeared. Producers cannot continue production if no one buys their products. From this perspective, consumers are a source of demand that central mechanism that makes the economy work. Consumption is part of the life of each individual and an expression of wealth. Individuals have different needs, you meet using generally certain goods and services purchased, obtained by themselves in their own households or provided free or at prices lower than the market by institutions or government agencies (e.g., services health or education). Beyond the arguments justifying the importance of household consumption for the production process, it is based on other reasons that go from the reality that people means more than being only in the sense that consumers consume most direct link level objectives living.

The standard of living is a broader concept, meaning that its objectives are related to compliance with the set of human needs (basic or otherwise), but also obtain satisfaction through the use of goods and services. Consumption of goods and services as a whole and its composition, is one of the most relevant expressions of the living standards of the population of a country or human communities and direct way of measuring living standards. Along consumption, revenue is used as another measure of living standards of the population.

This method of measurement is found generally in developed countries that used to measure poverty (and the poverty line) income and not consumption. World Bank is developing projects to combat poverty in developing countries, with a strong emphasis on the use of consumption poverty measurement as one of the important landmarks in assessing the living standards of the population of a country. The choice of income or consumption to measure living standards is based on both theoretical considerations and practical. In theory the choice between income and consumption to measure living standards does not appear explicitly as they are considered in their totality are consumed income and the income and consumption are identical. In practice, there are significant deference between income and consumption, each with its significance in assessing the standard of living. The first is the savings, when the difference between income and consumption is positive. The accumulation of savings in household income can have an important significance for living standards, especially future generations. The second is the diseconomies, the difference between income and consumption is negative. This is the case particularly when elderly population who consume more than they earn, using savings during their working lives, whether this happened. Each of the two variables - income or consumption - expressing different aspects of living standards of the population, so these two economic aggregates should not be seen as opposites, but complementary.

The terms "sustainable consumption" and "sustainable production" are part of the current of thought that support sustainable development, the current generated by concern for use with greater care resources (natural) and environmental protection. In this context, consumption itself is not seen as a threat to current and future development, but the consumption pattern of negative environmental effects. In the system of national accounts, private consumption is captured as a component of gross domestic product (GDP) measured by expenditure approach, the group "final consumption expenditure". The final consumption expenditure of households cover expenditure for the purchase of goods and services which are directly used to meet the individual needs of their members. The "final consumption of households" has a special significance in macroeconomic analysis, showing how a country's production achieved in one year is for individual consumption of the population. This part of the production (GDP) is spent on meeting individual needs has the highest proportion of GDP (55-75%), depending on the policies aimed at welfare and those pursuing

economic development of a nation, long-term (savings and investments). Final consumption expenditure of households is also used in international comparisons is an important element in evaluations of development and welfare policies of different countries, in the medium and long term. In the EU projections on GDP growth the level in the period 2012-2018 is decreasing (fig.1).

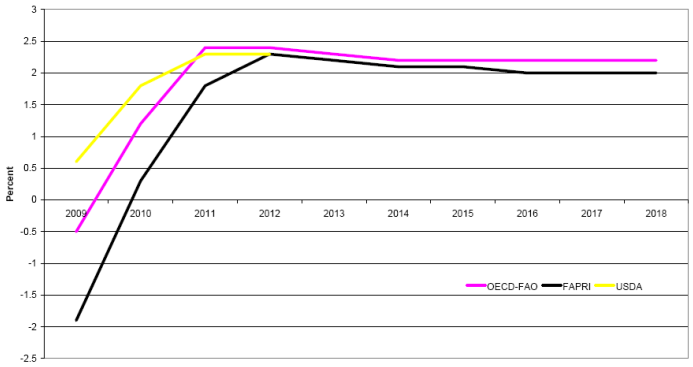

Figure 1. Projections on GDP growth 2009-2018 (EU)

Source: European Commission (2009)

The main methods of analysis used to highlight the influence factors on changes in consumption in general, consumer spending funds in particular are: regression and correlation and elasticity calculation. The regression method can reveal the relationship between the dependent variable (request, expense etc.) and the independent variable (income, price etc.) on the basis of functions called regression functions. The ratio of the number of factors taken into regression analysis is simple or multiple. In a simple regression linear form, (Y = a + bx), b parameter called regression coefficient how much the changes (increases or decreases) in average variable of results / dependent to change the unit of the variable factor. The sign of the parameter b depends on the direction of the link: b> 0 indicates a direct effect; b <0 indicates a reverse effect. Correlation method is used in direct connection with regression and consists in determining indicators (such as correlation coefficient, correlation ratio) which measures the intensity of the relationship between the dependent variable and the independent variable (factors), the degree of influence of each factor considered important. The calculation of elasticity generally demand (purchases) income and price developments in particular is also a commonly used method to analyze the influence of these factors consumption.

2. Material and Methods

Agro-economic models are mainly used to predict the impacts of changes in environmental resources (soil and water quality) on agricultural production. Bio-economic modeling of agricultural systems can be characterized by three different methods: mathematical programming, regression and accounting. Regression models use statistical estimates of region-specific agro-biodiversity production functions based on observed relationships between physical characteristics of the land and farm inputs, policies, prices.

The regression models are constructed from observed historical relationships and can therefore not easily predict alternative future scenarios and not include feedback effects between changes in agricultural production and environmental conditions. The following example will be estimated and a regression equation to illustrate a model water exploitation index (WEI), population in Romania and greenhouse gas emissions by sector (1 000 tones of CO2 equivalent)- GGE using in period: 1990-2014. Series used: water exploitation index (WEI).-population (POP), greenhouse gas emissions (GGE) by sector (1 000 tones of CO2 equivalent) since 1990 with the data source: www.insse.ro-Tempo-online database. For a description of the analyzed phenomenon we built a model of the form:

D(WEI)= C(1)*(POP) + C(2)*GGE+ C(3) + C(4)*T

Dependent Variable: D(WEI)
Method: Least Squares
Date: 04/15/15 Time: 12:31
Sample (adjusted): 1991 2014
Included observations: 24 after adjustments
D(WEI)= C(1)*(POP) + C(2)*GGE+ C(3) + C(4)*T

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	8.590005	0.000302	0.284523	0.7789
C(2)	-8.720005	0.000334	-0.261245	0.7966
C(3)	-2408.544	7146.130	-0.337042	0.7396
C(4)	34.43051	45.55658	0.755775	0.4586

R-squared	0.196286	Mean dependent var	-100.0000
Adjusted R-squared	0.075729	S.D. dependent var	343.2200
S.E. of regression	329.9684	Akaike info criterion	14.58688
Sum squared resid	2177583.	Schwarz criterion	14.78323
Log likelihood	-171.0426	Hannan-Quinn criter.	14.63897
F-statistic	1.628155	Durbin-Watson stat	1.441306
Prob(F-statistic)	0.214506		

With option View/Actual, Fitted, Residual/Actual, Fitted, Residual Graph it si represented the effective value of the dependent variable, the estimative value and regression errors. (Fig.2)

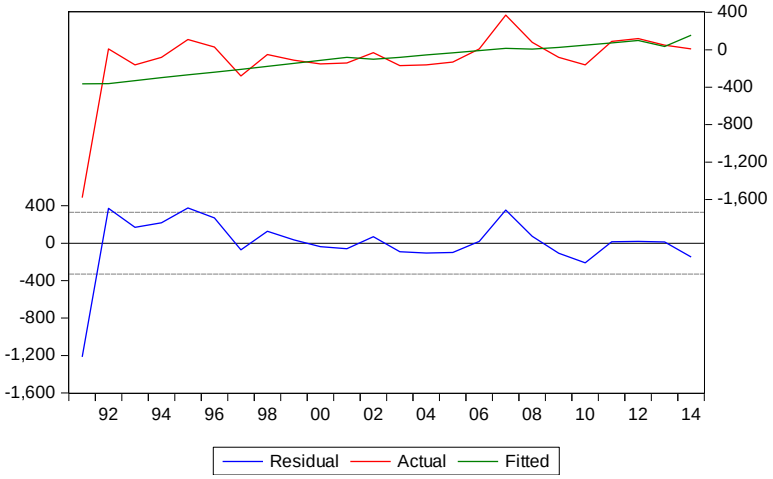

Figure 2

Adjusted / Estimated water exploatation (green line) is close to the empirical value of an endogenous variable (red line). The blue line, and is thus the graph residues, which may be the difference between two values above the other.

Estimation Command:

==========

LS D(WEI)= C(1)*(POP) + C(2)*GGE+ C(3) + C(4)*T

Estimation Equation:

==========

D(WEI)= C(1)*(POP) + C(2)*GGE+ C(3) + C(4)*T

Substituted Coefficients:

==========

D(WEI)= 8.595*(POP) - 8.717*GGE- 2408.5 + 34.4*T

3. Results and discussions

In the model developed there is a direct relationship between water exploitation index (WEI) and population growth POP, and a statistically insignificant relationship with the greenhouse gas emissions (GGE).

The coefficient of population growth (POP) from regression model it is $\hat{\beta}_1$ = 8.598 and standard error $SE(\hat{\beta}_1)$ = 0,003, and statistic $\hat{t}_1$ = 0.28, calculated : $\hat{t}_1 = \frac{\hat{\beta}_1}{SE(\hat{\beta})_1} = \frac{\text{Coefficient}}{\text{Std.Error}}$; valoarea p (*p value*) = 0.77, which shows that the population is an important factor influencing the water exploitation index WEI.

The coefficient of greenhouse gas emissions (GGE) is $\hat{\beta}_2$ = -8.717, eroarea standard $SE(\hat{\beta}_2) = 0{,}03$, iar statistica $\hat{t}_2$ = -0,26. The sign of parameter does not influence the result of comparison between t and t calc spreadsheet calculation is used because the estimated absolute value.

The value of this probability is 0.79. The value of t calc (8717) is higher than the value of t table (0.003) and therefore greenhouse gas emissions (GGE) is an important factor influencing the water exploitation index.

The coefficient constant term in the regression model is = -2408.5, standard error = 7146, t-statistic = 0.33 expressed, with probability p value of 0.73. So the term is significant endorsement for the regression model chosen.

Report of determination (R2) shows the percentage is explained by the influence of significant factors. It is calculated as: use in assessing the quality of the model. It can take only values in the range [0,1]. The values are closer to the value 1, the model is better.

The regression model is specified in this period we can say that growth can explain variation greenhouse gas emissions (GGD) with water exploitation index (WEI) consumption.

The agro-biodiversity models can optimize demand for environmental inputs that would maximize farm profits, subject to input and/or output prices, available capital or labor, and prevailing environmental conditions in the context of climate or land availability. Optimization models have the advantage of allowing a detailed specification of farm management activities and restrictions simultaneously, including technologies, multiple crop rotations, livestock management, and different soil. The analytical focus of agro-economic optimization models is typically that of profit maximization or cost minimization, with environmental parameters exogenous

to the model such as account for environmental pollution impacts from agriculture Extensions in bio-economic farm modeling will need to allow integrated analyses of multiple values (environmental costs and profits) affected by agricultural systems.

Biodiversity is the main indicator, which expresses the durability and stability of the area in direct relationship with life and the environment. Monitoring biodiversity both quantitatively and qualitatively gets us in contact with the environment, as the biodiversity is in continuous change. Solely through measuring biodiversity one can perceive the sudden changes that directly affect the quality of life. Following the indicators of diversity a reconsideration of the proportion of domestic animals can be made, bearing in mind the number of animals per hectare, according the law. The correlation of biodiversity with demographic pressure and the determination of the structure of animal numbers and of the coefficients established by the CE Regulation.

4. Conclusion

The Bio-economic models are based on the economic paradigm that values are derived from *impacts on human welfare*. The objective function in bio-economic models is to allocate environmental resources to those uses that yield the highest net benefit to human beings. Assessing the impacts of environmental management changes requires analyses of human welfare effects. Develop a new Bio-economic model it is necessary for development of human society requires a change of old concepts, especially economic ones and their connection to specific environmental management and the current crisis. In this respect, the basic components of the concept of sustainable development are: bio-economy and environmental protection. Thus, the bio-economy should develop mechanisms, criteria, tools, models of social development. Finding optimal alternatives between economy and environment depends on the ability of decision makers to choose and use financial and economic instruments to promote environmental protection activities: taxes (taxes) that can be promoted in the form of tax differentiation; subsidies that encourage change in attitude and funding available to stop pollution; introduction of new mechanisms of market economy (trade emission rights, insurance); incentives for financial consolidation etc. Bio-economic modeling allows this assessment by evaluating the costs and benefits associated with environmental resource use. Bio-economic models offer a useful addition to existing biophysical/ecological models by allowing thorough analyses of socio-economic values, and making testable predictions about environment-human interactions. It is now to develop the integrated modeling, and use the bio-economic modeling experiences, as economic costs and benefits. Future modeling efforts should aim to include market and nonmarket impacts of environmental changes in their framework. Enhanced representation of natural processes and dynamics would improve the ability of bio-economic models for IA

of various policy objectives. This necessitates a more integrated approach that acknowledges the multiple linkages and feedbacks between natural and socioeconomic systems.

In our reserch we developed one model using the series from water exploitation index (WEI), population in Romania and greenhouse gas emissions by sector - (GGE) using in period: 1990-2014.Theoretically with GGE growth should increase the water exploitation index (WEI) , but up to a certain level. The econometric model has shown that water exploitation index needs at the individual level is approximately constant, being influenced by specific biological factors and influences population growth and greenhouse gas emissions, which directly influences can have negative impacts on biodiversity agro ecosystems.

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