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Contents

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39. Georgios Magoulios, TEI of Serres, Greece
40. Spryridon Mamalis, TEI of EMTh, Greece
41. KavoosMohannak, Queensland University of Technology, Australia
42. HarisNaxakis, TEI of Epirus, Greece
43. Michael Nikolaidis, TEI of EMTh, Greece
44. Stergios Papadimitriou, TEI of EMTh, Greece
45. TheodorosPapadogonas, TEI of Halkida, Greece
46. Martin Samy, Liverpool Hope University, United Kingdom
47. ZeljkoSevic, University of Greenwich, United Kingdom
48. CharalambosSpathis, Aristotle University of Thessaloniki, Greece
49. JelenaStankevičienė, Vilnius Gediminas Technical University, Lithuania
50. George Stathakis, University of Crete, Greece
51. ConstantinosStefanou, ATEI of Thessaloniki, Greece
52. Ioannis Theodosiou, University of Aberdeen, Scotland, United Kingdom
53. EleftheriosThalassinos, University of Piraeus, Greece
54. Angelos Tsaklagkanos, Neapolis University, Cyprus
55. Ioannis Tsalavoutas, Adam Smith Business School University of Glasgow, U.K.
56. AnastasiosTsamis, Panteion University of Social & Political Sciences, Greece
57. TheodorosTsekos, TEI of Kalamata, Greece
58. UtkuUtkulu, DokuzEylül University, Turkey
59. Stavros Valsamidis, TEI of EMTh, Greece
60. Michalis Zoumboulakis, University of Thessaly, Greece

Technology Spillover from Foreign Direct Investment in Turkey

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Abstract

Purpose – The aim of this paper is to investigate the relationship between Foreign Direct Investment flows and economic growth using quarterly data for the period of 2002 and 2015 in Turkey. Thus we try to examine whether technological diffusion generated by FDI inflows to Turkey enhances the innovative capability of the country or not.

Design/methodology/approach – The variables Foreign Direct Investment (FDI) and Gross Domestic Product (GDP) are sourced from Electronic Data Delivery System (EDDS) in Central Bank of the Republic of Turkey. FDI series consist of values called "Net Incurrence of Liabilities" in Balance of Payments Analytical Presentation while GDP series gather from the expenditure based GDP data in EDDS. Both Johansen Cointegration Test and Granger Causality Test are applied to examine between Foreign Direct Investment flows and economic growth in Turkey.

Findings – Results reveal that there is not any significant link among the FDI and economic growth during the studied time period in Turkey. It seems that FDI inflows to Turkey is not complementary to economic growth, which shows that positive spillover effect sourced from FDI inflows to Turkey does not exist.

Research limitations/implications – Policymakers should recognize that technology spillover effects of FDI do not occur without greater absorptive capacity. Attracting FDI is only one part of the story and thus not yield the desired benefits itself. Positive effects of FDI depends on the overall incentive and capacity structure of the host country. Then the key policy implication here is that policymakers should give same weight of policies aimed at attracting FDI versus those that seek to improve local economic conditions.

Originality/value – This study insight the spillover effects of FDI based on Turkish experience that benefits from FDI do not occur automatically and effortlessly in developing countries.

Keywords: Technology Spillover, Foreign Direct Investment, Turkey.

1. Introduction

Given the growing competition in international markets characterised by rapid technical change, companies are obliged to innovate. Accordingly, it has been widely accepted that international differences in technological capabilities fundamentally determine the economic growth differences among countries. Indeed, innovation based competitiveness dominates all of the dynamics of international economic relations today. This structure of international economy creates big struggle for developing countries suffering from deficiency of innovative capability. Indeed, scholars from a variety of economics disciplines have mostly indicated the lack of the capabilities needed to generate new technologies in developing countries. Thus, in the global economy the economic performance gaps between developing and developed countries expand permanently.

However, liberalisation process of goods and financial markets create a new external source to build innovative capabilities for developing countries. With the rapid expansion of liberalization policies in the global economy, the movements of Foreign Direct Investment (FDI) among countries have hugely increased. Foreign investments made by multinationals firms in developing countries does not bring only capital but also intangible assets like technological know-how, management and marketing skills, which enable home country to compete successfully. Thus, FDI inflows to developing countries build a capability building for knowledge utilization and creation process that makes them much more productive. Economists have been considered FDI as an important external knowledge source to generate technical change for developing countries traditionally lacking the capabilities needed to generate new technologies. Economists have also pointed out the importance of FDI movements to narrow the technological and economic performance gaps between developed and developing countries.

Developing countries have been experienced high amount of FDI inflow during the liberalisation of their goods and financial markets. Empirical studies showed that some developing countries benefit the FDI inflow as an international sources of knowledge to generate technical change. Thus, FDI have been considered as a significant factor enhancing innovative capability building to gain competitiveness in a number of developing countries. In other words, FDI saves developing countries from relying on limited domestic sources of knowledge to generate technical change. Accordingly, the effect of FDI on the technological and economic performance in developing countries has been of great interest to policy-makers. In the framework of an active public policy

programme, developing countries start to attract FDI for their economies as much as possible.

Looking at the FDI inflows data over the last decades from Electronic Data Delivery System (EDDS) in Central Bank of the Republic of Turkey, it seems that Turkey has also increased its attraction for multinationals firms. The post-2000 period in Turkey witnessed a steady increase in FDI inflows. The average level of FDI inflows between 2000 and 2009 was USD millions 9060,2 while this value between 1990 and 1999 was USD millions 771,7. That means FDI flows to Turkey increase more than ten times in 2000s compared to the level in 1990s. This increasing trend has also continued and the average level of FDI inflows Turkey between 2010 and 2015 has been USD millions 13381,7. Thus, Turkish experience offers a superb sample to be examined the role of the FDI in technological improvement and economic growth processes. Accordingly, the aim of our study is to examine whether technological diffusion generated by FDI inflows to Turkey enhances the innovative capability of country or not.

The rest of the paper is organized as follows. Section 2 reviews literature that focuses on the relationship between technological slipovers from FDI inflows and economic growth in developing countries. Section 3 describes the used data and the model specification and presents empirical results. Final Section concludes and makes some policy implications.

2. Literature Review

In this section, main streams of literature on the relationship between FDI inflows and technological capability building are presented. There is a huge literature focusing on the relationship between technological capability building and FDI inflows, through slipovers effect of foreign firms. Economists have long recognized the potential for positive externalities from inward FDI in host economies. FDI inflows enhances the opportunity for local firms to benefit from knowledge transfer generated by better-endowed multinationals firms. Thus technological progress in host country is facilitated through inward FDI. That means the effect of FDI inflows to a host economy is beyond that of a simple import of capital into the country. Indeed, FDI is not merely defined as a source of physical capital but also knowledge-capital. Consequently, FDI inflows enable not only the increase of capital stock in the host economy but also increase technological improvements via "technology spill over effect".

In terms of technology spillover effect of FDI, multinational enterprises entry to local markets may generate productivity improvements for domestic firms. Local firms learn technological knowledge embodied in foreign firm operation to compete successfully in the domestic and international markets. This learning process may occur in host countries either directly or indirectly. Direct knowledge transfer from inward FDI can occur through the formal collaboration between a local firm and its foreign entrants. Indirect knowledge transfer can occur through informal knowledge spillover by observing and imitating foreign entrants. Local firms in host country observe and imitate the production models of multinational enterprises coming from FDI inflows. In

both cases by deepening linkages with multinational cooperation, local firms may get the technologies or organizational forms used by foreign better-endowed firms. Thus, the presence of multinational firms and their interaction with local firms in the host country can create virtuous cycles of technological capability building in the host country (Padilla-Perez and Matinez-Piva, 2009, 303).

Accordingly, studies regarding developing countries have found sound evidence for a positive link between FDI inflows and productivity in host countries' industries. Blalock and Gertler (2008) tested the hypothesis that multinational firms operating in emerging markets transfer technology to local suppliers to increase their productivity by using a panel dataset of Indonesian manufacturing establishments. Their findings indicated that foreign entrants transferred technology to upstream suppliers resulting in improvements in productivity for local firms. Using firm-level panel data from the Indian manufacturing sector from 2000-2008, Malik (2015) also examined the productivity effect of technology spillover via linkages through FDI in India. He found that technology spillover from FDI exists and its degree depends on technological ability of domestic firm. Consequently, firms in high-technology industries benefit more from technology spillover from foreign firms compared to firms in low-technology industries. Liu and Wang (2003) examined the impact of FDI on total factor productivity for a cross sectional sample of Chinese industrial sectors in 1995. Empirical findings indicated that foreign presence and the firm size are the most important factor enhancing total factor productivity in Chinese industries. Baltabaev (2014) also made a multinational study to examine the impact of FDI on total factor productivity growth in 49 countries for the period from 1974 to 2008. He found that FDI is an important factor of technological transfer. Thus this study indicated that technologically backward countries adopt new technologies via FDI inflows to make their countries more productive.

Empirical studies focusing on investigating spillover or technology transfer from FDI inflows to host countries also tested whether there is a positive association between FDI presence and labour productivity in the economy. Thus these studies used the variable of labour productivity as a dependent variable while FDI share in an industry was used as an explanatory variable. Liu et al (2001) analysed the effects of inward FDI on labour productivity in the Chinese electronics industry data for the period 1996-1997. The empirical findings suggested that foreign presence in the industry is associated with higher labour productivity. Thus, they confirmed that encouraging inward FDI into the electronics sector in China may be expected to have a beneficial effect on labour productivity. Ramirez (2006) analysed the impact of FDI on labour productivity between 1960 and 2000 in Chile by using cointegration analysis. Empirical results showed that FDI flows had a positive and significant effect on labour productivity growth during the 1960-2000 period and the effect was stronger during the 1996-2000 period. Buckley et al. (2007) specifically focused on the impact of FDI inflows on labour productivity in China`s automotive industry using a panel data set over the period from 1995 to1999. They found that inward FDI

plays a positive role in raising labour productivity, which supports the theory of positive FDI spillover effects.

Although the studies reviewed in this section until now examine the impact of inward FDI on the total factor productivity and labour productivity of local firms, there is also a good reason to believe that similar effects are likely to hold for innovation capability of the firms in host country. Thus, some researchers suggested that innovation might represent a fruitful alternative to the standard measures of FDI spillover effect instead of productivity. In fact, work in the innovation literature has long documented the role of competition in increasing incentives for firms to innovate. Cheung and Lin (2004) examined the impacts of FDI on the number of domestic patent applications in China using provincial data from 1995 to 2000. They found evidence of positive spill over effects of FDI on the number of domestic patent applications. In addition, exports by the FDI firms in China to international markets appear to have marginally significant and positive effects on domestic patent applications. Behera et al. (2012) empirically examined the technology spill overs of FDI across Indian manufacturing industries. The empirical evidence on Pedroni cointegration tests based on panel data from 1990 to 2007 across 16 Indian manufacturing industries showed the long-run relationship between foreign presence and innovation capability of domestic firms. Sivalogathasan and Wu (2014) used a panel data approach to determine the spillover effect of FDI on domestic innovation capability for a group of emerging South Asian markets from 2000 to 2010. Empirical evidence showed that FDI inflows generated spillover effects on domestic innovation capability in South Asian countries. Thus, their results supported the hypothesis that inward FDI brings knowledge spillover into the host country and promotes domestic firms` innovation capability.

As can be seen from the findings indicated above, firms investing in foreign countries bring advanced technology to firms in host countries in different channels. Thus, it can be expected to have a positive effect of FDI on economic growth since FDI having a spill over effect of technology improves host countries' productivity and innovation capability. Therefore, understanding the impact of inward FDI on host country via technology slipovers aids also our understanding of how inward FDI can act as a catalyst for economic growth. Accordingly, in the framework of the endogenous growth model economists consider FDI as an important source of spillover of new ideas and technology change across countries. Amwar and Sun (2011) developed a simultaneous equations model to empirically examine the relationship between foreign direct investment and economic growth based on data for the period 1970-2007 in Malaysia. Findings of the study revealed that an increase in the stock of foreign investment in Malaysia has contributed to an increase in the stock of domestic capital and economic growth. Mehic et.al. (2013) investigated the impact of FDI on economic growth in the seven transition countries of southeast Europe (Albania, Bosnia and Herzegovina, Bulgaria, Croatia, Macedonia, Romania and Serbia) for the period 1998-2007. The main results showed that positive and statistically significant effect of FDI on economic growth. Thus, they concluded

that FDI seems to be an important catalysis for output growth in southeast European countries. Concerning with the nexus between FDI attraction and economic growth, lastly some economics found the bidirectional relationship between them. Omri and Sassi-Tmar (2015) examined the relationship between FDI inflows and economic growth in three African economies (Tunisia, Morocco and Egypt) during 1985-2011. Their analysis based on a simultaneous equations model revealed that high level of foreign direct investment inflows accelerated economic growth in all three economies. In addition, they also indicated a mutually promoting two-way linkage between FDI and economic growth in these economies. Similarly, Baklouti and Boujelbene (2016) investigated the relationship between FDI and economic growth on the economies of the MENA region. They used panel data models with simultaneous equations by Generalized Method of Moments on the period 1998-2011. Their results showed that there is bidirectional causality between economic growth and FDI, Thus they concluded that economic growth and FDI attractiveness are complementary.

Besides the studies indicating the causal relationship from FDI inflows to productivity, innovation and economic growth, some other studies also showed that the spillover from FDI do not arise automatically in all case. For example, Chen (2007) analyse quantitatively the relationship between FDI and regional innovation capability for each province in China. He tests whether more inward FDI in a province will lead to a higher level of innovation capability. The results of his study showed that the more FDI will not necessarily bring the higher innovation. Similarly, Garcia et al. (2013), investigated the relationships between industry-level and firm-level inward FDI and the innovative performance of host country firms. By utilizing data from 1799 Spanish manufacturing firms from 1990 to 2002, they investigated the relationship between inward FDI and the innovative performance of Spanish manufacturing firms. Their results did not confirm the positive spillover effect of FDI inflows for Spanish local firms. Herzer (2015) examined the long-run effect of the level of FDI on the level of total factor productivity (TFP) for 70 developing countries for the period 1981-2011 using panel cointegration techniques. The results showed that FDI does not affect TFP in the short run while FDI has, on average, a robust negative long-run effect on TFP in developing countries.

Concerning with the studies focusing on relationship between FDI and economic growth in Turkey, researchers have also found the mixed results. Alagoz et al. (2008) examined the relationship between FDI and economic growth in Turkey's for the period 1992-2007 by using Granger Causality Test and Regression Analysis. The results of Granger Causality Test did not showed a causality between FDI and economic growth while regression analysis indicated the impact of FDI on economic growth between 2002 and 2007. Mucuk and Demirsel (2009) used Johansen Cointegration and Granger Causality Test and Impulse-Response Function and Variance Decomposition Analysis in order to analyse the relationship between FDI and economic growth for the period 1991-2007. Empirical results showed a mutual relationship between FDI inflows and economic growth. Bilgili et al. (2007) investigated the interaction between

economic growth and FDI by employing time series methods like Impulse-response Function and Variance Decomposition for the period of 1992 and 2004. They concluded that there is a mutual relationship between economic growth and FDI. Finally Ekinci (2011) also analysed the relationship between FDI and economic growth by using the Johansen Cointegration and Granger Causality Tests for the period 1980-2010. Empirical results indicated a two-way causality between FDI and economic growth.

On the other hand some economists analysing the interaction among FDI and economic growth in Turkey indicated that there is no any relationship between them. For example, Acikalin et al. (2006) examined the relationship among real wages, growth and FDI using the Johansen Cointegration and Granger Causality Tests for the period 1980-2002. Empirical findings did not confirm a causal relationship from FDI to economic growth. Kilic and Ates (2009) analysed the relationship between FDI and economic growth by using Johansen cointegration Test for the data between 1983 and 2000. Their findings determined that there are not any significant causality links from FDI to economic growth. Demirsel et al. (2014) analysed the relationship between FDI and economic growth in Turkey by using Johansen Cointegration Test and Variance Decomposition Analysis for the data covering the period between 2002 and 2014. They indicated that there is no any relationship between FDI and economic growth. Finally Gerceker (2015) analysed the relationship between FDI and economic growth by using the data covering the period 1998-2014. Johansen Cointegration test results indicated that there is no relationship between FDI and economic growth in the long run.

In conclusion, studies focusing on the effect of FDI on economy in Turkey and other developing countries have generated mixed results. Thus, it can be concluded that technology spillover effects arising from FDI do not occur automatically and effortlessly (Padilla-Perez and Matinez-Piva, 2009, 311). Accordingly, some empirical findings specifically indicated that local firms cannot successfully assimilate and apply external knowledge sourced from FDI without greater absorptive capacity. For example Du et al. (2008) analysed the factors generating a "spillover effect" in reaction to FDI by drawing upon data collected in 37 industries in China between 1998 and 2003. They demonstrated that a higher absorptive capacity can only strengthen the positive spillover effect of FDI. Borensztein et al. (1998) also examine empirically the role of FDI in the process of technology diffusion and economic growth in 69 developing countries between 1970-1989. They found that FDI may be the main channel through which advanced technology is transferred to developing countries if only human capital is available enough. Similarly, Li and Liu (2005) examine the impact of FDI on economic growth based on the panel data for 84 countries over the period 1970-99. They find that human capital and technology-absorptive ability are very important for FDI inflows to positively promote economic growth in developing countries. Alfaro et al. (2004) explored the links among FDI, financial markets and economic growth by using cross-country data between 1975 and 1995. Their empirical evidence suggested that FDI plays an important role in contributing to economic growth if a country has developed financial market. Lastly Adams (2009) analysed the impact of foreign direct investment on economic growth in Sub-Saharan Africa for the period 1990-2003. The results showed that positive effects of FDI depends on the overall incentive and capacity structure of the host country.

3. Data, Methodology and Empirical Results

This section aims to investigate the cointegration between foreign direct investment flows and economic growth using quarterly data for the period of 2002 and 2015 in Turkey. The variables Foreign Direct Investment (FDI) and Gross Domestic Product (GDP) are sourced from Electronic Data Delivery System (EDDS) in Central Bank of the Republic of Turkey. FDI series consist of values called "Net Incurrence of Liabilities" in Balance of Payments Analytical Presentation while GDP series gather from the expenditure based GDP data in EDDS.

3.1 Unit Root Test

In this section the time series of FDI and Gross Domestic Product should be checked for the stationary. Both Johansen Cointegration Test and Granger Causality Test need stationary time series at same level to examine the relationship between these time series. Accordingly, we applied Augmented Dickey-Fuller and Phillips-Peron unit root test on time series. The results of unit root tests are presented in Table 1. The results of both test indicate that all the series are stationary in their first differences, $I(1)$, at 1% significance levels while the variables are non-stationary in their levels.

Table 1: Results of Unit Root Tests

Variables	ADF		Philips Peron (PP)	
	Level	First Difference	Level	First Difference
FDI	-1.784 (0.2699)	-8.133 (0.000)*	-1.639 (0.1281)	-7.601 (0.0000)*
GDP	-2.159 (0.2351)	-7.379 (0.000)*	-2.809 (0.2010)	-9.488 (0.0000)*

Note: p-value in parentheses. *, represents the statistical significance level of 1%

3.2 Johansen Cointegration Test

Unit root tests show that both time series are stationary at their first difference. Thus, after determining that the series are integrated of the same order, we can test whether the series related to FDI and GDP are integrated by using the Johansen Procedure. Cointegration analysis in econometric studies can be used to evaluate the co-movement of different time series in long-term. Accordingly, we applied Johansen's Maximum Likelihood Method to examine the relationship between FDI and economic growth in this section. This method uses both the Trace Statistic and the Maximum Eigenvalue Statistics (Johansen 1991). The results from the cointegration test in Table 2 shows that both Trace and Maximum Eigenvalue Tests cannot reject the null of zero cointegrating vectors. Besides the hypothesis that there is one cointegrating

vector can be rejected. Thus, the results of cointegration test are not in favor of long co-movement between FDI and GDP. As a result, it has been indicated that no cointegration vector exist among the series. It can be concluded that there is no any long-term relationship between the FDI and economic growth in Turkey. In other words, technology spillover of FDI cannot be seen in Turkey.

Table 2: Results of Johansen Test for Cointegration

Hypothesis	Trace Test		Maximum Eigenvalue Test	
	Trace statistic	Prob.	Max-Eigen statistic	Prob.
$H_0 : r = 0$	12,73*	0,1363	11,45*	0,1418
$H_0 : r \le 1$	1,36*	0,2811	1,31*	0,2989

Note: p-value in parentheses. r is the number of co-integrating vectors. *denotes acceptation of the null hypothesis at the 0.05 level

3.2 Granger Causality Test

We also checked the relationship between FDI inflows and economic growth by using Granger Causality Test. This test allow us to make statements about the causal relationship between variables in econometric models. Thus the notion Granger-causality identifies whether one variable precedes another. In our case, Granger causality tests observe two time series, FDI and GDP, to identify whether series FDI precedes series GDP, GDP precedes FDI, or if the movements are contemporaneous. The test results are presented in Table-3. These results look like the indication of Johansen cointegration test and show that there is no any relationship between FDI and economic growth in Turkey. Both null hypothesis arguing non-causality from FDI to economic growth and from economic growth to FDI cannot be rejected. It can be concluded that technology spillover of FDI in Turkey do not exist since it cannot be indicated any causal relationship from FDI to GDP.

Table 3: Results of granger Causality Test

Null Hypothesis	F-Statistic	Prob.
FDI does not Granger cause GDP	1,7110*	0,1372
GDP does not Granger cause FDI	0,8235*	0.3691

*denotes acceptation of the null hypothesis at 0.05 level

In conclusion the results of both Johansen Cointegration Test and Granger Causality Test show that there is no any relationship between FDI to economic growth, which indicates the non-existence of positive spillover effect of FDI. In other words our study could not find the expected causality from moving from FDI to economic growth in Turkey. Thus it can be concluded that Turkey do not have good economic condition enough to get the positive spillovers effect of FDI inflows. We know that technology transfer channelled through FDI arises from strategic interaction between foreign firms and local firms. Thus, the magnitude of spillover depends on the motivation and "learning capabilities" of local firms. Then it can be argued that FDI inflows are beneficial to the host country when local firms can manage their interaction with foreign firms well. If local firms are unable to absorb the new technological challenge, FDI have a non-positive outcome on the local industry growth. The scope of technology transfer from FDI also depends on host country characteristics at macro level like human capital and ICT infrastructure. In conclusion, the findings from examining the case of Turkey shows that technology spillover effects of FDI do not occur automatically and effortlessly. Accordingly, policymakers aiming to enhance productivity growth via FDI inflows to Turkey should take into absorption ability of firms as well as structure of economy account rather than only focusing on attracting FDI to the country.

4. Conclusion

The liberalization process has opened a significant window of opportunity for developing countries to improve their technologies via learning from Foreign Direct Investment (FDI) inflows to their countries. Thus, economists examine the expansion of FDI as an important factor to facilitate technology progress for developing countries. However, the existing literature acknowledges that the technological spillover from FDI follows different paths in different countries. Accordingly, this study focus on the Turkish case in order to determine the positive spillover effect of FDI. In order to determine the positive spillover effect of FDI for Turkish economy, we examine the impact of FDI on economic growth based on quarterly data over the period 2002-2015. Results of both Johansen Cointegration Test and Granger Causality Test reveal that there is not any significant link among the FDI and economic growth during the studied time period in Turkey. It seems that FDI inflows to Turkey is not complementary to economic growth, which shows that positive spillover effect sourced from FDI inflows to Turkey does not exist.

Thus Turkish case indicates that domestic economies cannot successfully assimilate and apply external knowledge sourced from FDI without greater absorptive capacity. This result of the study holds important implications for policymakers aiming to enhance productivity growth via FDI inflows to their countries. Accordingly, policymakers should recognize that technology spillover effects of FDI do not occur automatically and effortlessly. Attracting FDI is only one part of the story and thus not yield the desired benefits itself. Positive effects of FDI depends on the overall incentive and capacity structure of the host country. Therefore, in order to get positive spillover effect from DFI, policymakers should also give special importance to provide suitable structural condition enhancing absorption capacity of their economies. Then the key policy implication here is that policymakers should give same weight of policies aimed at attracting FDI versus those that seek to improve local economic conditions.

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Customer satisfaction from private utility companies: an explanatory study

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Abstract

Purpose –*The present study examines the factors that have an impact on "customer satisfaction" in the context of private utility companies. The main purpose of the study is accomplished through the development and the empirical testing of a conceptual framework (research model). The proposed framework includes six dimensions (research factors): (a) tangibles, (b) reliability, (c) responsiveness, (d) assurance, (e) empathy, and (f) customer satisfaction.*

Design/methodology/approach – *The present study adopted the SERVQUAL approach (model), only after analytically testing its suitability for use within the investigated area. In that direction, the focus group methodology was used. Finally, the proposed conceptual framework was tested on a random sample of gas consumers residing in the area of Thessaloniki, Greece. The final sample consisted of 437 adult consumers. The reliability and the validity of the questionnaire were thoroughly examined. Empirical data were analysed using the "Structural Equation Modelling" (SEM) technique. The present study is empirical, explanatory, deductive and, mainly, quantitative.*

Findings – *Empirical results indicate that "reliability" has the highest impact on "customer satisfaction", while "empathy" has no impact at all. More specifically, the impact of "reliability" on "customer satisfaction" is indirect, mediated through three other dimensions of the conceptual framework (namely, "tangibles", "responsiveness" and "empathy").*

Research limitations/implications – *A limitation stemming from the implemented methodology is the use of self-reported scales for the measurement of the six research factors. Moreover, the paper lacks a longitudinal approach. Finally, the empirical research (survey) is focused on one organisation and, therefore, offers relatively limited generalizability.*

Originality/value – *Very few studies have utilised the SERVQUAL approach in the context of an explanatory research. This approach offers a unique understanding of the relationship that exist between its five dimensions (factors) (tangibles, reliability, responsiveness, assurance, empathy). Such an approach has very rarely been attempted in the relevant literature.*

1. Introduction

Customer satisfaction is considered a crucial factor for business survival and development (Blut *et al.*, 2015; Zhao *et al.*, 2012). Moreover, it has become one of the main elements for improving quality in the global competitive marketplace (Ryu *et al.*, 2012). Customer satisfaction can be seen either as a goal or a measurement tool. It affects customer retention and, therefore, profitability and competitiveness (Shi *et al.*, 2014).

The relevant literature argues that the delivery of high-quality services increases customer satisfaction and creates the key of maintaining competitive advantages in today's highly diverse environment (Blut *et al.*, 2015; Chang *et al.*, 2009; Cho *et al.*, 2013). Thus, organisations are interested in achieving the highest possible level of service provision, and, therefore, excel against their competition.

During the last decades, the service sector underwent continuous growth (Liang *et al.*, 2013; Mulder *et al.*, 2014). The global deregulation of services, in combination with the increasing need for customer satisfaction, have placed

service quality at the centre of academic and business attention. Successful service organisations invest time and effort in delivering services of increased quality, services that fully meet customer expectations and help achieve business objectives (Agyapong, 2011). The main objective is to develop and maintain customer loyalty (commitment) and satisfaction, increase profitability, while keeping costs at a relatively low level (Orel and Kara, 2014; Bloemer *et al.*, 1999; Fullerton, 2014; Shi *et al.*, 2014).

Service quality is defined as a measure of how well the service level that is delivered by an organisation matches the overall expectations of its customers (Parasuraman *et al.*, 1985). Service quality means that the organisation is conforming to customer expectations on a consistent basis.

According to Orel and Kara (2014), previous research has extensively studied the impact of service quality on customer satisfaction, using established measurement scales, such as SERVQUAL. Despite that, very few of these studies have examined the concepts of service quality and customer satisfaction in the context of utility companies. Moreover, most of the empirical studies have adopted an explor-

atory approach, failing to examine cause-and-effect relationships. The present study was conducted in order to bridge these gaps in the relevant literature.

In that context, the main purpose of the present study is to empirically examine the antecedents of customer satisfaction in the utility service sector. An empirical survey was conducted in a sample of 437 customers of a private utility company. Empirical data were analysed using enhanced techniques (e.g. Structural Equation Modelling), revealing interesting relationships between the factors of the conceptual framework.

As mentioned above, the contribution of the study is twofold: (a) It examines service quality and customer satisfaction in the utility service sector (previously neglected in the international literature), (b) It adopts an explanatory approach, significantly enhancing the understanding of the phenomenon under investigation.

1.1. Customer satisfaction from utility companies

Utility companies, having a dominant role and contribution in the global economy, strive to provide services of "optimal quality standards" (Holt, 2005). Their objective is to satisfy their customers, by developing mutual relationships that will protect their corporate future. In that direction, they try to provide services that are proportional to customer expectations and develop positive feelings for these services (Shaw and Ivens, 2002). Research has indicated that for every customer that registers a complaint, nearly twenty-six others remain silent (Blut *et al.*, 2014; Griffin and Herres, 2002).

According to Bowen (1986) and Surprenant and Solomon (1987), services, being intangible in nature, depend largely on human interaction and are, therefore, difficult to control. The importance of human interaction makes employee behaviour a significant determinant of customer satisfaction (Beatson *et al.*, 2008; Schneider and Bowen, 1985). This is why many service companies consider their employees as marketers. After all, employees are the ones who represent the organisation, its philosophy, ethics and level of service. Their actions can be performed poorly, harming the company, or satisfactorily, adding more value (Nguyen *et al.*, 2014; Gounaris and Boukis, 2013). Researchers have established a positive correlation between employee behaviour and customer satisfaction of a specific service (Schneider and Bowen, 1985). Specifically, front-line employees (FLEs) have a significant effect on customer feelings (Zeithaml *et al.*, 2006).

Moreover, service organisations use statistical tools in order to identify the level of customer satisfaction and make the necessary improvements (Zhao *et al.*, 2012). The systematic improvement of processes incudes "good return policies" and complaint departments, which allow customers to participate in the evaluation of service provision and, therefore, feel respected (Kaufman, 2015).

Although utility companies are quite versatile, the present study focuses on the gas industry. According to Michael Porter's (1985, 2008) "five forces model", the gas industry is characterised by limited new entry threat, substitutes and customer power. On the other hand, the competition is intense and the power of the suppliers is quite significant. In addition, gas companies have to comply with various government regulations that raise the overall cost. Another important factor is the continuous need for new

technologies that can improve service performance. Social factors can also enhance customer satisfaction: every gas company, no matter how profit-oriented, strives to provide services that are socially responsible.

Service quality is influenced by all the above factors. More specifically, gas companies focus on rules and regulations, global economic and market-specific trends, as well as customer needs. The triangle "government, industry, society" highlights the roads to sustainability and economic success.

According to Lukoil (2013), gas consumption will continue to follow an upward trend, with an approximately 2,2% annual increase until 2025, in comparison to other conventional energy resources. Therefore, great opportunities arise for gas companies that are able to increase their customer satisfaction and their customer base.

2. Conceptual framework

The present study aims to develop and empirically test a conceptual framework that investigates the factors affecting customer satisfaction.

The development of the conceptual framework was based on two methodological steps: firstly, a review of the literature identified the factors that were used by previous studies as antecedents of customer satisfaction; secondly, a qualitative research (focus group methodology) was conducted in order to discuss these factors and provide a list of the most significant ones (Berg *et al.*, 2004).

In order to enhance the validity of the qualitative research, two separate sessions were held, each with different participants. Each focus group included seven citizens; consumers of natural gas.

The participants of each group were given (on paper) a list of the factors used in the relevant literature to predict customer satisfaction. Then, a detailed conversation was conducted, with one member of the research team acting as moderator. Each focus group took approximately one and a half hours.

After long discussions, each focus group unanimously chose the most important factors of the provided list. The two focus groups agreed, with minor exceptions, on the same factors. These factors fall into the five dimensions of the SERVQUAL instrument.

SERVQUAL is a globally recognized service measurement instrument, consisting of "intangible, heterogeneous and inseparable" characteristics that govern service industries (Parasuraman *et al.*, 1985, 1988).

The conceptual framework of the present study incorporates the five dimensions of the SERVQUAL instrument (tangibles, reliability, responsiveness, assurance, empathy) (independent factors), and (f) customer satisfaction (dependent factor). More specifically, it is hypothesised that the five independent factors have a statistically significant, positive impact, on customer satisfaction:

Hypothesis 1: Tangibles have a positive impact on customer satisfaction.

Hypothesis 2: Reliability has a positive impact on customer satisfaction.

Hypothesis 3: Responsiveness has a positive impact on customer satisfaction.

Hypothesis 4: Assurance has a positive impact on customer satisfaction.

*Hypothesis 5*: Empathy has a positive impact on customer satisfaction.

3. Research methodology
3.1. Population of the study

The proposed conceptual framework (research model) of the present study was formulated after the literature review analysis and the completion of the qualitative research (focus groups). Its empirical examination was conducted on a random sample of gas consumers residing in the area of Thessaloniki, Greece.

Currently, the only provider of natural gas in the city of Thessaloniki is 'EPA Thessalonikis' (or 'EPA') (epathessaloniki.gr). The company was founded in 2000. It is 51% publicly owned (Greek state) and 49% privately owned (Italian company 'Eni'). Eni manages the company. At this moment, it is a monopoly, but this is expected to change in the future.

Figure 1: The proposed conceptual framework
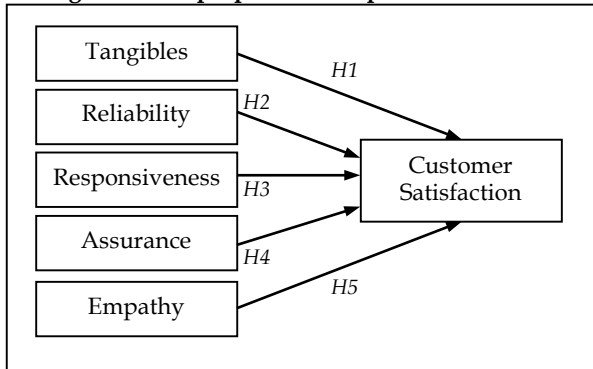
'EPA Thessalonikis' ('EPA') services twelve (12) out of the fourteen (14) municipalities of the city. Over 52,6% of the total population of Thessaloniki, use natural gas. According to official data from the board of directors (EPA Thessalonikis, 2016), the active customers of the company on 31-12-2015 were 181.025. These gas consumers constitute the target population of this study.

3.2. Measurement

A structured questionnaire was used in order to collect the appropriate primary data. The questionnaire included three different sections: (a) Demographic information (six items), (b) Measurement of service quality (SERVQUAL instrument): tangibles, reliability, responsiveness, assurance, empathy (twenty-two items), (c) Measurement of "customer satisfaction" (four items).

The five dimensions of the SERVQUAL instrument were adapted from Parasuraman *et al.* (1988), while the measurement of "customer satisfaction" was based on a synthesis of previous studies (Deng *et al.*, 2010; Ryu *et al.*, 2008; Kuo *et al.*, 2009).

The final questionnaire included twenty-six (26) items for the measurement of the six research factors. As mentioned above, all these items were adopted from the international literature. The seven-point Likert scale was used (1= strongly disagree, 7= strongly agree). All questions were translated into Greek and then back again to English

by another person, in order to detect and, consequently, improve upon discrepancies. All questionnaire items, concerning the six research factors, are presented in Table 5.

3.3. Data collection

Data were collected using random sampling techniques. More specifically, cluster sampling, simple random sampling and systematic sampling techniques were used in order to achieve satisfactory representation from all areas of the city of Thessaloniki.

The study was conducted between June and August of 2015. Four hundred and forty-eight questionnaires were collected, while 437 valid questionnaires were finally used for the statistical analysis; 11 questionnaires were discarded from the final sample because of their extreme values.

Taking into consideration that the study population includes 181.025 gas consumers, the sample size (n=437) is considered adequate and representative (confidence level=95%, margin of error=5%).

Table 1: Demographic characteristics of the sample

Question		Frequency	%
Genre	Male	209	47,83%
	Female	228	52,17%
	Total	*437*	*100%*
Age	20 – 30	82	19,85%
	31 – 40	99	23,97%
	41 – 50	97	23,49%
	51 – 60	73	17,68%
	61 and more	62	15,01%
	Total	*413*	*100%*
Education	Elementary	28	6,45%
	High School	126	29,03%
	Technological	123	28,34%
	University	129	29,72%
	Post-graduate	28	6,45%
	Total	*434*	*100%*
Monthly family income	0-1.000 €	159	37,50%
	1.000-2.000 €	168	39,62%
	2.000-3.000 €	86	20,28%
	> 3.000 €	11	2,59%
	Total	*424*	*100%*
Area of residence	Western Thessaloniki	119	27,55%
	Centre Thessaloniki	168	38,89%
	Eastern Thessaloniki	145	33,56%
	Total	*432*	*100%*

Table 1 includes some basic information about the demographic characteristics of the sample. In general, it seems that the sample is representative of the population of the country and the population of the study.

3.4. Reliability and validity

The instrument (questionnaire) that was used in the present study was tested for both its content and construct validity. The control for the content validity was conducted prior to the commencement of the survey and included.

The control for the construct validity was conducted in two steps. Each of the six factors was evaluated (a) for its unidimensionality and reliability, (b) for the goodness of fit to the proposed research model.

The estimation of the unidimensionality of each of the six factors was conducted using Explanatory Factor Analysis with the method of Principal Component Analysis. Moreover, the statistical measure Cronbach Alpha was used (the statistical package SPSS was used in both cases) to estimate the reliability of the research factors.

All tests concluded that all the scales used are valid and reliable (no items were excluded from the analysis) (see Table 2 for the main results). For the appropriate statistical analysis, the following measures have been examined (Hair *et al.*, 1995; Fabrigar and Wegener, 2011):

▪ For determining the appropriateness of the factor analysis, the following measures were examined: (a) the 'Bartlett's test of Sphericity' (it should be statistically significant at the 0,05 level), (b) the statistical test of 'Kaiser-Mayer-Olkin' (KMO) (values over 0,8 are satisfactory, while values over 0,6 are acceptable).

Table 2: Construct validity and reliability

Construct / Factor	Items	Factor loadings	Cronbach Alpha	K.M.O.	Bartlett's Test Sig.	TVE	Eigenvalue
Tangibles	4	0,866; 0,922; 0,857; 0,857	0,898	0,833	0,00	76,762%	3,070
Reliability	5	0,859; 0,843; 0,865; 0,892; 0,800	0,904	0,845	0,00	72,617%	3,631
Responsiveness	4	0,848; 0,900; 0,903; 0,745	0,866	0,753	0,00	72,498%	2,900
Assurance	4	0,902; 0,904; 0,903; 0,767	0,889	0,805	0,00	75,908%	3,036
Empathy	5	0,872; 0,905; 0,861; 0,821; 0,734	0,889	0,859	0,00	70,692%	3,535
Customer satisfaction	4	0,851; 0,818; 0,816; 0,861	0,856	0,689	0,00	70,016%	2,801

Table 3: Estimation of the goodness of fit

Construct / Factor	Items	Factor loadings	Normed X^2	C.R.	V.E.	RMR	CFI / GFI
Tangibles	4	0,805; 0,926; 0,798; 0,794	1,339	0,900	69,319%	0,010	0.985; 0,999
Reliability	5	0,826; 0,843; 0,791; 0,918; 0,706	4,758	0,910	67,195%	0,043	0,980; 0,970
Responsiveness	4	0,762; 0,951; 0,842; 0,701	4,106	0,890	67,135%	0,049	0,994; 0,991
Assurance	4	0,911; 0,894; 0,834; 0,609	2,950	0,890	67,390%	0,021	0,997; 0,994
Empathy	5	0,843; 0,926; 0,818; 0,764; 0,623	3,687	0,898	64,181%	0,080	0,985; 0,977
Customer satisfaction	4	0,933; 0,688; 0,879; 0,747	3,555	0,888	66,862%	0,051	0,986; 0,984

▪ For determining the number of the extracted factors the criterion of 'eigenvalue' was used. Factors with 'eigenvalue' over one are selected.

▪ For testing the significance of the variables (items), their factor loadings were used. For a sample size of more than 150 observations a loading over 0,55 is considered to be significant.

▪ For testing the reliability (internal consistency) of the constructs (factors) the 'Cronbach's Alpha' measure was used. Values greater than 0,7 are considered valid.

Furthermore, the goodness of fit of each the research factor was evaluated using Confirmatory Factor Analysis (CFA). All tests produced satisfactory results (see Table 3 above for the main results). More specifically, the following measures have been examined (Schumacker and Lomax, 2010; Smith and McMillan, 2001):

▪ X^2: It should be statistically insignificant (p>0,05).

▪ Normed X^2 (X^2/df): Values between 1 and 3 are desirable, while values between 1 and 5 are acceptable.

▪ Construct Reliability (CR): It should be higher than 0,7.

▪ Variance Extracted (V.E.): It should higher than 50%.

▪ RMSEA: It should be less than 0,1.

▪ RMR: It should be less than 0,05.

▪ CFI / GFI: They both should be higher than 0,9.

4. Empirical results

4.1. Mean scores

Table 4 presents the mean scores for every research factor, while Table 5 presents the mean scores for every item on the questionnaire.

Assurance and responsiveness are the two dimensions in which 'EPA' performs best (mean score in both dimensions is 5,4). On the other hand, the lowest mean score corresponds to empathy, indicating that 'EPA' should focus on

its future improvement. Moreover, the mean score for customer satisfaction is 5,36, which appears in line with the results obtained for the five dimensions of service quality.

In general, the following conclusions can be made:

▪ Empathy is the dimension with the lowest mean score (mean score = 5,07). Therefore, to a large extent, end users feel that the company operates in its own interest. On the other hand, assurance and responsiveness are the dimensions with the highest mean score (mean score = 5,40).

Table 4: Mean factor scores

Item	Mean	Std. Deviation
Tangibles	5,1838	5,1838
Reliability	5,3021	5,3021
Responsiveness	5,4006	2,5994
Assurance	5,4071	5,4071
Empathy	5,0709	2,9291
Customer satisfaction	5,3629	5,3629

Table 5: SERVQUAL mean scores / "Customer satisfaction" mean scores

		Item	Mean*	Std. Deviation
Tangibles	1	'EPA' uses modern equipment.	5,31	1,250
	2	The physical facilities of 'EPA' are visually appealing.	5,05	1,464
	3	Employees (managers and technicians) are well dressed.	5,35	1,379
	4	The appearance of the physical facilities is in line with the kind of services provided.	5,03	1,371
Reliability	5	When 'EPA' promises to do something by a certain time, it does so.	5,12	1,555
	6	When you have a problem, 'EPA' shows a sincere interest in solving it.	5,30	1,434
	7	'EPA' is an institution you can depend on.	5,61	1,265
	8	'EPA' provides its services at the time it promises to do so.	5,20	1,394
	9	'EPA' maintains error-free records.	5,27	1,397
Responsiveness	10	'EPA' always informs customers when services will be performed.	5,14	1,734
	11	Usually, 'EPA' provides prompt service to its customers.	5,54	1,427
	12	'EPA' employees are always willing to help customers.	5,69	1,421
	13	'EPA' employees are always willing to respond to customer requests.	5,24	1,570
Assurance	14	The behaviour of 'EPA' employees instils confidence in citizens.	5,52	1,240
	15	Citizens feel safe in their transaction with 'EPA' employees.	5,44	1,383
	16	'EPA' employees are consistently courteous with citizens.	5,73	1,352
	17	'EPA' employees appear to have the support of the administration in order to do their job.	4,94	1,455
Empathy	18	'EPA' provides customers with individual attention.	5,19	1,751
	19	'EPA' employees provide customers with individual attention.	5,42	1,566
	20	'EPA' employees know the individual needs of customers.	5,13	1,616
	21	'EPA' has customers' best interest at heart.	4,62	1,953
	22	'EPA' has operating hours convenient to all customers.	4,99	1,923
Customer satisfaction	1	The comments I make about 'EPA' when talking with other people are always positive.	5,27	1,771
	2	I intent to use the services of 'EPA' in the future.	5,61	1,755
	3	I encourage my friends and relatives to use the services of 'EPA'.	5,43	1,657
	4	Overall, I am very satisfied with the services provided by 'EPA'.	5,15	1,556

The seven-point Liker scale has been used: 1= totally disagree, 7=totally agree

- Moreover, despite the fact that customers are very satisfied with the company employees, they believe that employees do not have the support of the administration needed to do their job effectively.
- The items with the lowest scores should be strengthened by the management of the company. For example, customers believe that the operating hours are inconvenient. Moreover, physical facilities are not adequate and need improvement.
- Customer satisfaction seems within acceptable levels (mean score = 5,36). From another perspective, given that 'EPA' is a monopoly in the local market of natural

gas, there is always the threat that another competitor will enter the specific market. In that context, 'EPA' should not rest on its high level of customer satisfaction and defend its market position in the future.

4.2. Structural Equation Modelling

The examination of the proposed conceptual framework was conducted with the use of the Structural Equation Modelling technique. The estimation of the structural model was conducted with the Maximum Likelihood Estimation method. The Covariance Matrix was used as the table of entry and the extraction of the Standardized Completely Solution was requested (Hair *et al.*, 1995).

Table 6: Hypothesis testing / Initial results

H	Path			Estimate (r)	p	Result
H1	Tangibles	→	Customer satisfaction	0,322	***	Accepted
H2	Reliability	→	Customer satisfaction	-,081	0,334	Rejected
H3	Responsiveness	→	Customer satisfaction	0,254	***	Accepted
H4	Assurance	→	Customer satisfaction	0,155	0,057	Rejected
H5	Empathy	→	Customer satisfaction	0,485	***	Accepted

*** $p < 0,01$

Table 7: Final results (modified model / significant paths only)

H	Path			Estimate (r)	p	Result
NP	Reliability	→	Tangibles	0,721	***	New path
NP	Reliability	→	Responsiveness	0,491	***	New path
NP	Responsiveness	→	Empathy	0,516	***	New path
NP	Tangibles	→	Empathy	0,337	***	New path
H1	Tangibles	→	Customer satisfaction	0,292	***	H1
H5	Empathy	→	Customer satisfaction	0,416	***	H5
H3	Responsiveness	→	Customer satisfaction	0,227	***	H3

*** $p < 0,01$

Figure 2: The initial structural model (not all paths are statistically significant)
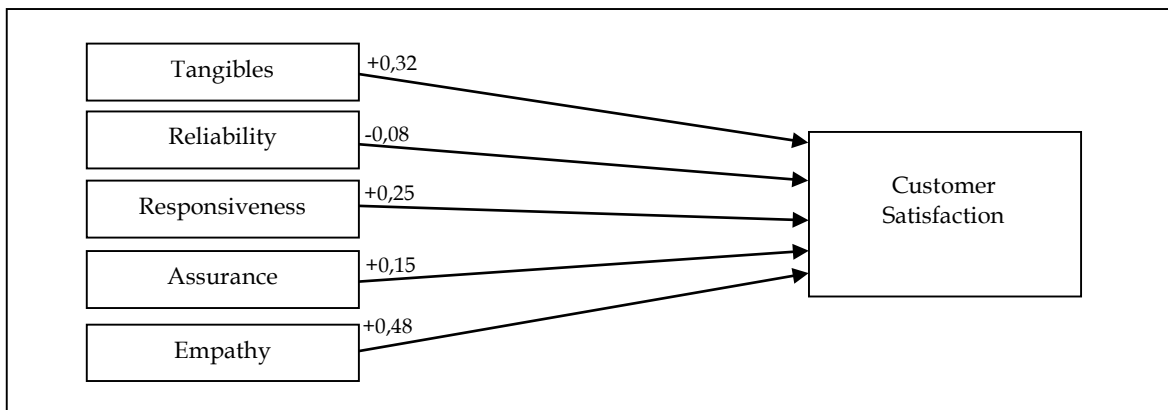
Figure 3: The modified structural model (all paths are statistically significant)
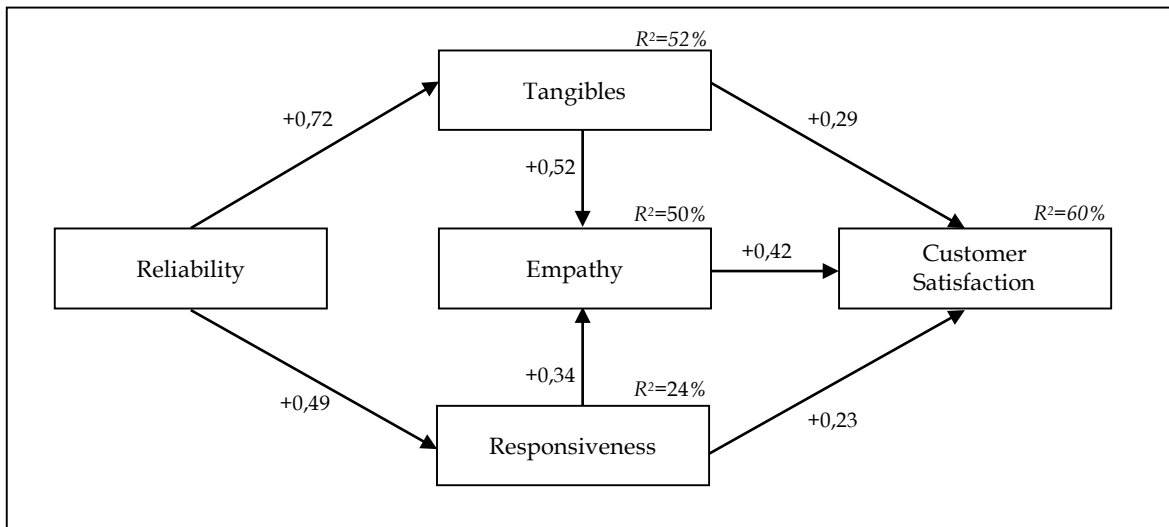
Table 8: Direct, indirect and total effects between research factors

Direct effects				
	Reliability	Responsiveness	Tangibles	Empathy
Responsiveness	0,491	0,000	0,000	0,000
Tangibles	0,721	0,000	0,000	0,000
Empathy	0,000	0,516	0,337	0,000
Satisfaction	0,000	0,227	0,292	0,416
Indirect effects				
	Reliability	Responsiveness	Tangibles	Empathy
Responsiveness	0,000	0,000	0,000	0,000
Tangibles	0,000	0,000	0,000	0,000
Empathy	0,497	0,000	0,000	0,000
Satisfaction	0,529	0,215	0,140	0,000
Total effects				
	Reliability	Responsiveness	Tangibles	Empathy
Responsiveness	0,491	0,000	0,000	0,000
Tangibles	0,721	0,000	0,000	0,000
Empathy	0,497	0,516	0,337	0,000
Satisfaction	0,529	0,442	0,432	0,416

In more detail, the (modified) structural model fitted the data well, while the factors that were included can explain 60% of the variance of the dependent factor, i.e. satisfaction from the provided services.

It must be stressed that various new paths were added to the model, based on modification indexes function of AMOS. This resulted in a structural model with improved fit and explanatory power.

More analytically, to evaluate the fit of the overall (modified) model the X^2 value (X^2 = 3,981 with 3 degrees of freedom) and the p-value (p = 0,264) were estimated. These values indicate a very good fit of the data to the overall model. However, the sensitivity of X^2 to the sample size enforces control of other supplementary measures of evaluating the overall model, such as the "Normed-X^2" index (1,327), the RSMEA index (0,037) the CFI (0,998) and the GFI (0,993), that all indicate a very good fit.

Additional tests of the significance of the measurement model, such as Factor Loadings, Construct Reliability and Variance Extracted were also estimated. Results indicate

that all loadings are significant at the p<0,05 level. Additionally, Construct Reliability and Variance Extracted measures for all constructs are satisfactory.

Table 6 illustrates the results of the initial analysis, while Table 7 the final results (modified structural model).

The initial results offer support to 3 research hypotheses, whilst the other 2 hypotheses are not verified by the empirical data. The analysis of the results enables interesting observations.

In order to enhance the understanding of the empirical results, we have attempted their schematic representation in Figure 2 and 3. Figure 2 represents the initial model, while Figure 3 represents all the statistically significant relationships among the research factors (modified model).

Table 8 is quite important, since it provides all effects between research factors. For example, reliability does not have a direct effect on customer satisfaction, but its indirect effect is quite significant (r=0,529).

In general, the following observations can be made:

- Although the modified research model (Figure 3) includes only the direct relationships, Table 8 presents the total effects (direct and indirect) between all research factors.
- In that context, reliability has an indirect effect on customer satisfaction, through the dimensions of tangibles, responsiveness and empathy. The empirical analysis concluded that reliability is the dimension with the highest impact on customer satisfaction (r=0,53) (see Table 8). This result is also supported by Zeithaml *et al.* (2006). It seems that service organisations should really focus on the enhancement of that factor. More specifically, they should act as they promise, be dependable and show sincere interest in solving customer problems.
- On the other hand, customer satisfaction is directly affected by tangibles, responsiveness and empathy, while empathy is also directly affected by the first two dimensions.
- Empathy is a crucial factor in customer satisfaction: it has a direct effect on the latter (r=0,42), but most importantly it mediates the relationship of all other factors of the research model. More specifically, the indirect effect of tangibles and responsiveness on customer satisfaction is mediated through empathy. Additionally, empathy mediates the effect of reliability on customer satisfaction. There are two alternative paths for that relationship: (a) reliability → tangibles → empathy → customer satisfaction), and (b) reliability → responsiveness → empathy → customer satisfaction. Therefore, service organisations need to focus on providing customers with individual attention and fully cover their needs.
- Tangibles seem to directly affect customer satisfaction (r=0,29). This result indicates that people can develop positive or negative feelings towards an organisation, only by focusing on the tangible aspects of their interaction (e.g. facilities, technologies, employee appearance). Responsiveness also seems to have a direct effect on customer satisfaction (r=0,23). Therefore, the interaction with customers (e.g. prompt service, willingness to help) is also extremely significant for their overall satisfaction.
- Assurance was not found to have any effect on any of the other factors of the research model. Therefore, it is not included in the modified research model (Figure 3). Its seems that service organisations need to focus on all other dimensions, avoiding making investments in the level of customer assurance.

5. Conclusion

An interesting observation concerns the interaction of the company under examination with its end users. The participants of the survey, although satisfied to a high extent, believe that 'EPA' performs mostly for its own interest, rather than in their interest. From one perspective, this conclusion might not be surprising; after all, 'EPA' is a large gas company with an objective to make profits, whilst it is also a monopoly in the Thessaloniki market. Although, from another point of view, customer feelings may have a negative impact on the company once the market opens and competition emerges.

Maybe, end gas users believe that 'EPA' shows little interest towards its customer base because gas prices are not as low as expected. As highlighted in conversations with the participants of the empirical research, there is a difference in gas prices between Athens and Thessaloniki. 'EPAs' customers believe that they are being charged more than the residents of the Greek capital, thus expressing disappointment and confusion. This finding should be taken into consideration and careful evaluation by the company. Thessaloniki, being the second largest economic, political and industrial centre of Greece, constitutes a large market: displeasing customers in terms of their payment obligations could prove to be very threatening, especially if the Thessaloniki gas market opens up (Papadopoulos *et al.*, 2008).

Regarding the sample of the survey, its satisfactory representation of the population can be supported in the light of the demographic characteristics. The breakdown between the different age groups, different levels of education and levels of monthly income shows that the sample fully represents the overall population of Thessaloniki. Finally, survey respondents reside in the centre of Thessaloniki, as well as in the east and west of the city. Therefore, representation from all city regions is ensured.

The analysis of the mean score for the five SERVQUAL dimensions and the factor measuring customer satisfaction, leads to the following conclusions:

- The services offered by 'EPA' are quite satisfactory, since the average for all responses is greater than five (in a 7-point Likert scale) for all five dimensions of service quality.
- More specifically, the best performance is found in the dimension of responsiveness (mean=5,4). Apparently, customers of 'EPA' consider that employees are always willing to help.
- In contrast, the weakest performance corresponds to the dimension of empathy (mean=5,07), indicating that although employees are helpful, customers feel that the organisation does not have their best interests at heart. Regarding 'EPAs' customer satisfaction, it is at a satisfactory level (mean=5,4).

The evaluation of the proposed conceptual framework (research model) reveals the following:

- Firstly, the conceptual framework that was created and tested using empirical data was found to be valid and

reliable (EFA and CFA). Furthermore, the factors that affect, both directly and indirectly, customer satisfaction can explain its variance by $R^2=60\%$. This underlines the high explanatory power of the proposed model.

- The factor (dimension) with the highest impact on customer satisfaction is reliability. More specifically, reliability has an indirect effect on customer satisfaction, through all the other statistically significant factors of the conceptual framework. This means that reliability is the cornerstone for increasing customer satisfaction.
- In addition, the dimension of empathy is of considerable importance, since it affects customer satisfaction both directly and indirectly. In other words, empathy is a very important mediator.
- Furthermore, the equipment (tangibles) and responsiveness have both a direct and indirect effect on customer satisfaction.
- Finally, the assurance factor has been removed from the final research model as statistical analysis has shown that it has no significant effect on customer satisfaction.
- In general, the present empirical research proves that tangibles, responsiveness, reliability and empathy, influence customer satisfaction, both in a direct and indirect way. 'EPAs' actions should begin with increasing towards recruiting, training and evaluating employees. Specifically, employees can use the empirical results in order to:
- Recognise which personal characteristics have a positive influence on customer satisfaction and work towards their enhancement;
- Better understand customer needs and offer services accordingly.

Managers can use the empirical results in order to:
- Adopt customer oriented techniques;
- Discover ways to develop a friendlier environment, both for the customers and their employees;
- Use objective criteria to evaluate their staff.

The statistical analysis indicated that reliability is the most important of the five dimensions regarding customer satisfaction. Therefore, 'EPA' must focus on strengthening this factor. Specifically, it should:
- Provide information promptly and willingly, on all issues concerning scheduled or temporary services;
- Advertise its services, by emphasizing its strong points (e.g. employee willingness to provide help);
- Adapt its gas prices.

Regarding the weaknesses of 'EPA', the statistical analysis has underlined the factor with the lowest score. "Empathy", the ability to understand the needs of others, is a crucial element for utility companies, since it creates positive customer feelings. The present study pinpoints possible solutions for that issue:
- Better communication between staff and management can enable the former to provide excellent service to customers, who feel that their needs are not yet fully taken into consideration;
- Training on customer psychology, as well as consultation and continuous service evaluation, must also be considered. The company should offer more skills to

its credibility, by performing in a reliable manner and showing more empathy towards its customers.

5.1. Managerial implications

The empirical research was conducted on a representative sample of customers of a natural gas company operating in the city of Thessaloniki, Greece. The relevant statistical analysis has led to several results and conclusions, described above. Examining the relationships between the dimensions of service quality (SERVQUAL) and customer satisfaction, several suggestions can be made. Some indicate potential threats for the sustainability of the company, while others offer reassurance for its future success. Nevertheless, continuous improvement is always necessary, since the nature of competition (present or future) demands constant adaptation to customer needs.

Although personal improvement and individual performance is a matter of employee professionalism, consciousness and spirit, the present study provides some useful information to 'EPAs' personnel. Firstly, employees could use this study in order to define their role in the business, determine their individual behaviour and evaluate their personal performance. In addition, the company management can use the provided empirical results as a guide

front-line employees and carefully measure customer satisfaction on a regular basis.

Besides obtaining expertise on customer satisfaction, managers must constantly set a good example, motivate employees and encourage them with relevant seminars. Greek citizens generally view large utility companies with great insecurity. Profit-oriented managerial behaviour, bureaucracy, delays and inadequate communication between employees and customers, have lead customers to develop bias towards service organisations. Organisations should provide organised services, focus on human-centred performance and develop sincere interest towards their customers. After all, it has been proven that customer satisfaction is the cornerstone for a successful organisation. A strong position in the market and loyal bonds between company and customers are influenced more by behaviours, rather than lower prices (Dimitriades, 2006). Although 'EPA' is currently a solo player in Thessaloniki's gas market, the near future may demand a competitive position. Therefore, the results and the proposals of the present study can be considered as a guide for managerial implementation.

5.2. Limitations and future research

The main limitations of the study are listed below:
- The empirical survey was focused on one sector and, therefore, the generalizability of the results to other sectors of the economy is limited.
- The use of self-reported scales for the measurement of the six research factors is an inherent limitation of the employed methodology. Moreover, the paper lacks a longitudinal approach.
- Data collection failed to include the suburbs of the city of Thessaloniki, since 'EPA' does not operate branches in these areas. To avoid unequal distribution, the study focused on collecting information from the western, eastern and centre of Thessaloniki.

- The study has evaluated service quality by measuring customer perceptions. Customer expectations were not included in this study, due to the nature of the services

provided by the company ('EPA'), as it would be practically impossible to measure and compare both perceptions and expectations.

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Investigating the impact of viral message appeal and message credibility on consumer attitude toward brand

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Abstract

Background *- Due to the rapid growth of the Internet and use of e-commerce in recent years, viral marketing has drawn the attention of manufacturing and service organizations. However, no research has been conducted to examine the impact of message appeal and message source credibility on consumers' attitude with mediating role of intellectual involvement of consumers and their risk taking level.*

Purpose *- The aim of this study was to examine the impact of appeal and message source credibility on consumers' attitude with mediating role of consumers' intellectual involvement and their risk taking level.*

Design/methodology/approach *– The population of this study includes consumers of mobile phones (Samsung, Sony, Nokia, LG and iPhone) in Bushehr city (Iran). As the population of the study is unlimited, 430 questionnaires were distributed using available sampling method, and 391 questionnaires were collected and analyzed. Using structural equation modeling, data were analyzed through smart PLS software.*

Findings *–The results show that the appeal and credibility of the message source have impact on consumer attitudes toward the brand. It was also found that intellectual involvement of consumers plays the mediating role in the relationship between message appeal and consumer attitudes toward brand. In the relationship between message source credibility and customer attitude towards the brand, the level of risk taking of people has no mediating role.*

Research limitations/implications *– Data collection tool was questionnaire in this study, and questionnaire has some disadvantages that can affect the results. Additionally, this study was conducted in Bushehr city (Iran). Therefore, we should be cautious in generalizing the findings.*

Originality/value *– In this study, the effect of message appeal and message source credibility on consumer attitude to brand was examined. The risk taking level of consumer and his involvement level were considered as mediating variables.*

Keywords: Viral marketing, message appeal, message source credibility, consumer attitude, the level of intellectual involvement, the level of risk taking

JEL Classification: M31 Marketing, M37 Advertising

1. Introduction

Nowadays, most people, especially young people, use the Internet or tend to use social networks. The created space has provided some threats and opportunities for companies. It has also caused marketers to revise their marketing methods and pay more attention to impact of internet network on marketing methods. Word of mouth marketing refers to the transmission of information among users through language (Wu and Wang, 2011). Viral Marketing is generally a combination of word of mouth marketing and internet networks. It means that consumers send brand or messages of the company through internet network to each other. Two very important features of this type of marketing are high speed and low cost (Kaplan and Haenlein, 2011). In viral marketing, the message must

be designed in a way that it can attract people and persuade them to send this message to their family and friends. These messages are sent by users to each other via the Internet (Bahrainizadeh and Zamani, 2011). Experts believe that many factors affect the success and effectiveness of viral marketing that these factors either relate to those consumers who are exposed to message or relate to message properties or situation and context in which message is sent (Kaplan and Haenlein, 2011). Yang et al. (2012) indicated that when customers see themselves against the risks of buying, they seek the credible information and this information includes information sent through word of mouth or through the credible sources. If receiver of the message believes that message source is credible, the impact of this message on people attitude to product and brand will be more than when a

person feels that message has lower credibility (Cheung et al., 2008). McKinney (2002) also states that based on the satisfaction of the Web model, understandability, reliability, and usefulness of the information are three basic dimensions of quality information in viral marketing affecting consumer attitude toward the brand (Cheung et al., 2008). Based on what was said, companies might be aware of type of the relationship between message appeal and consumers' attitude in light of these studies. Unfortunately, very limited number of studies has been conducted on viral marketing and investigation of variables that viral marketing can be implemented by using them. Therefore, due to increasing importance of viral marketing and word of mouth marketing in the advertising strategies and methods of the companies, this study was conducted to examine the impact of emotional appeal and credibility of message on consumers' attitude toward brand.

2. Literature review and background of study
2.1. Word of mouth marketing and viral marketing

What has caused that stories like Harry potter to be popular and famous among young people? It can be said that word of mouth marketing has played the main role in popularity of these stories. Word of mouth marketing means that customers will transmit positive or negative experiences of a given product or anything else that they like to others and people become an advertising factor for a product (Proctor and Richard, 2002). Word of mouth marketing is a type of informal communication on evaluation of product and services among the customers. In this type of marketing, customers themselves play the role of marketers for company. Word of mouth marketing plays an important role in shaping the attitudes and behavior of consumers (Lim and Chung, 2014). A vital component in the marketing process for any organization is the use word of mouth marketing because consumers become an advertiser for the organization in this type of marketing (Dinh and Mai, 2016). Viral marketing means disseminating a message or content that contains advertising or information about a company's brand through social media. In other words, it can be stated that viral marketing is a strategy encouraging people to send the advertising messages to each other. In this marketing, advertising message is disseminated as a virus among people (Beverland et al., 2014). To better implementation of viral marketing, two variables of message appeal and message source credibility can have an important role (Wu and Wang, 2011).

• *Message appeal:* Wu and Wang (2011) suggest that message appeal emotionally or intellectually affects consumer attitudes towards a product and brand. Emotional appeal affects a person emotionally and intellectual appeal represents a benefit that consumers find it from product. In other words, the intellectual appeal is the focus of message on product features that have benefit for the consumer. Emotional appeal of the message means to stimulate consumer through his emotion or feeling (Noble & johnson, 2013). Emotions and social sharing of emotions phenomenon is key in viral communications. Dobele et al. (2007) state that advertising message of the company should establish an emotional communication between company or brand and message

receiver so that company to be sure consumers will send this message to others and it will affect them.

• *Message source credibility:* The message source credibility means that how much the receiver of the message has trust in sender and reflects the mindset of the receiver of the message to sender. It represents consumers' attitude in relation to the source of the message (Gunther, 1992). From the perspective of Wu and Wang (2011), a credible message has two basic components including reliability and expertise. Reliability reflects the amount of trust and acceptance that the receiver of the message has toward sender that includes being reliable, unreliability, having honesty- not being honest, being reliable, not being reliable, being sincere, and insincerity. Expertise represents having the knowledge that sender of a message has about the product that includes specialized message, lack of specialized message, being experimental, not being experimental, being knowledgeable, not being knowledgeable, being qualified, not being qualified (Wu and Wang , 2011).

2.2. Consumer attitude towards the brand

According to the Marketing Association of America, the brand is a name, term, symbol, design or a combination of these items, reflecting the main nature of a company or a service (Vazifehdust et al., 2010). Brand is something more than a mere name, since it contains all communications that customer establish with features of the products (Maleki et al., 2015). According to Keller (1998), brand has three components that include brand attitude, brand benefits, and brand reputation. According to Keller (1998), brand attitude is the belief of the people to benefit obtained from the reputation, performance, and experience of brand. A strong belief in environmental performance of brand leads to a positive attitude towards brand in consumer. Attitude includes favorable and unfavorable evaluations, emotions or feelings and behavioral attitudes (Wu and Wang, 2011).

According to Wu and Wang (2011), the attitude consists of three components:
• *Cognitive component:* it includes knowledge and understanding that consumers obtain after consuming the product or receiving the information.
• *Stimulating component:* it is the emotional reactions of consumers toward the brand representing consumer evaluation of the product or brand.
• *Effort component:* it represents hatred, tendency, behavior, or individual performances toward a product or brand.

According to Kachersky et al. (2015), people attitude toward the brand can include three components: cognitive, emotional and functional.

2.3. Level of intellectual involvement

There are different definitions of intellectual involvement. The key component of this concept is personal dependence or attachment and there is a general agreement that the level of intellectual involvement of consumer to a target is determined based on its importance to the consumer (O'Reilly & Marx, 2011). The level of intellectual involvement reflects the importance of that product to the customer and represents consumer interest in the product (Yang et al., 2012). Intellectual involvement is defined as perceived dependence or

attachment of a target based on basic needs, values, and interests. Target word is used in a general sense and refers to a product or brand, advertising or a shopping situation (Nowrouzi & Qalandari, 2009).

2.4. Level of risk taking

Consumers differ in terms of risk taking. Studies show that the level of risk taking of people depends on internal factors of the person and it does not depend on external considerations of market. Risk includes two components of the uncertainty of the results and the importance of negative results of a choice, and people may differ in both components and they may differ from one situation to another situation (Vazifehdust et al., 2010). Gounaris and Stathakopoulos (2010) believe that consumers become loyal to one product or brand to reduce the perceived risk. This loyalty is high in risk-averse people. They showed that consumers' risk-averse leads to loyalty and their dependence on one brand (Bahrainizadeh and Ziaei, 2012).

2.5. Relationship between message appeal, message credibility and consumer attitude toward brand

Using appeal in advertising message is known strategy in advertising, since merely information in a message does not lead to the motivation of consumers but stimulating the feelings leads to motivation (Wang and Lee, 2005). Hawkins et al. (2003) state that rational appeal acts through rational reasoning and leads to change in behavior and belief of consumer toward brand through thinking. In contrast, emotional appeal stimulates the person psychologically leading to change in attitude and behavior of the person. Additionally, Kim and Lee (2012) suggest that message appeal affects sender expertise and message source credibility, that is one component of message source credibility, affects the consumer attitude toward brand indirectly. Generally, customers mostly like to receive information sent to them through non-profit organizations. If the message is sent from a non-profit organization, people will pay more attention compared to the message sent from a business or manufacturing company (Smith et al., 2005). Recent research also showed that source message credibility has a significant impact on consumer attitudes and plays an important role in the effectiveness of advertising companies. Source of message credibility means creditability of message sender (Clow et al., 2006). Credibility of source of message sent via internet affects the perception of consumer to information sent for him and it leads to creation of positive attitude in consumer toward product brand at the same time (Chiou & Hsu). Kim and Lee (2012) suggest that message appeal affects sender expertise and message

Table 1: Research literature

Row	Title of research	Researcher/ researchers	Results of findings
1	Investigating the effects of electronic word of mouth marketing	Cheung et al. (2008)	The results show that two main variables have a significant impact on the acceptance of information in the word of mouth marketing. These two variables include logical quality of the message and source of the message credibility. In this study, it was shown that two dimensions of source of message credibility namely expertise and reliability have direct impact in acceptance of information.
2	Why viral message is sent?	Dobele et al. (2007)	In this study, they examined the role of emotions and feelings in viral messages. The results showed that the feelings of surprise, cheerfulness and sadness had the greatest impact on message transmission, respectively.
3	Investigating the impact of message credibility and message appeal on attitude toward brand	Wu and Wang (2011)	The results indicate that source of message credibility has direct impact on consumer attitudes toward brand in the viral marketing. In addition, at the high involvement, intellectual appeal of the message has high impact on consumer attitude toward brand. Generally, it can be said that source of message credibility has more impact on consumer attitude compared to message appeal.
4	How customers evaluate the credibility of viral message?	O'Reilly & Marx (2011)	The results showed that the level of risk taking and intellectual involvement of consumers play the mediating role in relation with consumer attitudes towards brand. Another finding of this study shows that source of message credibility depends on four factors of message repeat, being rational, finding the dependent source, and previous experience of the brand.
5	The impact of viral marketing on brand	Moore (2003)	This research examines the impact of viral marketing on organizations brand and different products. Its results indicate that viral marketing affects consumers' attitude to the brand.

6	The impact of viral messages on rate of message sending in the media communications process	Jafariani & Doaee (2010)	The results show that among the various feelings, the feeling of surprise, cheerfulness and fear have a positive effect on the rate of transmission of viral message and sadness virus affects the transmission of viral message negatively. Additionally, anger and hatred have no effect on viral message transmission.
7	Investigating the impact of word of mouth marketing incentives on consumer attitude	Pongjit & Beise-Zee (2015)	The results of this study show that organizations using word of mouth marketing require long-term incentives. Additionally, these organizations should use mutual communications to influence consumers.
8	Investigating the impact of TV advertising appeal on consumer attitude toward brand	Feiz, Fakharyan, Jalilvand, & Hashemi (2013)	The results showed that advertising appeal dimensions (feelings of fear appeal, relative appeal, and humor appeal) have impact on consumer attitude toward advertising of a company.

Source: Provided by authors

2.7. Conceptual model of research

This study aims to examine the effect of appeal and credibility of the source of viral messages on consumers' attitude toward the brand according to mediating role of level of intellectual involvement and risk taking level of consumer. By studying the theoretical and experimental literature on research topic and taking into account the results of research conducted by Wu and Wang (2011), Wang et al. (2005), O'Reilly and Marx (2011) and Gerard & Liu (2009), research hypotheses were developed. By identifying the key variables of study and making relationship between them through theoretical and experimental literature, conceptual framework of this study was developed. The conceptual framework of this research is shown in Figure 1.

Figure 1: Research Conceptual Model
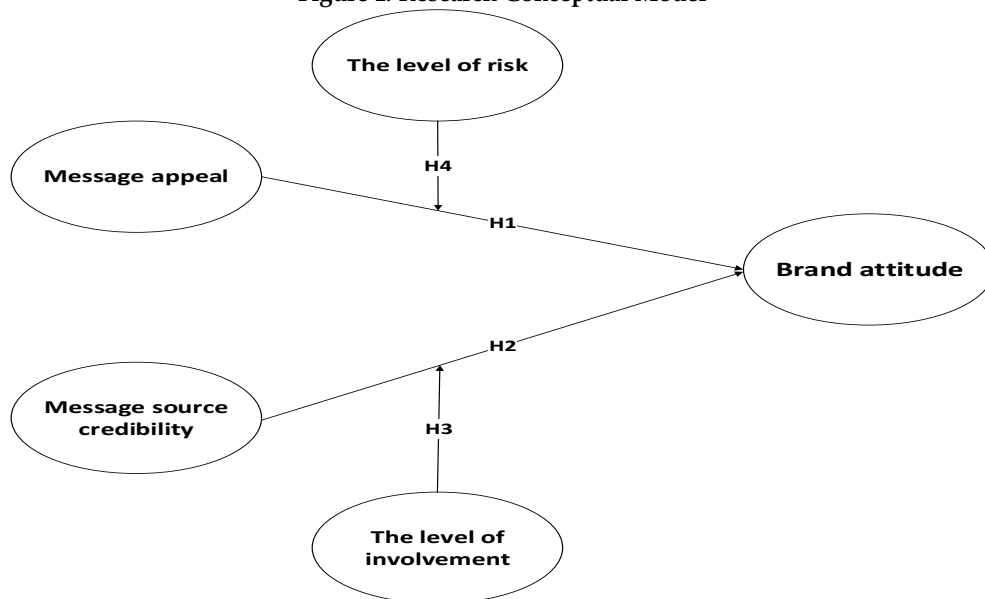
3. Methodology

This research is applied in terms of goal, and in terms method of data collection is a descriptive survey and correlation. The study population included all people using mobile phones (Samsung, Sony, Nokia, LG and iPhone) in the city of Bushehr. Due to large population, sampling was used in this study. Based on unlimited population of Cochrane formula, sample of study was determined to be over 384 subjects at 95 percent confidence level and 5 percent sampling error.

In this study, by convenience sampling, 430 questionnaires were distributed among the population using available sampling that eventually 391 questionnaires were returned. Data were collected through questionnaire. The Questionnaire consists of three parts, including introduction, the demographic questions, and questions measuring the main variables of research. To measure the research main variables, 28 questions were developed through combining two questionnaires of Wu and Wang (2011) and O'Reilly and Marx (2011). Five-item Likert scale (from strongly agree to strongly disagree) was

used to measure the variables of the study. Table 2, provides information on development of questions of the questionnaire. As the questionnaire of this research was developed by combining two questionnaires of other researchers and validity of variables has already been measured, it can be said that the research questionnaire is valid. However, content validity method was used to determine the validity of the research. For this purpose, the developed questionnaire was provided for a number of university professors in the field of management and marketing and consumers of mobile phones, and they were asked to express their ideas and views on validity of

questionnaire. After collecting the views, the final questionnaire was developed. To measure the reliability of the research questionnaire, Cronbach's alpha coefficient was used. Cronbach's alpha coefficient for all variables is higher than 0.7 and it is 83% for total questionnaire, suggesting that reliability of questionnaire is at the desired level. Additionally, Average Variance Extracted (AVE) Index was used to measure the validity of the questions of the questionnaire, and composite reliability (CR) coefficient was used to measure the reliability of the questionnaire (Hair et al., 2011). Table 2, shows the results of validity and reliability indices of the questionnaire.

Table 2: Variables of the study and sources to extract the items and the reliability results

Variable	Number of items (questions)	Resources of questionnaire	AVE	CR	Cronbach's alpha coefficient
Message appeal	6	(Wu & Wang, 2011)	0.51	0.84	0.77
The message source credibility	6	(Wu & Wang, 2011); (O'Reilly & Marx, 2011)	0.62	0.92	0.71
Consumer attitude toward brand	8	(Wu & Wang, 2011)	0.61	0.85	0.80
Level of consumer involvement	4	(Wu & Wang, 2011)	0.63	0.66	0.77
Level of consumer risk	4	(O'Reilly & Marx, 2011)	0.65	0.84	0.73
Total questionnaire	28				0.83

Source: Provided by authors.

In order to calculate the convergent validity, AVE index was used. If the AVE value is at least equal to 0.5, it indicates that the variables have good convergent validity (Hair et al., 2011). This means that latent variable can explain more than half of the variance of the visible or observed variable in average. As average variance extracted (AVE) index for all variables was higher than 0.5 in this study, convergent validity of model variables was confirmed. Composite reliability (CR) coefficient and Cronbach's alpha coefficient measure the reliability of the questionnaire. As Table 2 shows, since composite reliability coefficient (CR) and alpha coefficient are higher

than 0.7 for all variables of study, the reliability of the questions in the questionnaire is at acceptable range.

To test the hypotheses and conceptual model of study, structural equation modeling (Partial Least Squares) through smart PLS software was used.

4. Data analyses and results
4.1. Descriptive results of the research data

To analyze the data, descriptive statistics was used to analyze demographic variables. Table 3, is related to demographic variables of the study that they were analyzed through collecting 391 questionnaires.

Table 3: Demographic characteristics of respondentsDemographic variable	Levels	Percentage of frequency
Gender	Male	53.8
	Female	41.7
Education	Diploma and lower	15
	Associate	20
	Undergraduate	45
	Graduate and higher	20
Age	18 to 25 years	24.8
	26 to 35 years	38.4
	36 to 45 years	27.3
	Over 45 years	9.5
Phone brand	Sony	27.3
	Nokia	35
	Samsung	20.2
	LG	6.8
	iPhone	5.8

Source: Provided by authors.

As shown in Table (3), 53% of respondents are men and 41% of them are female. In addition, 27% of them are consumers of Sony, 35% of them are consumers of Nokia, 20% of them are consumers of Samsung, 7% of them are consumers of LG and only 6% of them are consumers of iPhone. In addition, 15% of respondents have diploma and lower, 20% of them have an associate's degree, 45% of them are undergraduate, and 20% of them are graduate and higher.

The data in Table 4 show that the highest mean was related to level of risk taking and the lowest mean was related to people involvement level with product. Additionally, the highest standard of deviation was related to consumer attitude and the lowest standard of deviation was related to message appeal.

Table 4: Descriptive information of research variables

Variable	Mean	SD	Kurtosis	Skewness
Message source credibility	3.41	0.85	-0.894	-0.139
Message appeal	3.61	0.75	0.234	-0.254
Consumer attitude towards brand	3.52	0.97	-0.485	0.453
Level of consumer involvement	3.40	0.77	-0.651	0.582
Level of consumer risk	3.64	0.79	0.875	0.039

Source: Provided by authors.

As Table 4 shows, the highest mean was related to level of consumer risk and the highest standard of deviation was related to Consumer attitude towards brand. In addition, the indices of Skewness and Kurtosis show that research data are distributed normally.

4.2. Testing the conceptual model of research

Conceptual model and research hypotheses were tested using structural equation modeling through smart PLS software. All variables of study were converted into visible or observed and latent variables. Observed variables (rectangles) are measured directly by the researcher, while the latent variables (Oval) are not measured directly, but they are inferred based on relationships or correlations among the measured variables. Latent variables represent some theoretical constructs that are not visible directly, while they are constructed and observed through other observed variables. Figure 2 shows the model of the study in the estimation of the path coefficients mode.

Figure 2. **Confirmatory factor analysis, measurement and structural model with along standardized coefficients values**
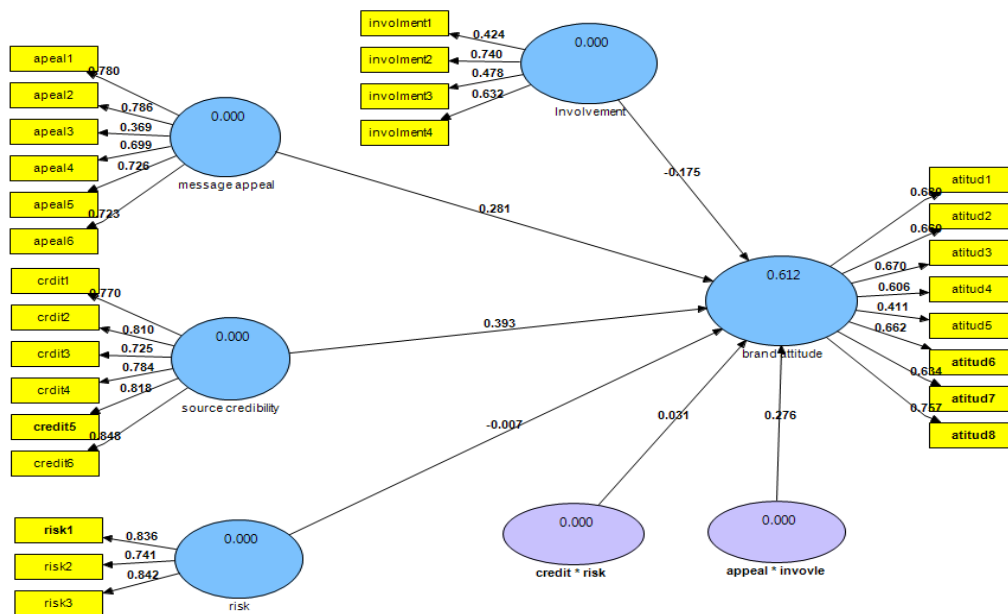
The numbers in the oval are determination index. The coefficient of determination (R2) examines that what percentage of the variance of a dependent variable is explained by independent variable(s). Therefore, it is natural that this value for the independent variable to be zero and more than zero for the dependent variable. When this value is higher, the impact of independent variables on dependent variable will be higher. Therefore, we can say that three variables of message source credibility, message appeal, level of consumer involvement and level of risk taking could explain the consumer attitude variable. The remaining percentage is related to prediction error and it can include other affecting factors that they were not considered in this study.

Figure 3. **Confirmatory factor analysis, measurement and structural model with along significance coefficients (t-value)**

Figure 3 shows different model of research in significance coefficients absolute value mode (|t-value|). In fact, this model tests all measurement equations (factorial loads) and structural modeling (path coefficients) using statistic t. According to this model, if the value of statistic t is higher than 1.96, path coefficnet and factorial load will be significant at the 95% confidence level, and if the value of sta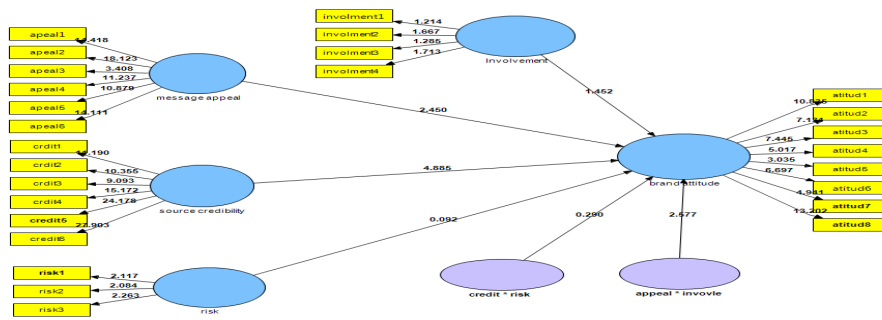tistic t is lower than 1.96, factorial load or path coefficinet will not be significant. Additionally, if the value of statistic t is more than 2.58,

path coefficient and factorial load will be significant at the confidence level of 99%.

Model fit indicators are one of the most important parts in the analysis of structural equation modeling. These indices answer the question that whether the model represented by the data, confirms the measurement model of the study? The results of model adequacy indices (harmonize) and assessing the relationships between the various elements of the model is shown in Table 5.

Table 5: Indicators conceptual model fit in the implementation of structural equation modeling

Index model fitting	X²/DF	P	CFI	NFI	RMSEA	IFI	RFI
Acceptable fit	≤ 1 ≤ 3	≥ 0.05	≥ 0.9	≥ 0.9	≤ 0.09	≥ 0.9	≥ 0.9
Obtained Value	1.010	0.422	1.000	0.973	0.005	1.000	0.943

Source: Provided by authors.

Based on data derived from the implementation of confirmatory factor analysis in structural equation model, the conceptual model was confirmed. The results of model adequacy indices (harmonization) and assessment of the relationships between various factors approve this fact.

After extracting data related to confirmatory factor analysis, we can test the main hypotheses of research. According to the results obtained from the path coefficients and significance coefficients or statistics t (Figures 2 and 3), we can say that message source credibility has positive and significant impact on

consumer attitudes at a confidence level of 99%. Additionally, message appeal has a significant positive impact on consumer attitude. It was also found that the intellectual involvement of consumers plays mediating role in the relationship between message appeal and consumer attitude toward brand. However, people the level of risk taking does not play the mediating role in the relationship between message source credibility and consumer attitude toward brand. Table 6 shows the summery of testing the main hypotheses of the study.

Table 6: Testing the main hypotheses of the study

Hypotheses	Standardized path coefficient	T-value	P-value	Result
H₁: The appeal of viral message can have a positive impact on consumer attitude toward the brand	0.281	2.450	0.000	Accepted
H₂: Message source credibility has a positive impact on consumer attitude toward brand.	0.394	4.885	0.000	Accepted
H₃: In the relationship between a message source credibility and consumer attitude toward the brand, the level of consumer risk taking plays the mediating role.	0.031	0.290	0.097	Rejected
H₄: In the relationship between message appeal and consumer attitude toward the brand, the level of consumer involvement plays the mediating role.	0.276	2.577	0.000	Accepted

Source: Provided by authors.

5. Conclusion and recommendation

In this study, the effect of message appeal and message source credibility on consumer attitude to brand was examined. The risk taking level of consumer and his involvement level were considered as mediating variables. The results of this study showed that consumer level of involvement, message appeal, and message source credibility are very important factors affecting the attitude of consumer (brand trust, brand interest, and purchasing severity of consumer). The first result indicates that the message source credibility has significant positive impact on consumer attitude toward brand. It means that if consumer realizes that the source of viral message sent for him is credible, he finds a positive attitude to brand or product of the company. In addition, consumers send these messages to others when they recognize that sources of the message are credible. Therefore, to increase the effectiveness of the word of mouth marketing, companies should increase their professionalism and message source credibility. Professionalism emphasizes on knowledge and experience of providers. This result is consistent with the results of researchers such as Gerard & Liu (2009), Clow et al. (2006), and Wu & Wang (2011). The second result showed that message appeal has significant and positive impact on consumer attitude toward the brand. This means that how viral messages that companies send them for consumers are appealing from the consumers' perspective. When they find these messages appealing, they will more likely send them for others. Therefore, it is better for companies using viral marketing to use intellectual and emotional appeals. The results of the research are consistent with results of researchers such as Wu & Wang (2011), Jafariani & Doaee (2010), and Kim & Lee (2012). In this study, it was hypothesized that the intellectual involvement of consumer has the mediating role in the relationship between message appeal and consumer attitude toward brand. The results of this study showed that this hypothesis is confirmed. The results of this study show that this hypothesis is confirmed at 95%. By confirming this hypothesis, it can be stated that consumers who have a high level of intellectual involvement, if advertising messages sent to them are appealing (rational and emotional appeal), they will find positive attitude to the considered brand and they will sent the message for others. Therefore, it is better for companies using viral advertising to send advertising messages to people who have a higher level of involvement. Another result shows that risk-taking level of people has no mediating role in the relationship between message source credibility and consumer attitude toward a brand. However, O'Reilly & Marx (2011) point out that people risk taking level can have mediating role in the relation with consumer attitude. It seems that due to cultural differences or differences in the type of products chosen, the result of the study is not consistent with results of other researchers. The findings of this study indicate that the use of viral marketing and word of mouth marketing requires using credible sources. Based on studies conducted, it was found that in the products that people have lower involvement level, it is better that

emotional message to be used so that people send the messages to each other. In general, the results showed that the source of the message credibility has significant and positive impact on consumer attitudes, purchase intention, brand interest and brand honesty. The results of this study also show that message appeal has a positive impact on the attitude. This finding says for companies using viral marketing that how their message should be designed so that it can affect the consumer. In addition, findings of this study suggest that it is better that viral advertising message of the companies to be more productive rationally and intellectually for people who have higher involvement level so that consumers believe that the message source is credible. On the other hand, it is recommended that emotional images to be used in the viral message for people who are at the lower involvement level.

The results of this research can be used by all companies using viral marketing and word of mouth marketing. According to the findings of the research, the following applied recommendations are provided for companies:

1. Research findings show that regardless of people risk taking level, the source of the message credibility is one of the factors affecting consumer attitude (brand interest, brand honesty, and purchase intention) in the case of brand of the phone manufacturer companies. Therefore, to be successful in viral marketing, these companies should design their advertising messages in such a way that consumers to feel that the source of the messages is credible.

2. Based on the research literature, when consumers have a high higher level of intellectual involvement to the product, it is better that companies to use intellectual or rational appeals, and when consumers have lower level of intellectual involvement, it is better that emotional appeals including images to be used.

3. When the intellectual involvement of consumers is high, they will pay more attention to source of the message. Therefore, when consumers of the product have higher intellectual involvement, it is better that more attention to be paid on source of message and companies should do their best so that their consumers to perceive that their messages is credible.

Research activities have always been faced with limitation in the implementation that can have an impact on results and reduce its generalize. This study is also no exception. For example, data collection tool was questionnaire in this study, and questionnaire has some disadvantages that can affect the results. In addition, in the questionnaire text, the name of mobile phones manufacturing companies such as Samsung, LG, Nokia and the iPhone has been mentioned. As a result, users of mobile phones may make mistakes in remembering promoting and advertising activities of the companies, and this can have an impact in the completion of the questionnaire. Additionally, this study was conducted in Bushehr city (Iran). Therefore, we should be cautious in generalizing the findings.

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The Determinants of Hospital Length of Stay in Nigeria.

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Abstract
Purpose- Hospital length of stay (LOS) does not only signal the seriousness of illness, it can also lead to catastrophic cost for patients or households. This paper examines the factors that determine LOS in Nigeria; a country where more than 99% of the cost of health care is borne by patients.
Design/methodology/approach- The dataset, consisting of 1,150 people who reported one or more overnight stays in a hospital, comes from the two waves of the Nigerian General Household Survey. Due to the overdispersion and the truncation of LOS at zero, a zero-truncated negative binomial regression model was adopted to establish the causal relationship between LOS and patients' predisposing, enabling and needs-related characteristics.
Findings- LOS tends to increase with the following factors: age, household size, availability of formal medical care facilities, and the severity of illness. However, there is an inverse relationship between LOS and the cost of care, being a female, resource endowment in the area, and utilization of preventive care. People in lower and higher socioeconomic brackets tend to have higher LOS than people in the middle socioeconomic bracket.
Research limitations - Actual description of diseases respondents suffered from, which is important in determining the severity of illness, was not available. I relied on a proxy to measure the severity of illness.
Implications- Policy makers in developing countries continue to explore strategies for reducing poverty and vulnerabilities among the populace. An understanding of the determinants of LOS can help inform policymakers, hospital administrators and patients regarding health care reforms, planning for patients LOS, and planning for the period of hospitalization, respectively.
Originality/value- To the best of my knowledge, this is the first paper to empirically examine the determinants of LOS in Nigeria.

Keywords: Hospital Length of Stay, Zero-truncated Negative Binomial, Healthcare Reforms, GHS-Panel, Nigeria

JEL classification: I12, I28

1.Introduction

According to the Integrated Surveys on Agriculture General Household Survey Panel Report (2014), Nigerians generally spend very little on the direct cost associated with medical care but when they do, it is often on hospital admissions. The concern, however, is the near absence of health insurance to alleviate such unforeseen and potentially burdensome financial need, and the disproportionate distribution of health care facilities. With the gradual decline in major health care indicators for the country, an examination of hospital overnight stays does not only help us understand the coping strategies of households but also offer some insight regarding a health care reform that reduces exclusion, meets the needs of the people and increases participation by all stakeholders.

Previous studies have examined the factors that determine medical care utilization across geographical regions, time, and cultures. One of the most important determinants of health care utilization in the absence of insurance is income, especially for poor households (Kaiser Family Foundation, 2011). Cisse (2011), in an analysis of health care utilization in Cote D'Ivoire for instance, finds that income is positively related to health care utilization. The exact role of income in the consumption of medical care can only be appreciated if consumers correctly report their incomes. Unfortunately, this is not usually the case. Consumers, generally, accurately report their expenditures during surveys, they do not do the same with regards to their incomes (Vyas and Kumaranayake, 2006). In Africa, high levels of illiteracy, cultural practices, the fear of persecution by agents of the state and a large informal sector make income data even more unreliable.

Apart from income, other studies, specifically on sub-Saharan Africa, have identified other determinants of health care services utilization. The factors determining utilization have been grouped at the level of the provider and the consumer of health care (Mwabu et al., 1993; Ellis et al, 1994; Sahn et al., 2003). At the level of health care provider, the quality of medical care in terms of technical efficiency as proxied by the availability of drugs has been cited as a key determinant of demand for health care (Mwabu et al., 1993; Ellis et al, 1994; Sahn et al., 2003). Due to the difficulty in accessing and the technical nature of measuring provider level data, most studies have focused on the consumer.

Studies that have focused on the role price plays in health care demand at the level of the consumer have been inconclusive. While some studies (Akin et al., 1986; Christian, 2003) find that prices are not important determinants of medical care, other studies find the opposite (Sarah et al., 2006; Mwabu, 1986; Mwabu et al., 1993; Gertler and van der Gaag, 1990; Bolduc et al., 1996; Dow, 1999). The inconclusive nature of the price effect may be due to the particular health service being examined since many of the studies reviewed here examined health services in general. For instance, the influence of price on ambulatory services on the consumer may be different from the role price plays in the utilization of a hospital bed.

Gender differences in health care utilization have also been identified in Kenya (Mwabu et al., 1993), Tanzania (Sahn and Stifel, 2003), and Uganda (Hutchinson, 1999). Mwabu et al. (1993) for instance finds that since men generally control the household finances, they are less constraint by the costs of care

associated with travel and user fees. Hutchison (1999), Sahn and Stifel (2003), on the other hand, find that individuals in households with women with higher levels of education are more likely to use curative care.

Other studies find significant differences in utilization based on place of dwelling (rural or urban) (Cisse, 2011; Oladipo, 2014), level of education of the household head (Cisse, 2011), distance (Feikin et al., 20009; Cisse, 2011; Moïsi, 2011), household size (Cisse, 2011; Sahn and Stifel, 2003).

Clearly, while there is ample literature on health care utilization as a whole, the same cannot be said about specific health care services when it comes to sub-Saharan Africa. In the case of hospitalization for instance, while there are studies on length of stay exploring different illnesses in advanced economies, the issue remains mostly unexplored in Africa. This study bridges this gap. This study also enhances the current research in the general field of LOS by utilizing methods that appropriately model the nature of the dependent variable (as demonstrated by Carter and Potts, 2014).

To identify the determinants of health care service utilization, Andersen's (1995) behavioral model or its variant is commonly used throughout the literature. The model categorizes variables into predisposing, enabling and needs-related factors. Predisposing factors include biological factors that may influence the likelihood of an individual's need for health service, the social structure that may influence how an individual can cope with health problems, and health beliefs that may influence an individual's perception of their need for a health service (Andersen, 1995). An individual's preventive health care status can also influence the likelihood of needing further care, including hospitalization. Within this context, preventive care status is a predisposing factor and is also included in the analysis.

Predisposing factors included in this study are demographic characteristics (gender, age, marital status) and socio-structural characteristics such as education level, and family size. Enabling factors are the elements that support access to care. The primary enabling factors used in this study are wealth (based on per capita expenditure and households' assets), travel time to a health care facility, and community characteristics such as availability of resources (resource endowed Southern Belt, the Middle Belt and the resource-deprived Northern Belt) and region of the country (Rural vs Urban).

Needs-related factors include the self-reported perception of the severity of illness. According to the literature, needs are the strongest factors impacting health care service utilization (Andersen, 1995; Boyle et. al, 1996; Dhingra, 2010). Specific diagnoses tend to lead to much higher service utilization. The duration of ill-health, severity of symptoms, psychological distress, and poor physical health and other needs-related factors have been found to lead to higher service utilization. The study relies on the self-reported perception of the severity of illness by including a categorical variable that captures the patient's inability to do vigorous exercise or otherwise.

The next section presents an overview of the methods employed in this study. The section discusses the data and variables used in the study. This is followed by the results section. Section 4 discusses the results and Section 5 concludes the study.

2. Materials and Methods
2.1 Settings

The study setting is Nigeria, where the health care sector is a shared responsibility between the Federal, State, and Local governments. The Federal Government is generally responsible for policy issues. The responsibility for the management of health facilities and programs is shared by the State Ministries of Health, State Hospital Management Boards, and the Local Government

Areas (LGAs). The states operate the secondary health facilities (general hospitals) and in some cases tertiary hospitals, as well as some primary health care facilities. State authorities are also responsible for the training of nurses, midwives, health technicians and the provision of technical assistance to local government health programs and facilities. There are 774 local government units who oversee the operations of primary health care facilities (PHCs) within their respective geographic areas. PHCs provide basic health services, and community hygiene and sanitation. There exists a formal-informal health care system. Formal care refers to services provided by government-owned facilities, private hospitals, and clinics/health centers. Informal care includes self-care, unauthorized religious centers, and other facility/care centers not licensed for the purpose of hospitalization.

2.2 Data

Nigeria is a developing country with high incidence of poverty. With about 60% of the population living in abject poverty, Nigeria is home to the poorest number of people in Africa, despite its rich natural resources. Data from the Nigerian General Household Survey (NGHS) show that the average household spends ₦10,354 a week on food, electricity, meals taken away from home, mobile phone recharge card, education and nonfood expenditure. This translates into $66.79; using the 2012 exchange rate of $1 to ₦155.02. The typical household spends ₦2,992 on hospital overnight stay. The NGHS-Panel also reveals that the average household head is 51.43 years with approximately 49.53% and 50.47% of males and females, respectively. About 68.40% of the household members in the sample are not married, and 63.99% have never been married. The average household size in the sample is six, and 73% of the households have members who are 12 years old or younger.

The dataset for this study is from the 2010/2011 and 2012/2013 waves of the panel component of the Nigerian General Household Survey (GHS-Panel). The GHS-Panel is a sub-component of the Nigerian General Household Survey (GHS). The GHS-Panel, which started in 2010, tracks 5,000 households every two years. The GHS-Panel primarily collects additional data on agriculture, other household income, expenditure, and consumption; beyond what the GHS collects. Pooling the two waves of survey yielded 54,936 individuals representing 9,632 households. Using questions related to ill-health and hospital length of stay, the final sample was 1,150.

Length of stay (LOS) here is defined as the self-reported number of nights an individual stayed in a health care facility (whether formal or informal) due to illness. Specifically, the following questions were used to obtain the sample from the two surveys:

During last 12 months, were you admitted to a hospital/health facility?

How many nights did you stay in hospital/health facility?

Other questions used in the study were in relation to households' assets (to determine assets' based wealth), individuals' predisposing characteristics, enabling factors at both the family and community levels, and perceived the severity of illness. All monetary values were converted into 2012 values in order to make the two waves comparable using the consumer price index for 2010 and 2012, respectively.

Next, quantitative variables were converted into ordinal variables. This allowed for a more useful interpretation of the results. For instance, each individual's age was either 1, 2, or 3 if the individual was 0-15years (child), 16-65 years (working age

group) or over 65 years (aged) respectively. Similarly, the time spent in traveling to a health care facility was converted to an ordinal variable: 1, 2, 3 and 4 for travel time of 0-15 minutes, 16-30 minutes and 30-45 minutes and over 45 minutes respectively. Finally, cost per night was calculated as the ratio of total cost to the total number of nights spent in a health care facility. All respondents were grouped under lowest cost, low, and medium costs based on the quintile respondents fall under. The lowest two levels of quintile were put into one category- the low-cost LOS group. Respondents who fell in the highest 2 levels of the quintiles were put together in the high-cost LOS category. The reason for the conversion is to ensure that the results are easily tractable and meaningful for policy reform purposes.

In addition, patients' response to the question "Can you do vigorous activities" was used to measure the severity of ill health. The type of health care facility admitted patients consulted was also included to capture the differences in LOS between the formal and informal caregivers. People consult a variety of professionals in different facilities including hospitals and clinics (formal sector facilities) and informal facilities such as traditional healers, faith-based (religion) facilities, and chemists/patent medicine vendors. Whether a person sought preventive care were also included as variables in the study. One's location can greatly affect health care access and utilization and thus location variables were included.

2.2.1 Socioeconomic Status (SES)

Medical care, in general, can be viewed as any other commodity; individuals in a higher socioeconomic bracket tend to consume more of it. Socioeconomic status (SES) reflects the placement of the individual, family, household, census tract, or some other aggregate with respect to the capacity to create or consume goods and services that are of value in the society. SES can be indicated by educational attainment, occupational standing, social class, income (or poverty), wealth, tangible possessions, houses, cars, boats, or degrees from elite colleges and universities. In ideal settings, SES is reflected by measures of income. Unfortunately, self-reported income data are often inaccurate due to a number of reasons. For instance, income data are missing for a number of individuals in both waves of the GHS-Panel. Some respondents while admitting they received payment for work done, they simply did not state how much they were paid. A number of respondents also reported receiving in-kind payments while some other households reported that they received no payment (in cash or kind) during last 12 months.

Due to the likely inaccuracy of the income data, I used per capita household expenditure as the measure of socioeconomic status. By way of robust checks, I also constructed a socioeconomic status index based on the assets in the households. To obtain per capita expenditure, households' expenditures were added up across all the different expenditure categories in the survey and divided by the total number of people in the household. The socioeconomic status index was constructed using the principal component analysis command in STATA (version 13). The command generates weights for assets and animal ownership (Gwatkin et al., 2000; Filmer and Pritchett, 2001; Mckenzie, 2003) based on their (assets or animals) prevalence; scarce possessions receive a higher weight and common assets receive a lower score. The assets for the construction of the SES index in this paper include ownership of durable household items such as televisions, bicycles, computers, radios, and GSM mobile phones. Ownership of farmland and animal holdings, alongside the type of dwelling, sources of drinking water during dry seasons, sanitation and type of cooking utensils used in the household are also included in the construction of the index (see Appendix A for the full list of components used in the construction of the index). Based on these components, a score is calculated for each household. The household is then categorized into one of the levels of a five-point scale based on its score. The five levels are Poorest, Poor, Medium, Rich and Richest.

3. Results
3.1 Descriptive Analysis

The sample for this study includes 1150 respondents reporting one or more overnight stay in a healthcare facility (LOS) due to ill-health. These patients were admitted into both formal and informal facilities across Nigeria. The number of people reporting LOS was about the same for both waves of the NGHS-Panel. In Figure 1, the maximum LOS reported is 99 nights. The median and mean LOS were 5 and 8 nights respectively. The majority (73%) reported 1-8 nights while 7% spent at least 25 nights (long-term stay). Figure 1 shows the distribution of LOS for all admitted patients.

Figure 1: Histogram of length of stay
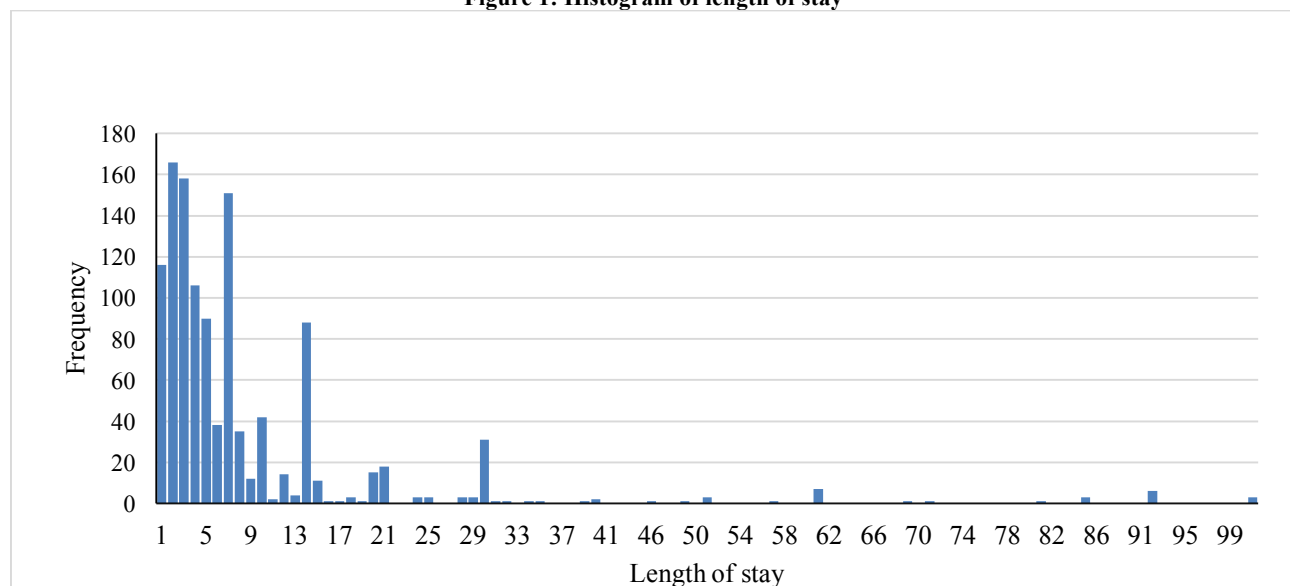
In relation to an individual's socioeconomic status, about 32% of all those hospitalized came from poor homes (that is, poorest and poor socioeconomic groups). Based on households' expenditure (assets), 22.59% (25.83%) of the hospitalized were from homes in the richest category. Table 1 shows the distribution of households' socioeconomic status based on per capita expenditure and assets. The table suggests that the proportion of hospitalized individuals increases with higher socioeconomic classification.

Table 1: Expenditure and Asset Based Socioeconomic Status of inpatients

Wealth quintile	Assets based	Expenditure-based
	Percent	Percent
Poorest	16.87	14.71
Poor	15.65	18.78
Middle	20.35	22.87
Rich	22.30	21.83
Richest	24.83	22.59
TOTAL N = 1,150	100%	100.00%

The length of hospital overnight stay is examined further in Table 2. The distribution of patients who reported at least one night is represented in Table 2 based on different socioeconomic dimensions and demographic characteristics. To keep the analysis tractable, three categories of LOS were created: 1 up to the median number of nights (5 nights); 6 to 24 nights; and over 25 nights to depict long-term stay. Any LOS of 25 or more nights is considered a long-term stay. A number of interesting issues can be observed from Table 2. One observation is that whilst 56% of all those admitted are females, men tend to have a longer LOS.

The table also shows that there exists an urban-rural divide as far as LOS is concerned. About 61% of all those reporting LOS, reside in rural areas. This phenomenon is further supported by the fact that most of the hospitalized came from households in the relatively poorer and rural Northern Belt of the country. This suggests the either absence of formal medical facilities in rural areas hampers healthcare or there is a lack of knowledge on the part of patients or both.

Table 2: Characteristics of patients and number of nights spent in a health facility

	Number (N = 1150)	Percent	Nights, % 1 – 5 nights (up to median)	6 – 25 nights	Long-term stay (>25)
Sex					
Female	639	55.57	58.53	36.93	4.54
Male	511	44.43	51.27	40.31	8.41
Age					
≤ 14	321	27.91	63.55	34.89	1.56
15-64	665	57.83	55.49	36.84	7.67
65+	164	14.26	38.41	51.83	9.76
Education					
None	498	43.30	55.02	40.36	4.62
Some	652	57.70	55.52	36.96	7.52
Marital status					
Never Married	454	39.48	62.78	34.36	2.86
Married	572	49.73	51.75	39.34	8.92
Separated/Divorced	18	1.57	50.00	50.00	0
Widowed	106	9.22	43.40	49.06	7.55
Location Type (1)					
Rural	836	72.70	53.11	40.91	5.98
Urban	314	27.30	61.15	31.85	7.01
Location Type (2)					
Southern Belt	238	20.70	51.94	41.17	6.89
Middle Belt	346	30.09	65.13	31.09	3.78
Northern Belt	566	49.21	54.05	39.02	6.94
Household Size					
1-5	400	34.79	52.50	41.00	6.50
6-10	555	48.26	55.14	38.56	6.31
11-15	182	15.84	64.16	31.21	4.62
16+	13	1.11	40.91	45.45	13.64
Wealth quintile (Expenditure)					
Poorest	161	14.00	52.80	40.99	6.21
Poor	216	18.78	56.48	35.65	7.87
Middle	263	22.87	60.84	34.60	4.56
Rich	251	21.83	49.00	43.43	7.57
Richest	259	22.59	56.37	38.22	5.41

Facility type					
Formal	814	70.78	58.72	35.63	5.65
Informal	336	29.22	47.02	45.24	7.74
Travel time					
0 - 15 minutes	363	31.57	55.65	37.47	6.89
16 - 30	655	56.96	55.88	38.02	6.11
31 - 45	125	10.87	51.20	44.00	4.80
46 - 60	7	0.61	57.14	28.57	14.29
Preventive Care					
Yes	108	9.39	54.70	40.84	4.46
No	1,042	90.61	55.30	38.43	6.27

Table 2 also suggests travel time to a health facility positively affects LOS; those living close by are less likely to be hospitalized than those further away. Those further away tend to have a longer LOS. For instance, while about 19% of the 12% of patients who live at least 30 minutes away from a health care facility reportedly stayed more than 25 nights in a health care facility compared, only 12% of the remaining 88.5% who stay less than 30 minutes away from the facility reported long-term stay. Lastly, of the 1150 individuals who were admitted, 9.4% of them utilized preventive care. These preventive care seekers reported shorter LOS on average; they were less likely to report long-term LOS (more than 25 nights).

One of the main concerns of any patient is the cost of admission, especially in a country where insurance is absent when it comes to health care. An examination of the data reveals that patients respond to changes in price when it comes to LOS. For instance, among patients reporting short-term LOS (1-5 nights), 42% reported nightly cost in the low-cost category, 48% in the medium-cost category and 10% in the high-cost category. The percentage of patients reporting medium-term LOS reported nightly cost as follows: 60% in the low-cost category, 35% in the medium-cost category and 5% in the high-cost category. Similarly, for patients in long-term care (more than 25 nights), the following distribution was reported: 65%, 32% and 3% for low-cost, medium-cost and high-cost category respectively.

3.2 Estimation results

This section presents the results of the estimates of the determinants of LOS in Nigeria. Hospital overnight stay is a count variable which takes discrete, positive values and is not normally distributed (as shown in Figure 1). Straightforward linear models assume constant variance and normal errors. However, with positively skewed LOS here, a linear model might lead to the prediction of negative counts, the variance of the response variable is also likely to increase with the mean, and the errors are unlikely to be normally distributed. Thus, ordinary least squares regression is inappropriate in this situation, and an alternative model that accommodates the properties of this type of data is required.

The Poisson regression model, which is commonly used to model count data, requires that the conditional mean of LOS be approximately equal to its variance. This equidispersion assumption fails to hold in this application since the mean LOS is 8 with variance equal to 150. The overdispersion (variance exceeds the mean) means the usual Poisson model may not be appropriate. An appropriate test for the presence of overdispersion is in order. The likelihood ratio (LR) test compares the validity of the Poisson specification against a Negative Binomial Regression Model. Also, since the data for the study is truncated at 0, I use the Zero-Truncated Negative Binomial (ZTNBin) Regression Model to appropriately account for this constraint.

Table 3 presents results from the ZTNBin regression using STATA 13. The socioeconomic status (SES) measure here is total household expenditure per capita. The results, where the SES measure is based on households' assets are not reported here since they were very similar to the SES based on per capita expenditure.

Table 3: Results from the ZTNGBin Regression

Variable	Coefficient	Std. Error	IRR
< 15 years	-0.6254***	0.1099	0.53
> 65 years	0.1018	0.1058	1.11
Female	-0.3222***	0.0707	0.72
Education	0.0944	0.0761	1.10
Married	0.03694	0.0876	1.04
Household: 1-5	-0.7199***	0.2591	0.49
Household: 6-10	-0.7116***	0.2572	0.49
Household: 11-15	-0.8711***	0.2678	0.41
Poor SES	0.2959 ***	0. 0962	1.34
Rich SES	0.2493***	0.0898	1.28
Low Cost LOS	0.4108***	0.0944	1.51
High Cost LOS	-0.4450***	0.0957	0.64
Time to facility: <15 min	-0.1951	0.4639	0.82
Time to facility: 16-30min	-0.1132	0.4616	0.89
Time to facility: 31-45min	-0.20	0.4730	0.81
Rural	0.0030	0.0874	1.00
Southern Belt	0.3343***	0.0976	1.40
Northern Belt	0.3018***	0.1084	1.35
Formal Facility	0.3599***	0.0784	1.43

Can't do vigorous exercise	0.2336***	0.0865	1.26
Preventive care user	-0. 2234*	0.1233	0.80
(Intercept)	2.5671***	0.5358	13.02

*** p<0.01, ** p<0.05, * p<0.1

Column 1 and Column 3 show the coefficients and the incidence rate ratios (IRRs) respectively. The IRRs are obtained through exponentiation of the coefficients of the independent variables from the ZTNBin regression. The IRR gives the percentage change in LOS given a unit change in the respective independent variable(s). The test for over-dispersion is indicated by the value of α from the ZTNBin regression output in STATA 13. An α greater than zero means that there is a real dispersion in the data. The value of α from the regression is 1.39. This means the estimated based on ZTNBin regression are the preferred results.

Predisposing factors that are statistically significant determinants of LOS are age, gender, household size and preventive care. A child (0-14 years) will stay 53% the time of an individual in the working-age group (15-64 years). Old people (65+ years) on the other hand spend 11% more nights, compared to those in the working-age group. A female only stays 72% the LOS of a male. Meanwhile, patients from households with 16 or more members have longer stays than any household size category. Patients predisposed to preventive have shorter stays than those who have not. An individual predisposed to preventive care records 79% of the LOS of a person who does not utilize such care.

Enabling factors, as mentioned earlier, are those forces that promote or reduce the individual's utilization of care based on their (enabling factors) level of availability. Both the poor and rich have higher LOS than the middle class. Specifically, an individual in the poor category (poorest and poor socioeconomic classes) will stay 34% of the time of the middle class. Those in the upper socioeconomic group (rich and riches groups) also stay 28% longer than patients in the middle SES.

The cost of care to the patient also enables patients' utilization of care. In this study, the price of care is inversely related to the length of stay (LOS). For instance, with low priced nights, patients stay 54% more nights than when prices are in the medium range. Moving from medium priced nights to high priced nights result in 36% fall in LOS.

Other important enabling factors are the location of households and the type of medical facility the individual consults. Individuals from households in the well-to-do Southern Belt, stay 40% more nights than individuals located in the Middle Belt. Those in resource-deprived Northern Belt also spend more nights in the hospital than patients in the Middle Belt; about 35% more. People consulting formal health care facilities stay 43% longer than those consulting providers in the informal sector.

Needs-related factors have been established as important determinants of health care utilization in the literature (Andersen, 1995; Boyle et. al., 1996; Dhingra, 2010). The needs related factor explored in this study is a patient's inability to do vigorous exercise. The regression results in Table 3 include a variable that measures the severity of ill-health. The survey asked respondents who reported to have been hospitalized during the year if they could do vigorous exercise. The response to this question was used as a proxy to measure the severity of ill-health. Patients who cannot do vigorous exercise have 26% more LOS than those who can still do vigorous exercise while ill.

4. Discussion

The study employed a zero-truncated negative binomial model (ZTNBin). Variable selection was mostly based on existing empirical literature on health care utilization in African countries. For ease of interpretation, I converted continues variables such as age, travel time, the nightly cost of care, and per capita expenditure into relevant and meaningful categories.

Factors which tend to increase LOS were age, the cost of care, resource endowment level of the area, formal medical facilities and the severity of illness. Females, household size, preventive care utilization tend to reduce LOS. The level of wealth is significant but not in a linear form, as one may expect.

Not surprisingly, in the absence of insurance, the enabling factors such as wealth and cost of care are strong determinants of length of stay. The role of insurance in health care utilization cannot be overemphasized. Its enabling role has been established in study after study. The existence of a functional health insurance system is, unfortunately, absent in many African countries and thus the relevance of this study. This study hopes to start bridging this gap. In the absence of insurance, one would naturally expect people in higher socioeconomic groups would use more health care services than those in the lower socioeconomic groups. In this study, this was not the case. After controlling for several variables in the regression, the study found that people in low-income groups spend more nights than the middle- class. Does this mean LOS is an inferior product or certain kinds of diseases requiring lengthy hospitalization only affect the poor? The actual disease type for which a patient was admitted can help shed light on this issue. The expected positive relationship between LOS and socioeconomic status is demonstrated when moving from the middle class to the rich category (high income).

The fact that the utilization of service for which there is no insurance coverage is greater among the poor than the middle class is an interesting result, but it is not surprising. The existence of user fees during hospitalization means that poor individuals are unlikely to seek medical attention if they do not consider their case severe. This behavior is similar to results from the RAND Experiment which showed that people delay or forego health care when payments are required at the point of service (Newhouse and RAND Corporation, 1993). It is also plausible that the poor end up seeking medical help from cheaper alternatives such as traditional healers and other informal sources. Such was the behavior of many Ghanaians during the 1990s when user fees were still in place. Asenso-Okyere et al. (1998) observe that Ghanaians in the 1990s indulged in self-medication and other behaviors aimed at reducing the cost of care. Whatever the reason, such cost-saving measures undertaken by the poor likely lead to the development of comorbidities, which require more nights in a hospital; as a consequence, the seeming initial inverse relationship between LOS and socioeconomic status.

A related enabling factor found in this study was the cost of care. As expected, the higher the cost per night the shorter the LOS. There has not been a consensus in the role price plays in health care utilization. The result here, however, support findings from Uganda (Sarah et al., 2006), Kenya (Mwabu et al., 1993), Egypt (Ellis et al, 1994) and Tanzania (Sahn et al., 2003).

The level of resource in a given area has been found to significantly affect LOS (Carter and Potts, 2014); people in

deprived areas tend to have higher LOS. This is the case in this study but only between the medium-resourced Middle Belt and resource-poor Northern Belt. People in resource-poor Northern Belt have higher LOS than the medium-resourced Middle Belt. However, moving from the medium-resourced Middle Belt to the rich Southern Belt results in an increase in LOS. This phenomenon is similar to the observed nonlinear effect of an individual's socioeconomic status on LOS; both poor and rich SES categories have higher LOS than the middle class.

Many predisposing characteristics were found to be significant determinants of LOS. For instance, gender disparity in LOS was apparent in this study. This result confirms results from past research on health care services utilization in general. This result supports similar findings from Kenya (Mwabu et al., 1993), Uganda (Hutchison, 1999), and Tanzania (Sahn and Tifel, 2003). In the case of Nigeria, the gender difference may be due to the fact that some 23.2% of women relied on their husbands for the payment of hospital bills. Individuals from large households with 16 members or more were also found to have longer LOS. This result is in line with studies on health care service utilization in general. According to (Cisse 2011) for instance, an increase in household size leads to a reduction in the probability of seeking modern medical care. The result suggests households adopt cost-saving tactics as wealth per capita decreases. Since larger households are more likely to be poor, this result again suggests resource-poor individuals have longer LOS than better-resourced individuals; which appears to be the general theme thus far.

On facility type, the study finds that individuals who sought treatment from a formal health facility, spend more nights in such facilities than those who used the informal sector. There is the need for more research to ascertain the reasons for this. What kind of diseases do people take to facilities in the informal sector? What is the difference in the treatment regimes between the two?

Any measure that can increase one's stock of health also reduces LOS. The use of preventive care helps maintain or increase one's stock of health. Thus, individuals predisposed to such care saw a shorter LOS than those who did use preventive services. This is an important revelation as policymakers seek strategies for improving health outcomes in Nigeria. The GHS-Panel survey did not ask respondents about the kind of preventive services they utilized. Such information would have greatly enhanced the analysis here. Nonetheless, the relevance of preventive care in the reduction of LOS should serve as the impetus towards an expansion in primary health care. Such an expansion should focus on identifying and adopting different preventive measures in different localities; a one size won't fit all.

Hospital length of stay does not only signal the seriousness of illness, it can also lead to catastrophic cost for patients and households alike. An understanding of the determinants of LOS in the absence of insurance can help better inform policymakers in Nigeria regarding health care reforms as well as in countries where health insurance is limited. Patients with this knowledge can also make necessary plans regarding the period of hospitalization. Health care administrators can also use the results here as input in planning and as a decision support tool for predicting an individual patient's LOS.

5. Conclusion

The main objective of this paper was to examine the determinants of hospital overnight stay in Nigeria. This is particularly important since those reporting LOS in the panel component of the Nigerian Household Survey had to pay their hospital bills out of pocket or rely on family and friends. The regression results reveal that overnight hospital stays initially increases in socio- economic status, decreases before increasing again. Compared to the middle class in society, the results show that the poor ends up spending more nights during hospitalization. All other results relating to deprivation either at the individual, household or community level points to a positive relationship between longer LOS and poverty. Thus LOS potentially increases the risks of deepening poverty among the already poor since hospitalization also means absence from work and therefore, loss of income.

Ongoing health care reforms need to address the potential vulnerabilities the poor are exposed to as a result of hospitalization. Fortunately, preventive care and an affordable health insurance program can help ameliorate these vulnerabilities. As discussed earlier, preventive care can reduce LOS by about 20%. This result should provide the basis for the expansion of primary health care programs in Nigeria. Improving the quality of staff in existing primary health centers will be a good start. As emphasized by the World Health Organization, primary care, among other things, ensures that care is continuous and comprehensive and provides the best possible health services in the light of economic considerations. An affordable health insurance program will also increase medical service utilization in general.

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Appendixes

Appendix A: Principal Component Analysis (using STATA 13)

Variable Description	Urban			Rural		
	Mean	Std. dev.	Factor Score	Mean	Std. dev.	Factor Score
Computer	0.088	0.283	0.298	0.188	0.001	0.015
Television Set	0.645	0.478	-0.318	0.255	0.436	0.376
Bicycle	0.097	0.296	0.047	0.262	0.440	0.031
Radio	0.580	0.494	0.078	0.568	0.495	0.120
Refrigerator	0.289	0.454	0.298	0.084	0.278	0.306
Generator	0.329	0.470	-0.338	0.164	0.370	0.317
GSM Phone	0.884	0.320	0.183	0.631	0.483	0.240
Satellite Dish	0.096	0.295	0.310	0.030	0.169	0.228
Vehicle	0.133	0.339	0.339	0.043	0.203	0.217
House- Owned	0.478	0.500	0.046	0.822	0.383	-0.088
House -Rent	0.316	0.465	-0.010	0.043	0.204	0.089
Type of Floor						
Sand	0.024	0.153	-0.114	0.127	0.333	-0.132
Concrete	0.862	0.345	0.070	0.565	0.496	0.330
Wooden	0.010	0.099	0.007	0.010	0.102	-0.015
Tile	0.041	0.197	0.251	0.009	0.095	0.107
Mud	0.061	0.239	-0.145	0.286	0.452	-0.274
Source of Cooking						
wood	0.208	0.406	-0.090	0.704	0.456	-0.192
Coal	0.024	0.152	0.007	0.006	0.078	0.064
Electric cooker	0.007	0.083	-0.001	0.003	0.052	0.034
Gas Cooker	0.030	0.171	0.217	0.006	0.078	0.057
Animal Ownership						
goat	0.582	0.493	-0.049	0.702	0.458	0.095
chick	0.581	0.494	-0.049	0.702	0.457	0.095
sheep	0.500	0.500	-0.049	0.579	0.494	0.095
Source of Water- Dry Season						
Pipe borne	0.166	0.372	-0.031	0.039	0.194	0.024
Borehole	0.415	0.493	0.086	0.340	0.474	0.205
River	0.025	0.155	-0.021	0.200	0.400	-0.148
Drainage	0.011	0.102	-0.044	0.010	0.098	0.016
Sachet Water	0.076	0.264	0.096	0.013	0.115	0.075
Sanitation Facility						
None	0.147	0.354	-0.042	0.282	0.450	-0.144
On Water	0.035	0.184	0.068	0.021	0.144	-0.005
Flush to Sewage	0.101	0.301	0.155	0.021	0.143	0.129
Flush to Septic Tank	0.248	0.432	0.245	0.050	0.218	0.200
Bucket/Pail	0.003	0.051	-0.012	0.008	0.088	-0.017
Uncovered Latrine	0.336	0.472	-0.095	0.341	0.474	0.134

The Effects of Foreign Direct Investments and Economic Growth on Employment and Female Employment: A Time Series Analysis With Structural Breaks For Turkey

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Abstract

Purpose - *The purpose of this paper is to examine the effects of foreign direct investments and economic growth on employment and female employment in Turkey with quarterly data for 2000:Q1-2013:Q4 terms.*

Design/ Methodology/Approach *- The data were obtained from Electronic Data Delivery System (EDDS) of the Central Bank of the Republic of Turkey (CBRT), Turkish Statistical Institute (TURKSTAT) and International Financial Statistics (IFS). The stationarity of variables are analysed with Carrion-i Silvestre et. al. (2009) unit root test with multiple structural breaks and the cointegration relationship between variables is tested with Maki (2012) cointegration test with multiple structural breaks. Dynamic ordinary least squares (DOLS) method is used for estimating cointegration coefficients.*

Findings – *It is revealed with the study that foreign direct investments affect employment and female employment negatively whereas economic growth affect employment and female employment positively.*

Orginality/ value - *Despite various studies exploring the relationship between FDI and employment, studies examining the relationship between FDI and female employment are absent in the literature. From this point of view, this study can be seen as the precursor for enlightening the gender dimension of the subject.*

Key Words: Employment, Female Employment, Foreign Direct Investment, Economic Growth, Unit Root and Cointegration Tests with Multiple Structural Breaks.

JEL Classification: C32, E24, F21, F40.

1. Introduction

Foreign direct investments (FDI) are key determinants for economic integration in the global world. As is known, the aim of investor country is to find the most appropriate region for cost-efficient production while host countries look for higher income flows, growth rates and higher employment levels in the globalization process, Developing countries are the main applicants of FDI owing to their beneficial effects. FDI are generally seen as the incentives of economic growth and technological progress, moreover, a significant financial source for reducing current accounts deficit.

Turkey, as a developing nation has attracted high levels of FDI inflows under favour of her geo-political location since 2000's and raised the growth rates in line with this acceleration. However, growth does not always conduce to employment and unemployment is the foremost problem of Turkey from past to present. Turkish economy is weak in generating jobs, furthermore, especially female employment levels in the country are considerably low in comparison with OECD and European countries. Gender and location are the substantial determinants of employment in Turkey. Unemployment rates are higher in urban owing to the limited employment opportunuties in manufacture and service sectors and lower in rural due to the employment creation effects of agriculture. Females are excluded from the labor market on a large scale as their employment rates are one-third of male's in the country.

The aim of is this paper is to examine the effects of foreign direct investments and economic growth on employment and female employment over the 2000-2013 period in Turkey. In this scope, quarterly data for 2000:Q1-2013:Q4 terms are used. The stationarity of variables are analysed with Carrion-i Silvestre et.al. (2009) unit root test and the cointegration relation between the variables is tested with Maki (2012) cointegration test with multiple structural breaks. It is thought that the study will both reveal the linkage between FDI and employment and uncover the link of economic growth and employment concerning the country. Although there are various studies exploring the relationship between FDI and employment, studies examining the relationship between FDI and female employment are absent in the literature. When viewed from this aspect, this study can be seen as the precursor for enlightening the gender dimension of the subject. In this framework, the study begins with the related literature reviews. The model and the data set will be presented in the next section. The econometric method and emprical findings will be determined in the following section. And the paper will be ended up with the conclusion section consisting the results.

2. Literature review

There are various studies investigating the effects of foreign direct investment in the world and Turkey. In much of these studies, it is revealed that FDI has a positive impact on employment. However, according to studies based on Turkey, many findings show that foreign direct

investments have no significant impact on employment creation. Fu and Balasubramanyam (2005) analyzed the relationship between employmentand foreign direct investment in China over the priod 1987 and 1998 by using GMM method and reached that a 1% increase in FDI leads to 0,03% increase in employment. Hunya and Geishecker (2005) studied on the employment effects of foreign direct investment in Central and Eastern Europe during the period 1993-2003 applying Gravity model and suggested that FDI has higher impact on skilled labour concerning employment. Craigwell (2006) studied the relationship between employmentand foreign direct investment in 20 English and Dutch speaking countries by panel data analysis during the period 1990 to 2000. He revealed that an increase in FDI in the entire sample of Caribbean countries leads to an approximate one to one increase in employment. Jayaraman and Singh (2007) analysed the relationship between foreign direct investment and employment creation in Fiji, covering a 34-year period (1970-2003) by using autoregressive distributed lag model (ARDL) and found unidirectional long run causality running from foreign direct investment to employment and a unidirectional causality from foreign direct investment to GDP in the short run (Jayaraman and Singh, 2007: 2). Ajega and Nunnekamp (2008) investigated the long-run relationship between inward FDI and economic outcomes in terms of value added and employment at the level of US states over the period 1977-2001 by using co-integration technique and Granger causality tests and found co-integration as well as two directional causality between FDI and outcome variables.

Hisarcıklılar et al.(2009) tried to explain the role of FDI inflows in job creation in Turkey between 2000 and 2007. They used dynamical panel data analysis and found a negative relationship between FDI inflows and employment. Aktar and Öztürk (2009) stated that foreign direct investment has no impact on increasing employment over the period 2001-2007 in Turkey in their study. Ekinci (2011) suggested a long term relation between foreign direct investment and economic growth between 1980-2010 by using Granger causality test in Turkey in his study. However, he found no relation between foreign direct investment and employment. Saray (2011) analyzed the relationship between employmentand foreign direct investment in Turkey covering 1970 and 2009 period by using autoregressive distributed lag model (ARDL)and revealed that FDI has no impact on reducing unemployment in the country. Vergil and Ayaş (2013) revealed that foreign direct investments had negative impact on employment across four sectors over the 1996-2002 period in Turkey. Additionally, they stated that the most negative impact has been realized on manufacture sector. Bakkalcı and Argın (2013) examined the relationship between FDI, growth, productivity, employment and wages between 1991 and 2011 in Turkey and determined that inward FDI has a positive impact on employment and firm performances. Göçer and Peker (2014) analyzed the effects of foreign direct investment on employment for Turkey, China and India by using 1980-2011 period data. They revealed that, 10%increase of foreign direct investment leads to a decrease on the employment in Turkey by 0,3% while decreases in China and India respectively by 0,3% and 0,2%.

Studies examining linkages between growth and employment presents changeable relations between the two facts. For instance, Krongkaew et. al. (2006) assert a positive linkage between economic growth andemployment in Thailand. They emphasize that the periods of economic growth (1992-1996 and 2000-2002) boosted labour demand substantially in the sectors where the poor are the dominant group. As a result, wages and salaries of bottom group increased and these events were significant in reducing poverty in the country. Islam (2004) determines that there is no invariant relationship between growth and employment for the experience of selected countries. For instance Indonesia's1970's and 1980's, Uganda's and Vietnam's experience in 1990's can be considered to be the case of "good growth" leading to high rates of employment. On the other hand Ethiopia and Bolivia's economic growth during the 1990's were not accompanied by expansion in employment. Meeskoub (2008) reveals that Middle East and North Africa (MENA) region has low growth elasticities of employment (weak relationship between growth and employment) as the majority of the poor are working in rural areas and in low productivity activities. Thus an employment policy putting the emphasis on strenghening the growth-employment nexus by promoting job creation and improving the access of the poor to such jobs is needed.

On the other hand, while there is no study examining the effects of FDI and/or economic growth on female employment, some studiesin the literature investigated the relationship between development and female labour force participation. In this framework, most of them suggest a U shaped relationship between development and female labour force participation. According to them, labour force participation rate (LFPR) first decline then rises as countries develop. For instance, Goldin (1994) confirms the U shaped relationship between development and female labour force participation in more than one hundred countries and in United States. Lechman (2014) supports the hypothesis on U-shaped relationship between female labour force participation and economic growth by using longitudinal data analysis concerning 162 countries over the period 1990-2012. Chapman (2015) approves the U-shaped relationship between development and female labour force participation in Middle East and North Africa, using a panel data set of 20 countries in the region for the period of 1990-2012. Mujahid et al. (2013) determines the long run and U shaped association between economic development and LFPR using ARDL technique for Pakistan's economy over the period of 1980-2010. However, Lahoti and Swaminathan (2013) suggests that there is no U shaped relationship between level of domestic products and women's female labour force participation rate (LFPR) by using state level data spanning 1983-84 to 2011-12 in India. They assert that growth by itself is not sufficient to increase women's economic activity.

3. The Model and Data Set

In the study, the effects of FDI and economic growth on employment and female employment is analysed with Carrion-i-Silvestre et.al. (2009) unit root tests with multiple structural breaks, Maki (2012)

cointegration tests with multiple structural breaks and dynamic ordinary least squares (DOLS). The quarterly data of FDI inflows, economic growth, employment and female employment from 2000:Q1-2013:Q4 are used in the study. The starting date of monthly data is 2005, quarterly data is 2000 and annual data is 1988 concerning the employment in Turkey. As the annual data has observation shortage and monthly data misses the experienced crisis in Turkey, the analysis period is selected as the quarterly 2000-2013 period. The analysis is based upon two different models:

$$\ln empsa_t = \alpha_0 + \alpha_1 \ln fdisa_t + \alpha_2 \ln rgdpsa + u_t (1)$$

$$\ln wempsa_t = \alpha_0 + \alpha_1 \ln fdisa_t + \alpha_2 \ln rgdpsa + u_t (2)$$

Emp and *wmp* represents employment and female employment respectively, *fdi* states foreign direct investment inflows and *rgdp* states real GDP as the indicator of the economic growth. Data of foreign direct investment acquired in US$ is obtained in terms of national monetary unit TL by multiplying with nominal US$/TL exchange rate. Real GDP and FDI data used in the analysis is obtained from Electronic Data Delivery System (EDDS) of the Central Bank of the Republic of Turkey (CBRT). Employment and female employment data is obtained from Turkish Statistical Institute (TUIK) and nominal US$/TL exchange rate data is acquired from International Financial Statistics (IFS). As all variables show seasonal fluctuations, these fluctuations are purified by Tramo/Seats method. Purified variables are attached "sa" attachment. Natural logarithms of series are taken to transform the series from exponantial increases to arithmetical increases.

4. Econometric Method and Emprical Findings
4.1. Unit Root Test with Multiple Structural Breaks

Granger and Newbold (1974) determines that supurious regression models might occur in case of high R^2 and significant t-values if the time series are not stationary, therefore, the stationarity of the variables should be checked. In this framework, Augmented Dickey-Fuller (ADF) (1981) and Phillips-Perron (PP) (1988) are the unit root tests which are used mainly in the literature. Furthermore, Dickey-Fuller (DF-GLS (ERS) (1996) and Ng- Perron (2001) unit root tests also check the stationarity of series.

Existence of structural breaks reduces the reliability of the results of related unit root tests in studies using time series. Hence, Perron (1989) developed one structural break unit root test in which the time of structural break is determined exogenous. Perron (1989) unit root test requires a true determination of break time. In case of a false determination of break time, the time series will seem unstationary although they are stationary actually. For this reason, Zivot-Andrews (1992) (ZA), Perron (1997), Lumsdaine-Papell (1997) (LP), Lee-Strazicich (LS) (2003), LS (2004) and Carrion-i-Silvestre et.al. (2009) structural breaks unit root tests are used in which the time of structural break is determined endogenously. Among this tests, ZA ve LS (2004) tests allow one, LP and LS (2003) tests allow two, Carrion-i-Silvestre (CS) (2009) multiple structural break tests allow five structural breaks in the series. Bai and Perron (2003) algorithm is used in the determination of break time in CS test. Furthermore, CS

test is determined by the help of quasi-GLS (generalized least squares) method, dynamic programming and the sum of error squares. The stochastic data production process of CS test is given below:

$$y_t = d_t + u_t (2)$$
$$u_t = \alpha u_{t-1} + v_t, \ t = 0,...,T \ (3)$$

Carrion-i, Silvestre et. al. (2009) have developed five test statistics for testing the stationarity for multiple structural breaks of time series in this process. These are feasible point optimal test; P_T suggested by Perron ve Rodriguez (2003), modified feasible point optimal test; MP_T developed by following Ng ve Perron (2001), M-class test statistics and test statistics allowing multiple structural breaks which are suggested by Ng ve Perron (2001) and Perron ve Rodriguez (2003). The hypothesis of the test are:

$H_0 =$ There is unit root under structural breaks.

$H_1 =$ There is no unit root under structural breaks.

When the calculated test statistics are lower than the critical value, H_0 is rejected. In other words, it is accepted that the analysed series are stationary. The stationarity of time series in this study is analysed with the CS multiple structural unit root test due to the presence of endogenous and exogenous shocks like 2000-2001 banking crisis, 2008 global crisis and financial shocks in the investigation period. The results of CS multiple structural unit root test are given in Appendix 1.

CS unit root test results show that the series are not stationary at level values as the test statistics calculated in level values are higher than critical values. And CS unit root test results also express that the series are stationary [I(1)] when their first difference are calculated. Considering this fact, long-term relationship between the series will be tested with co-integration analysis.

4.2. Cointegration Analysis

The presence of the long-term relationship between the variables are determined by the Engle-Granger cointegration test (developed by Engle and Granger) and Johansen cointegration test (developed by Johansen (1988) and Johansen & Juselius (1990)) which do not take the structural breaks into consideration. Gregory and Hansen (1996) stated that Engle-Granger and Johansen cointegration tests may give false results in investigating long-term relationship between the series in case of the presence of structural breaks. Hence, Gregory and Hansen (1996) developed a cointegration test allowing one structural break, moreover, in which the time of structural break is determined internally. Afterwards Hatemi-J (2008) has expanded the Gregory-Hansen cointegration test with a cointegration test allowing two structural breaks and also in which the time of structural break is determined internally. On the other side, Maki (2012) developed a cointegration test allowing five structural breaks, in which the time of structural break is determined internally in case of the existence of structural breaks. In this scope, the cointegration test of Maki is superior than Hatemi-J cointegration test. Maki (2012)

built four different models for testing cointegration relationship between series in presence of structural breaks. The models are given below:

$$\text{Model 0: } y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta x_t + e_t \quad (8)$$

$$\text{Model 1: } y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \beta x_t + \sum_{i=1}^{k} \beta_i x_t D_{i,t} + e_t \quad (9)$$

$$\text{Model 2: } y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \gamma t + \beta x_t + \sum_{i=1}^{k} \beta_i x_t D_{i,t} + e_t \quad (10)$$

$$\text{Model 3: } y_t = \alpha + \sum_{i=1}^{k} \alpha_i D_{i,t} + \gamma t + \sum_{i=1}^{k} \gamma_i t D_{i,t} + \beta x_t + \sum_{i=1}^{k} \beta_i x_t D_{i,t} + e_t \quad (11)$$

Model 0 states a model without trend where there is a refracture in the constant term, Model 1 expresses a model without trend where there is a refracture in constant term and grade, Model 2 states a model a model with trend where there is a refracture in constant term and grade and Model 3 refers a model where there is a refracture in constant term, in the grade and in the trend.

Additionally, $D_{i,t} (i = 1, ..., k)$ states dummy variable

and T_{Bi} shows the time of structural break.

The hypothesis of the test are:

H_0=There is no cointegration under structural breaks.

H_1= There is cointegration under structural breaks.

The critical values for testing the hypothesis are reproduced with Monte Carlo simulations. Accordingly, when the Maki cointegration test statistics is lower than critical value, H_0 hypothesis is rejected. In this study, Maki (2012) cointegration test with multiple structural breaks is used in analysing the long-term relationship between the variables. The results obtained for Model 1 and Model 2 are given in Appendix 2 and Appendix 3 respectively.

When Appendix 2 and Appendix 3 are analysed, it is revealed that test statistics in Model 0 and Model 2 at 1% significance level and test statistics in Model 3 at 5% significance level are lower than critical values. Test results indicate that the H_0 hypothesis is rejected as it shows there is no cointegration between employment&female employment and FDI & economic growth and variables are acting together in the long-run. In case of the examination of structural breaks, it is seen obviously that the test method is successful at predicting the 2000-2001 crisis in Turkey and the global 2008 crisis.

4.3. Estimation of Long-Term Cointegration Coefficients

Long-term cointegration coefficients can be estimated with dynamic ordinary least squares (DOLS) method developed by Stock and Watson. This method can be used in small samplings. Stock and Watson included the lags and leads of level values and differences in the method to solve the problem of endogeneity and autocorrelation between independent variables (Esteve and Requane, 2006. 118). Moreover, Stock and Watson stated that [I(0), I(1) and I(2)] χ^2 distributed DOLS and

dynamic generalized least squares estimator can be applied if the variables are cointegrated at different levels (Stock ve Watson, 2003, 800-801). Regression with two variables which is composed durig the estimation with DOLS method is given below.

$$Y_t = B^{'} X_t + \sum_{i=-m}^{m} \delta_i \Delta X_{t-i} + \sum_{i=-n}^{n} \varphi \Delta Trend_{t-i} + \varepsilon_t \quad (12)$$

In the equation 12, $B^{'} = (c, \alpha, \beta)$ refers coefficient matrix, $X_t = (1, X, Trend)$ refers explanatory variable matrix, (-m and –n) states the length lags and (m ve n) states the length of leads.

The long- term cointegration coefficients are estimated with DOLS method in this study. Besides, structural break dates obtained from Maki cointegration test are included in the analysis as dummy variable. The estimation results for Model 1 and Model 2 is stated in Appendix 4 and Appendix 5.

According to the results in Appendix 4, it is observed that, the coefficients of variables are significant, moreover, 1% increase in foreign direct investments reduces the employment at the rate of 0,09% and 1% increase in economic growth raises the employment at the rate of 0,2%. When the dummy variables are analysed, it is distinguished that d3, d4 and d5 variables are significant statistically. Furthermore, it is found that while d3 and d4 variables affect the employment negatively, d5 variable affects employment positively. And in paralel with the results in Appendix 5, it is observed that the coefficients of variables are significant, 1% increase in foreign direct investments reduces the female employment at the rate of 0,15% and 1% increase in economic growth raises the female employment at the rate of 0,63%. When the dummy variables are analysed, it is found that only d5 variable affects female employment positively and significantly. Generally, in both two models, it is revealed that foreign direct investments reduce employment and female employment contrary to theoretical expectations and economic growth increases employment and female employment in line with theoretical expectations as to the estimation results of cointegration coefficients.

5. Conclusion

Foreign direct investments have generally accepted as favourable inflows especially by developing nations as they bring along not only financial but also technological assets and know-how. On the other hand, it is observed that there is a failure in reaching a consensus about the effects of foreign direct investments and economic growth on employment in Turkey. This situation may derive from the methods of analysis and unnoticed structural changes in time series due to endogenous/exogenous crisis. Futhermore, it is determined that empirical studies examining the effects of foreign direct investments and economic growth on female employment in Turkey are absent. This paper analyses the effects of foreign direct investments and economic growth on employment and female employment over the 2000-2013 period in Turkey with quarterly data; 2000:Q1-2013:Q4 terms. The analysis methods of the study are, Carrion-i Silvestre et.al. (2009) unit root test with multiple structural breaks, Maki (2012)

cointegration test with multiple structural breaks and dynamic ordinary least squares (DOLS).

It is determined with the study that all variables are stationary at first difference by the results of Carrion-i-Silvestre et.al. (2009) unit root test. Maki cointegration test uncovers a long-term relationship between employment& female employment and foreign direct investments&economic growth. And according to the DOLS method used for the estimation of cointegration coefficients, it is asserted that foreign direct investments

affect employment and female employment negatively contrary to theoretical expectations, whereas economic growth affect employment and female employment positively in line with theoretical expectations. Furthermore, the study reveals that the coefficients of variables are statistically significant. It is thought the entrance of FDI inflows are noncontributory for creating employment as they generally take place by company mergers or acquisitions in Turkey.

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Appendixes
Appendix 1: CS Multiple Structural Unit Root Test Results

Variables	P_T	MP_T	MZ_α	MSB	MZ_T	Break Dates
lnempsa	18.34 (9.15)	17.88 (9.15)	-24.76 (-47.09)	0.14 (0.10)	-3.47 (-4.84)	2001:Q3,2003:Q1,2004:Q4, 2008:Q3,2010:Q4
lnwempsa	20.07 (8.84)	18.87 (8.84)	-21.85 (-45.69)	0.15 (0.10)	-3.29 (-4.77)	2001:Q2,2003:Q1,2004:Q4, 2007:Q3,2012:Q2
lnfdisa	20.36 (9.03)	19.2 (9.03)	-22.66 (-46.72)	0.14 (0.10)	-3.32 (-4.83)	2001:Q4,2005:Q2,2007:Q1, 2008:Q4,2012:Q1
lnrgdpsa	23.22 (9.22)	20.88 (9.22)	-20.77 (-46.45)	0.15 (0.10)	-3.22 (-4.79)	2001:Q4,2005:Q4,2007:Q3,2009:Q1, 2010:Q3
Δlnempsa	3.67* (9.31)	3.26* (9.31)	-135.1* (-46.62)	0.06* (0.10)	-8.21* (-4.79)	–
Δlnwempsa	3.67* (8.09)	3.46* (8.09)	-103.5* (-44.05)	0.06* (0.10)	-7.19* (-4.68)	–
Δlnfdisa	0.10* (9.34)	0.09* (9.34)	-146.4* (-47.25)	0.01* (0.10)	-48.21* (-4.83)	–
Δlnrgdpsa	3.83* (9.12)	3.66* (9.12)	-116.2* (-46.08)	0.06* (0.10)	-7.62* (-4.78)	–

Explanations: Δ symbol states first difference operator,* symbol states that the series are stationary at 5% significance level. Critical values are expressed parenthetical. The test method determined the critical values and the dates of structural breaks.The dates of structural breaks are given in the results of test (realized with level values) for showing the breaks in the original series.

Appendix 2: Maki Cointegration Test Results for Model 1

Model	Test Statistic Values	1% Critical Value	5% Critical Value	10% Critical Value	Break Dates
Model 0	-7.239*	−6.296	−5.760	-5.491	2002:Q4, 2004:Q4, 2008:Q3,2010:Q4 ve 2011:Q4
Model 1	-6.654*	−6.530	−5.993	-5.722	2001:Q3, 2003:Q1, 2004:Q4, 2007:Q1 ve 2010:Q4
Model 2	-6.934	−7.839	−7.288	-6.976	2001:Q3, 2003:Q1, 2004:Q4, 2008:Q1 ve 2009:Q2
Model 3	-8.141**	−8.713	−8.129	-7.811	2001:Q3, 2003:Q1, 2004:Q4, 2005:Q4 ve 2009:Q2

Explanations: When, the numbers of dependent variables are two (RV=2) and break number (m) is 5, critical levels in 1%, 5% and 10% significance level are obtained from Maki (2012,2013).* and ** symbols refers the cointegration relation respectively in 1% and 5% significance level.

Appendix 3: Maki Cointegration Test Results for Model 2

Model	Test Statistic Values	1% Critical Value	5% Critical Value	10% Critical Value	Break Dates
Model 0	-5.605*	−6.296	−5.760	-5.491	2000:Q4, 2003:Q1, 2004:Q4,2008:Q3 ve 2011:Q2
Model 1	-7.486*	−6.530	−5.993	-5.722	2003:Q1, 2004:Q1, 2004:Q4, 2007:Q1 ve 2010:Q3
Model 2	-6.863	−7.839	−7.288	-6.976	2001:Q2, 2003:Q1, 2005:Q2, 2007:Q4 ve 2009:Q1
Model 3	-8.957**	−8.713	−8.129	-7.811	2003:Q1, 2004:Q4, 2005:Q4, 2009:Q1 ve 2012:Q2

Explanations: When, the numbers of dependent variables are two (RV=2) and break number (m) is 5, critical levels in 1% and 5% significance level are obtained from Maki (2012,2013).* and ** symbols refers the cointegration relation respectively in 1% and 5% significance level.

Appendix 4: The Estimation Results of Cointegration Coefficients for Model 1

Dependent Variable: lnempsa			
Variables	**Coefficients**	**t-statistics (p-value)**	**Standard Error**
lnfdisa	-0.088	-4.803 (0.000) *	0.018
lnrgdpsa	0.226	3.397 (0.001) *	0.066
d1	0.0004	0.03 (0.975)	0.015
d2	0.035	1.491 (0.143)	0.023
d3	-0.038	-2.246 (0.03) **	0.023
d4	-0.05	2.412 (0.02) **	0.020
d5	0.11	8.234 (0.000) *	0.013
Constant Term	2.455	13.151 (0.000) *	0.186

Explanations: R^2 and adjusted R^2 values are respectively 0.93 and 0.91. The values between parentheses states the probability (p) values and the significancy of the coefficients at *; 1%, **; 5% significance level. Newey-Best bandwidth is used in long-term covariance estimation. Lead and lag lengths are accepted maximum 4 according to Schwarz information criterion. It is found that lead and lag lengths are respectively 2 and 0. The problems of autocorrelation and heteroscedastic are solved with Newey-Best method. Dummy variables are taken as, d1; 2001:Q1, d2; 2005:Q4, d3; 2008:Q3, d4; 2009:Q2, d5; 2010:Q4.

Appendix 5: The Estimation Results of Cointegration Coefficients for Model 2

Dependent Variable: lnwempsa			
Variables	**Coefficient**	**t-statistics (p-value)**	**Standard Error**
lnfdisa	-0.150	-4.361 (0.000) *	0.034
lnrgdpsa	0.627	21.127 (0.000) *	0.029
d1	-0.081	-0.563 (0.575)	0.144
d2	0.130	1.069 (0.291)	0.122
d3	-0.078	-1.222 (0.227)	0.064
d4	-0.121	-0.99 (0.327)	0.123
d5	-0.293	-2.354 (0.023) **	0.124
Constant Term	1.280	1.899 (0.064) ***	0.674

Explanations: R^2 and adjusted R^2 values are respectively 0.74 and 0.68. The values between parentheses states the probability (p) values and the significancy of the coefficients at *; 1%, **; 5%, ***; 10% significance level. Newey-Best bandwidth is used in long-term covariance estimation. Lead and lag lengths are accepted maximum 2 according to Schwarz information criterion. It is found that lead and lag lengths are respectively 1 and 0. The problems of autocorrelation and heteroscedastic are solved with Newey-Best method. Dummy variables are taken as, d1; 2000:Q4, d2; 2001:Q2, d3; 2007:Q1, d4; 2008:Q3, d5; 2009:Q1.

Reserve Options Mechanism: The New Monetary Policy Tool of CBRT and Its Effect on Exchange Rate Volatility

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Abstract

Purpose *– Reserve Options Mechanism (ROM) is a new policy tool of Central Bank of the Republic of Turkey (CBRT). In this study, it is aimed to examine the effect of the ROM on USD/TL exchange rate volatility.*

Design/methodology/approach *– The effects of the ROM and the direct foreign exchange interventions and auctions of CBRT on the USD/TL exchange rate volatility are analyzed by applying GARCH (1,1) model and using the data for the period 09.30.2011-06.03.2016.*

Findings *– It is found that the ROM significantly decreases the exchange rate volatility, which indicates the effectiveness of the ROM. The interventions of the CBRT also decrease the volatility but they do not play a significant role.*

Research limitations/implications *– Although all available data for the ROM since the beginning of the mechanism are used, one of the limitations of the study is that the ROM and also the interventions of the CBRT are not the only explanatory variables for the USD/TL exchange rate volatility. However, the results imply that the ROM is an efficient policy tool and contributes to the financial stability.*

Originality/value *– Since the ROM is introduced by CBRT recently, there are only a few empirical researches examining the effect of the ROM on exchange rate volatility. This study covers a longer and more recent time period than previous studies.*

Keywords: Reserve Options Mechanism, Exchange Rate Volatility, CBRT, Financial Stability, GARCH

Jel Classification: E58, F31, G15

1. Introduction

The price stability is the main concern of the CBRT, but the financial stability have also became a major goal after the last global crisis in financial markets. In the 2014-2018 strategic plan of CBRT, the strategic goals are separated into three areas as public, global, and institutional. The aims of the public area are explained; i) providing price stability and ii) contribution to the financial stability (CBRT, 2016a). Taken into account both the price stability and the financial stability as the new political compound, CBRT have started a flexible monetary policy since the fourth quarter of 2010 (Oduncu et al., 2013a).

Within the new monetary policy framework, Reserve Options Mechanism (ROM) is designed by CBRT as a new tool of monetary policy (Oduncu et al., 2013b). The ROM is developed to limit the effects of the volatility of capital flows on the financial stability. The ROM is developed to enhance the strength of the financial markets against the liquidity shocks of foreign currencies, and its structure enables to limit the exchange rate volatility (Alper et al., 2012). This mechanism provides an option to the commercial and participation banks to hold required

reserves for the liabilities of Turkish Lira (TL) in form of US dollars (USD) or gold in a determined level. Hence, the mechanism enables banks to use their USD assets in exchange for TL required reserves. Benefits of the mechanism are; i) reducing the volatility created by short term capital flows, ii) strengthening the gross foreign currency reserves (GFCR) of CBRT, iii) providing flexibility to the banks to manage liquidity, iv) reducing the credit level sensitivity regarding the capital flows, and v) reducing the need to the other policy tools (CBRT, 2012).

The ROM has started in September 2011. Initially, the option for holding foreign currency was limited up to the 10% of TL required reserves. Then, it had been gradually increased to 20% and 40%. In May 2012, the option was increased to the 45% of TL required reserves and the mechanism were separated into two tranches as the first tranche up to the 40% and the second tranche between 40-45%. Increasing coefficients were assigned to the tranches. The coefficient of the first tranche was '1' and the coefficient of the second tranche was '1.4'. These

coefficients mean that the more the banks benefit in the mechanism, the more they hold USD in exchange for TL. As of October 2016, the option can be used up to the 60% of TL required reserves and there is 11 tranches in the mechanism. Table 1. shows the tranches and the coefficients in the ROM, after the last regulation in September 2016.

Table 1: Tranches and Coefficients in the ROM

Optional Tranches (%)	Coefficients
0-30	1.0
30-35	1.7
35-40	2.1
40-45	2.5
45-50	2.7
50-55	3.1
55-56	3.9
56-57	4.1
57-58	4.3
58-59	4.5
59-60	4.7

Source: (CBRT, 2016b)

Within the first tranche, because the reserve option coefficient (ROC) is '1', banks can hold up to the 30% of TL required reserves in form of USD as one to one, by calculating the amount via USD/TL rate. In the second tranche, to hold between 30-35% of the TL required reserves in form of USD, the amount of TL for this tranche is multiplied with the ROC '1.5', and then the TL sum of the first two tranches is converted into USD. Table 2. presents a calculation example about using the mechanism. In the example, the bank must hold 100 TL required reserves. Using upper limit of the first tranche means that the bank holds $10 in exchange for 30 TL. If the bank uses 40% of the option (to the upper limit of the third tranche) that means it holds $16.33 ($10+$2.83+$3.5) in exchange for 40 TL. Using full of the mechanism requires that bank holds $37.34 in exchange for 60 TL. Consequently, if the bank benefits from the last tranche to the upper limit, it holds 40 TL + $37.34 for 100 TL required reserves.

Table 2: A Calculation Example for the ROM

Optional Tranches (1)	Reserve Option Coefficients (2)	TL Required Reserves (3)	TL Required Reserves by Multiplying the Coefficient (2x3)	USD Value of Tranches (1 USD = 3 TL)
0-30	1.0	30	30.0	10.0
30-35	1.7	5	8.50	2.83
35-40	2.1	5	10.5	3.50
40-45	2.5	5	12.5	4.17
45-50	2.7	5	13.5	4.50
50-55	3.1	5	15.5	5.17
55-56	3.9	1	3.90	1.30
56-57	4.1	1	4.10	1.37
57-58	4.3	1	4.30	1.43
58-59	4.5	1	4.50	1.50
59-60	4.7	1	4.70	1.57
TOTAL			**112 TL**	**$37.34**

The use of the option is sensitive to the funding costs of the TL and USD. If the USD funding cost decreases (in the speeding period of capital inflow), banks may intend to use the option at the higher levels by holding a bigger fraction of their USD asset in exchange for TL required reserves. As a consequence, the increasing use of the option reduces the transformation of the foreign currency inflow into credit and also reduces the appreciation pressure on TL (Küçüksaraç and Özel, 2012). Conversely, if the USD funding cost increases (in the speeding period of capital outflow), the use of the option is expected to be affected negatively because the banks withdraw their foreign currency reserves from CBRT. Moreover, the ROM decreases the need to sterilization for CBRT (Demirhan, 2013).

Alper et al. (2012) define the breakeven coefficient leaving banks indifferent to use or not to use the ROM, and calculate the breakeven coefficient value as the ratio of the funding cost of TL to the funding cost of USD (including the expected change in the exchange rate). If the cost of TL funding is 3% and the cost of USD funding is 2% for a bank, the breakeven coefficient is equal to 1.5. If the ROC is equal to 1 and 1.3 in the first two tranches respectively, the bank is expected to use the mechanism at

the upper limit of the second tranche. Since the funding cost of USD decreases in the speeding period of capital inflow, the threshold ROC for the bank increases, which can lead the banks benefiting more in the ROM. As a result, the ROM works as an automatic stabilizer by giving the flexibility to the banks to adjust their foreign currency reserves (Oduncu et al., 2013b). However, automatic stabilizer mechanism works if the ROM is not fully utilized, hence, the ROC needs to be determined high enough in the upper tranches (Alper et al., 2012).

Aslaner et al. (2015) explain the differentiation in the use of the option between banks as i) cost related factors (relative funding cost of TL to USD and cost of ROM) and ii) other factors (such as foreign currency liquidity conditions, global risk appetite, and exchange rate movements). They find that the relative cost of TL to USD

and the ROCs determined by CBRT are the main factors affecting the use of the ROM.

Depending on the market conditions (the speeding periods of the capital inflow or outflow), CBRT can review the mechanism by changing the highest using rate of the option or the ROCs. By reducing the coefficients, CBRT supplies liquidity to the market and by increasing the coefficients, it demands more foreign currency from banks. Consequently, the mechanism either works automatically in a passive situation or works in an active situation under the regulation of CBRT (Alper et al., 2012).

Figure 1. shows the maximum rates of the option and the using rates of the option starting from September 2011. It is seen that the mechanism have been used on a large scale since the beginning.
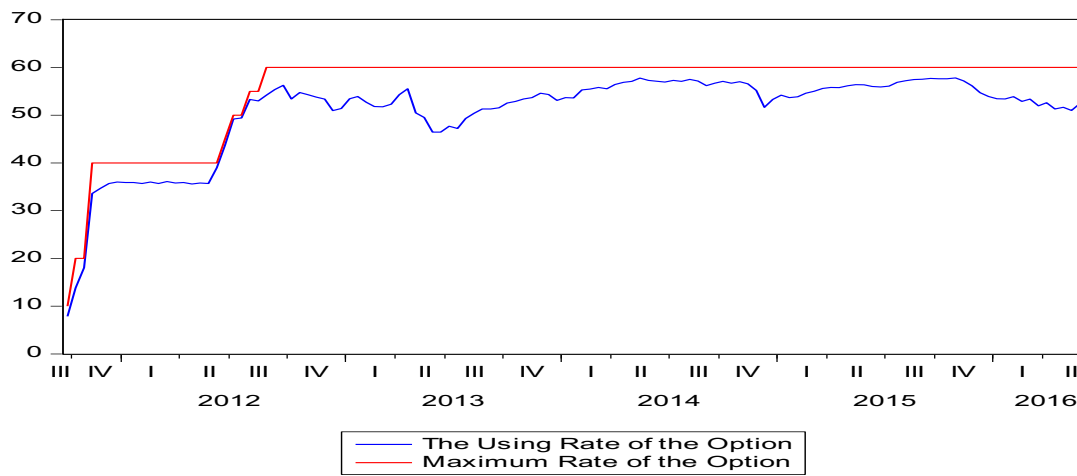

Figure 1: The Use of the ROM (%)

Figure 2. shows the timeline graph of the holding USD amount in exchange for TL in the mechanism. It is seen

that the amount declines since the fourth quarter of 2015. The last amount is $26.2 billion in June 3, 2016.
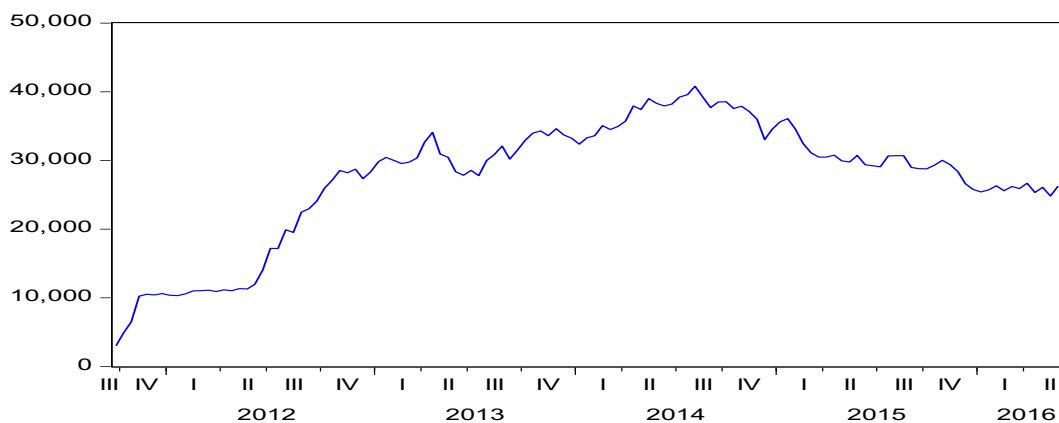
Figure 2: The USD Amount Holding in the ROM ($ Million)

Because the ROM is a new policy tool, there are a few empirical studies examining the effect of the ROM on the exchange rate volatility. Oduncu et al. (2013a) analyze the effects of the ROM, foreign exchange interventions of CBRT, and additional monetary tightening on exchange rate volatility. They use the data for the period from

10.15.2010 to 10.15.2012 and applied GARCH (1,1) model. They evidence that the ROM is efficient in decreasing the exchange rate volatility. In another study, Oduncu et al. (2013b) use dummy variable in GARCH (1,1) model to analyze the effect of the ROM on exchange rate volatility by giving '0' before the ROM between 10.15.2010-

09.29.2011 and '1' after the ROM between 09.30.2011-09.28.2012. They find that exchange rate volatility decreases significantly after the introduction of ROM. Also, Değerli and Fendoğlu (2013) examine the expectations of USD/TL rate's volatility, kurtosis, and skewness by using option prices and calculating the risk-neutral exchange rate probability density functions. They compare developing countries which give current account deficit including Brazil, Chile, Colombia, Czech Republic, Indonesia, Mexico, Poland, Hungary, Romania, South Africa, and Turkey. They document that after November 2011, USD/TL rate's skewness and especially the volatility and kurtosis decrease compared to other exchange rates, which indicates that the policy tools such as asymmetric interest rate corridor and the ROM are efficient.

This study aims to examine the effect of the ROM on the USD/TL exchange rate volatility. Also, the effect of the direct foreign exchange interventions and auctions of CBRT on the exchange rate volatility is examined. The major contribution of this study to the literature is that it covers a longer and more recent time period than previous studies. The data for the period from 09.30.2011 to 06.03.2016 are used and GARCH (1,1) model is applied. It is evidenced that the ROM is an efficient policy tool to contribute to the financial stability.

2. Data and Methodology

To examine the effect of the ROM on the exchange rate volatility, the ratio of the holding USD amount in the ROM to GFCR of CBRT is used as variance regressor in the GARCH (1,1) model. Return of the USD/TL rate level as the depending variable is calculated by using the indicative USD/TL ask rates announced at 03.30 pm by CBRT in every business day.

Required reserves are calculated by CBRT in two-week periods on Fridays. Maintenance period starts two weeks after the calculation day and lasts 14 day. Because TL required reserves of banks are calculated in a two-week period on Fridays, the amount of USD in exchange for TL in the ROM is a two-weekly time series. Hence, the two-weekly exchange rate return is calculated as the log difference of the exchange rate. The data are used for the period 09.30.2011-06.03.2016.

In the model, the ratio of net foreign currency interventions (NFCI) of CBRT to GFCR of CBRT is also used as variance regressor. NFCI of CBRT includes the direct foreign exchange purchase and sale interventions and purchase and sale auctions of CBRT. NFCI is derived for two-week periods. NFCI takes negative sign if the sum of the transactions in two-week is resulted as net sale. Conversely, it takes positive sign if the sum of the transactions is resulted as net purchase.

Mean and variance equations of GARCH (1,1) model are shown in equations 1. and 2., respectively. In variance equation, $ROM/GFCR_t$ represents the ratio of the holding USD amount in the ROM to gross foreign currency reserves of CBRT and $NETINTR/GFCR_t$ represents the ratio of net foreign currency interventions of CBRT to gross foreign currency reserves of CBRT.

$$R_t = \mu + \varepsilon_t \qquad \qquad 1.$$
$$\sigma_t^2 = a_0 + a_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \varphi_1 ROM/GFCR_t \qquad 2.$$
$$+ \varphi_2 NETINTR/GFCR_t$$

3. Empirical Findings

Descriptive statistics of the series are reported in Table 3. In panel B, it is seen that while return and NETINTR/GFCR series are stationary in level, ROM/GFCR series is not stationary.

Table 3: Descriptive Statistics of Series

	Return of USD/TL Rate	NETINTR/GFCR	ROM/GFCR
Panel A			
Mean	0.001643	-0.005983	0.269252
Median	0.001767	-0.003374	0.287468
Maximum	0.025049	0.000000	0.357903
Minimum	-0.021963	-0.061359	0.057216
Std. Dev.	0.008728	0.010610	0.067175
Skewness	-0.071978	-3.225057	-1.303782
Kurtosis	3.161386	13.49041	3.855116
Jarque-Bera	0.237742	770.9008***	38.28062***
Panel B			
ADF Test (Level)	-10.06302***	-6.783032***	-2.637202

Note: *** indicates significance at the 1% level. Critical values for ADF tests are -2.584214, -4.035648, -4.034997 for 1% level, respectively.

Although the ROM/GFCR series is not level stationary, first difference of this series is stationary and included in the GARCH model. For the error distribution in the GARCH model specification, Generalized Error Distribution (GED) is used. The correlation coefficient between ROM/GFCR and NETINTR/GFCR is -0.125, which indicates that there is no multicollinearity problem.

The results of GARCH (1,1) model are reported in Table 4. It is found that the reserve options mechanism significantly decreases the USD/TL rate volatility. On the other hand, the net foreign exchange interventions of CBRT do not play a significant role to decrease volatility. As a consequence, it is evidenced that the ROM is an efficient policy tool and contributes to the financial stability. This finding is in line with the findings of Oduncu et al. (2013a,b) and Değerli and Fendoğlu (2013).

LB-Q and LB-Q² tests results indicate that the null hypothesis of no autocorrelation for standardized residuals and squared standardized residuals cannot be rejected. Also, ARCH-LM test result indicates that the null

hypothesis of no ARCH effect cannot be rejected. Hence, diagnostic tests indicate that the model is well specified.

Table 4: Results of GARCH (1,1) Model

$$R_t = \mu + \varepsilon_t$$
$$\sigma_t^2 = a_0 + a_1 u_{t-1}^2 + \beta_1 \sigma_{t-1}^2 + \varphi_1 \text{ROM/GFCR}_t + \varphi_2 \text{NETINTR/GFCR}_t$$

α_0	α_1	β_1	φ_1	φ_2
3.48E-06	-0.079521	1.025381	-0.000960	-0.000319
(1.788070)*	(-1.941055)*	(13.96747)***	(-4.081502)***	(-1.195477)

LB-Q (10)	12.018	[0.284]
LB-Q^2 (10)	9.1962	[0.514]
ARCH LM (10)	1.0043	[0.445]

*** indicates significance at the 1% level and * indicates significance at the 10% level. *z*- statistics are given in the parentheses. *p*- values are given in brackets.

4. Conclusion

Reserve Options Mechanism (ROM) is introduced in September 2011 in the context of the CBRT's new policy mix, which takes into account both price and financial stability. The ROM is an option for commercial and participation banks to hold USD or gold in CBRT in exchange for the Turkish Lira required reserves in a determined level. It aims to reduce the adverse effects of the volatility of the capital flow, which is a challenge to financial stability and also aims to increase the gross foreign currency reserves of CBRT. Generally speaking, the mechanism is adopted by banks and it is used on a large scale since the introduction.

This study empirically examines the effect of the ROM on the USD/TL exchange rate volatility. In addition, the effect of the net foreign exchange interventions of CBRT is analyzed. The data for the period 09.30.2011-06.03.2016 are used and GARCH (1,1) model is applied. It is found that the ROM significantly decreases the exchange rate volatility. The interventions also decrease the volatility, but they do not play a significant role. Hence, it is concluded that the ROM is an efficient policy tool and contributes to the financial stability.

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The twin deficits hypothesis: Evidence from Ghana

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Abstract

Purpose – This paper investigates the twin deficit hypothesis for Ghana in view of the persistent co-movement between the budget deficit (BD) and current account deficit (CAD) over the past three decades.
Design/methodology/approach – The paper uses annual data for the period 1980-2014 and ascertains whether there is long-run association between the budget and current account deficits using the Johansen Cointegration test. The Error Correction Model is estimated to check stability of the long-run association between the two deficits. A Granger causality test is performed to determine the direction of causality between the two variables.
Findings – The results confirm the existence of long-run equilibrium relationship between the budget and current account balances. The error correction model finds an insignificant effect of the BD on the CAD both in the short and long runs. The ECM result was however significant for both the long run and short run regarding the effect of CAD on BD even as the adjustment parameter suggests that 33 percent of the disequilibrium in budget balance in the previous period is corrected in the current period. Granger causality results find support for the reverse causality argument, thereby rejecting the twin-deficits hypothesis for Ghana.
Research limitations/implications – For lack of consistent data variables such as exchange rate and interest rate were not included in the study.
Originality/value – The findings lend support to the reverse causality argument that says that causality runs from the current account deficit to the budget deficit.

Keywords: Twin deficits hypothesis, budget deficit, current account deficit, Granger causality, Ghana

1. Introduction

The twin-deficit hypothesis (TDH) postulates that fiscal deficits cause current account deficits. According to the twin-deficits hypothesis, when government increases its fiscal deficits, for instance, by spending in excess of its tax revenue, then the decline in national saving calls for the country to borrow funds from abroad to finance the excess expenditure in order not to crowd out domestic private investment.

While the TDH can be explained by the national income accounts framework showing the link between the current account and the budget balance, the discourse over the relationship between the fiscal and current account balances was ignited by the "Reagan fiscal experiment" during the 1980s when the United States economy faced periods of rising fiscal deficits and strong appreciation of the dollar plus worsening external balance. During the 1980s, the U.S. pursued expansionary fiscal policy mixed with tight monetary policy. The resultant high U.S. interest rates improved returns on dollar-denominated assets leading to dollar appreciation (both in real and nominal terms). The appreciation of the dollar made U.S. exports less competitive with adverse consequences on the current account balance. Similar patterns have been observed in countries such as Germany and Sweden, where rising budget deficits of the early 1990s were accompanied by a

real appreciation of the national currencies and a deterioration of the current account balance (Bagheri et al., 2012).

Sustained fiscal and current account deficits are major policy trepidations in both the developed and developing world. Large fiscal deficits tend to crowd-out private investment, engender increased borrowing, higher interest payments, inflation and ultimately stall economic growth. Large current account deficits give rise to currency crises, transfer of wealth to foreign nationals and depletion of international reserves (IMF, 2015).

Ghana has experienced strong growth over the past three decades. Starting from a dismal growth rate of 0.5 percent in 1980, growth rates picked up after the country embarked on Economic Recovery and Structural Adjustment Programmes (ERP/SAP) in 1983 and have averaged more than 5 percent per annum over the last three decades. The growth rate peaked at an unprecedented 14.1 percent in 2011 owing largely to the discovery and production of oil in commercial quantities, before decelerating to 4.1 percent in 2014. The country has achieved laudable results in reducing poverty and in improving several social indicators. According to the UNDP (2013), Ghana's Human Development Index (HDI) rose by 43 percent from 0.391 to 0.558 between 1980 and 2012 equivalent to an annual increase of 0.9 percent. Over the same period, life expectancy at birth, mean years of

schooling and expected years of schooling improved by 11.5 years, 3.4 years and 4.1 years, respectively, while GNI per capita increased by about 71 percent between 1980 and2012.The country's democratic credentials and a highly rated business climate have collectively aided its graduation to lower-middle income statussince 2007. Rapidly rising public debt in the 1990s, however, resulted in considerably higher interest payments and constrained social and development spending.Debt levelsrose markedly from 31.97 percent of GDP in 1990 to 123.35 percent of GDP at the end of 2000. Consequently, thecountry sought debt relief under the Heavily Indebted Poor Countris (HIPC) initiative in 2002 which sawdebt levels decline from 82.81 in 2002 to a low of 26.19 percent of GDPin 2006 before rising to 70.15 percent of GDP by end of 2014. Over the past three decades Ghana has experienced large fiscal and external imbalances and monetary financing of the budget which have been associated with high inflation, a decline in external buffers, a significant depreciation of the local currency, and high nominal interest rates, weighing on growth and real incomes of most households.

Thus Ghana's economy, like most in Sub-Saharan Africa, has been characterized by persistent budget overruns. Between 1980 and 2014, fiscal deficits averaged 6.1 percent of GDP, reaching a peakof 12.2 percent of GDP in 2012 on account of election-year budget slippages and has remained in double digits in the followingtwo years. Concommitantly, Ghana's current account deficit rose from a mean of 3.9 percent of GDP between 1980-2000 to 7.2 percent of GDP between 2001-2014 partly attributable to robust import demand and commodity price shocks. The current account however recorded a surplus of 0.1 percent of GDP in 2003 before deteriorating to -11.9 percent of GDP in 2008. So in the case of Ghana, the budget and current account balances as depicted in Figure 1 tend to exhibit co-movements over the last 35 years. The co-movements between the two variables require further scrutiny to ascertain any causal relationships between the budget and current account in view of the persistence of the two deficits.

Figure 1: Ghana's Budget and Current Account balance (1980-2014)
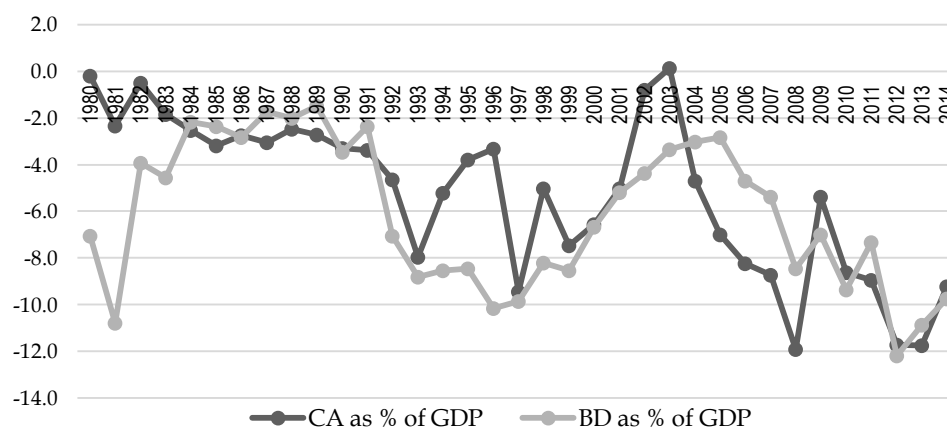
Source: Authors based on data from the IMF's World Economic Outlook Databas.

While many empirical studies have affirmed the TDH, several others confirm no such relationship. Yet, others have shown bidirectional causality (both balances affect each other) or reverse unidirectional causality (from current account to budget balance). Does the co-movement between the deficits imply the TDH in the case of Ghana? Or is it the current account deficit that is causing the budget deficit? Is there a possible feedback effect? There is a dearth of studies on the twin deficits hypothesis on Ghana. The country so far has featured in a cross-country study by Egwaikhide et al. (2002) for a number of Sub-Saharan African countries using data for the period 1970-1999. Employing ordinary least squares, they found evidence of twin-deficits for Ghana. Not only is new evidence needed for Ghana about the twin deficits given the dated nature of the data used by Egwaikhide et al. (2002) but also as observed by Corsetti and Muller (2006), the TDH holds in open economies. Ghana is relatively more open over the past three decades following the pursuit of more liberalized economic policies under the SAP compared to the 1970s and 1980s. The paper seeks to fill this gap by investigating the twin deficits hypothesis for Ghana, using annual data for the period 1980 – 2014. We test for unit root and cointegration, perform causality tests and employ the Error Correction Model (ECM). The rest of the paper is organized as follows. The next section presents a review of the literature whilst the data and methodology are described in Section 3. Section 4 presents and discusses the empirical results. Conclusions and policy implications are outlined in Section 5.

2. Literature Review

The much suggested connection between an economy's budget balance and current account balance has ignited extensive debate both in the theoretical and empirical literature for quite some time now, albeit inconclusive (Bartolini and Lahiri, 2006). This review analyzes the propositions by the main schools of thought (Keynesian and Ricardian views) as well as the unidirectional reverse causality from the current account deficit to budget deficit and the bi-directional causality arguments. The traditional argument (referred to as the Keynesian absorption theory) in the main suggests that an increase in the budget deficit represents an increase in domestic absorption or demand for goods and services over and above an increase in output. According to the absorption theory, fiscal

expansion, be it in the form of a tax cut or rise in government expenditure, reduces national savings, raises private disposable income and increases consumption demand for goods and services including imports. Since government often accounts for a greater proportion of domestic demand, this should translate into a deterioration of the current account balance, *ceteris paribus*.

A number of empirical studies support the Keynesian proposition (TDH). For instance, Tang (2013), reports that cointegration tests show U.S. fiscal balance, current account balance, real GDP and interest rates (short- and long-run) are co-moved over the periods $1970Q_2$ - $2011Q_4$, and provides evidence to validate the twin deficits hypothesis for the U.S. Tarawalie (2014) found evidence in support of the TDH for Sierra Leone, using a multivariate model as opposed to directly between the budget deficit and current account deficit. The Toda Yamamoto Causality test found causal running from the budget deficit to and current account. Similarly, Bagheri et al. (2012) for Iran, Panagiotis et al. (2009) for Greece, and Baharumshah and Lau (2007) for Thailand, all find support for the twin deficit hypothesis.

Nonetheless, opponents of the conventional view on the twin-deficits hypothesis think otherwise and often invoke the Ricardian Equivalence Hypothesis (REH) by Barro (1974) in their defence to suggest no causal relationship between the budget deficit and current account deficit. REH suggests that tax cuts by government would only worsen the fiscal stance which constitutes decline in national savings. But the resultant increase in private disposable income due to the tax cut only leads to increased private savings since households view budget deficits as an 'inevitable deferred taxation'. As such households would expect future tax increases to offset the earlier tax cuts so as to ensure consumption smoothing. Hence aggregate demand for goods and services including imports will not be affected by the expansionary fiscal policy. Therefore, it is only the budget deficit that increases whereas the current account position is unaffected. Enders and Lee (1990), Kaufmann et al. (2002), and Kim and Roubini (2008) are among studies that find support for the Ricardian Equivalence Hypothesis, emphasizing no systematic relationship between budget and current account deficits.

A reverse causality argument also referred to as "current account targeting" (Summers, 1988) argues a unidirectional relationship between the two deficits, with causality running from the current account deficit to the budget deficit. Thus, a deterioration in the current account deficit may lead to slower pace of economic growth and subsequently increase the budget deficit. As observed by Reisen (1998) and Khalid and Teo (1999), reverse causality rather than TDH should be the norm for net debtor developing countries because these countries have limited domestic resources and typically highly depend on foreign capital inflows to finance economic development. Alkswani (2000) also argues that for commodity-based exporting countries, reverse causality must hold as well, because increased exaport revenues tend to improve fiscal

revenues. Empirically, Saeed and Khan (2012) reports long run relationship between the two deficits for Pakistan with causality running from the current account deficit to the budget deficit for the period 1972 to 2008. Farajova (2011) also found evidence of long run causality running from current account to budget deficit for Azerbaijan. In the same vein, Sobrino (2013), using quarterly data from 1980 to 2012, rejects the twin deficits hypothesis for Peru. His evidence points strongly to reverse causality, that is, the current account causes the fiscal account. Similar results have been found for Kenya by Egwaikhide et al. (2002) in a cross-country study involving selected SSA countries and Lau et al. (2010) for Indonesia and South Korea. Argimon and Roldan (1994), Alkswani (2000) and Magazzino (2012) also found empirical support for the reverse causality proposition.

Some empirical studies, however, show a bi-directional (or two-way) causality between the two deficits, suggesting that fiscal deficits worsen the current account, and *vice versa*. Omoniyi et al. (2012), for instance, investigated the TDH in Nigeria for the period 1970-2008 and show results indicating bi-directional causality between budget deficits and trade deficits. Islam (1998) as well as Kouassi et al. (2004) found evidence of bi-directional causality for Brazil and Thailand, respectively.

3. Methodology and Data
National Income Identities

We provide the link between the budget balance and current account balance using the national income accounts framework. National income, *Y*, is measured by gross domestic product (GDP) is defined as the sum of private consumption expenditure (C), private investment expenditure (I), government purchases (G), and net exports (X - M), i.e. exports minus imports as in equation (1).

$$Y = C + I + G + X - M \qquad (1)$$

Alternatively, we can define national income, *Y*, based on use; either consumed (C), used for private saving (S) or paid in taxes (T).

$$Y = C + S + T \qquad (2)$$

Equating (1) and (2), and re-arranging terms gives:

$$X - M = (S - I) + (T - G) \qquad (3)$$

From equation (3), (X - M) is equivalent to the current account (CA) balance,[1] (S - I) is private savings and (T - G) represents public savings often called the budget surplus[2]. The sum of private and public savings yields the domestic national savings. The CA balance is thus equal to the surplus of private savings over investment and the gap between government tax revenue and government expenditure on goods and services, that is, the government budget surplus. Equation (3) further suggests that a budget

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[1]Strictly speaking, X-M, is the trade balance. Although, the current account balance is the trade balance plus net income from services and net transfers, these particular sub-accounts usually represent

a small fraction of the total transactions in the current account for many developing countries, including Ghana.
[2]When G exceeds T then we have a budget deficit (BD).

deficit (BD) may be offset by an increase in private saving or fall in domestic investment (I). The latter adjustment response does not cause the trade balance to fall contrary to the twin-deficits hypothesis. The twin-deficits hypothesis maintains that the external balance is dominated by the government budget balance, and that trade deficits reflect predominantly budget deficits.

However, it must be stressed that while equation (3) shows that the current account balance is associated with the gap between domestic savings and investment, it does not provide a theory of how the current account balance is determined. This condition implies that net exports (X-M) must provide the resources to cover the excess of government spending (G) that is not coming from domestic sources (national savings).

Econometric Strategy and Data

The paper uses annual data for the period 1980-2014, with emphasis on the budget balance (BD) and current account balance (CAD), obtained from the IMF's World Economic Outlook Database and the World Bank's World Development Indicators online. In line with recent literature we employ the Augmented Dickey Fuller (ADF) test to check stationarity of the variables. We proceed to ascertain whether there is long-run association between the budget and current account deficits using the Johansen cointegration test. The Error Correction Model (ECM) is estimated to check stability of the long-run association between the two deficits. Lastly, Granger causality test is performed to determine the direction of causality between the variables.

Unit Root Test

The Augmented Dickey-Fuller (ADF) test is employed to test the stationarity of the variables since many time series data tend to have unit root. The ADF procedure tests the null hypothesis that a series Y_t has unit root or is non-stationary by calculating t-statistics for the coefficient of the lagged dependent variable $\beta = 0$ in the following regression equation:

$$Y_t = \alpha + \beta Y_{t-1} + \gamma_t + \sum_{k=2}^{n} \delta_k Y_{t-k} + \varepsilon_{it} \qquad (4)$$

If the value of the ADF test statistic is less than the critical value (conventional 5 percent level of significance) then we accept the null hypothesis and conclude that the series Y_t is non-stationary, and vice versa. If a series is found to have unit root, then the series is differenced d number of times for it to be stationary. Hence if the first difference of the series Y_t becomes stationary, then we conclude that the series Y_t is integrated of order one or $Y_t \sim$I(1).

Cointegration Test

The literature suggests three widely used procedures to determine the existence of long-run association

(cointegration) or otherwise between stationary time series variables, namely, the Engle-Granger two-step method, the Johansen test, and the Phillips-Ouliaris cointegration test. The paper will adopt the Johansen test as it is more suitable for a two variable model as noted by (Gonzalo, 1994) relative to the others. The Trace test and the Maximum eigenvalue test will be adopted to determine the number of cointegrating vectors. The Trace (λ_{trace}) test examines the null hypothesis that the number of cointegrating vectors equals or is less than (r) and computed as:

$$\lambda_{trace}(r) = -T \sum_{i=r+1}^{p} In(1 - \lambda_i)$$

Then again, the Maximum eigenvalue (λ_{max}) test examines the null hypothesis that there is (r) number of cointegrating vectors in contrast to the alternative hypothesis that there are (r+1) cointegrating vectors. The λ_{max} test is thus calculated as follows:

$$\lambda_{max}(r, r + 1) = -TIn(1 - \lambda_i)$$

Error Correction Model (ECM)

We can proceed to run regressions in first difference provided the series of interest are *I*(1). Although we may well lose the long-run relationship inherent in the data. There is need to use variables in their levels as well in the regressions. The Error Correction Model is designed to fit in variables both in their levels and first differences and thus captures both the short run disequilibrium and long run equilibrium adjustments between variables. Following Mukhtar et al. (2007), the Error Correction Model showing the relationship between the CAD_t and BD_t is specified as follows:

$$CAD_t = \alpha_1 + \alpha_2 \quad BD_t - \rho \upsilon_{it-1} + v_{it} \quad (5)$$

$$BD_t = \beta_1 + \beta_2 \quad CAD_t - \rho \upsilon_{it-1} + \varepsilon_{it} \quad (6)$$

For instance, in equation (5), the short-run effect or impact multiplier is represented by α_2 and it describes short run impact of a change in BD_t on CAD_t.[3] The ρ explains long run gravitation towards the equilibrium relationship between the variables, that is, how much of the disequilibrium in the LHS variable in the previous period is corrected in the current period. The v_{it} and ε_{it} are the serially uncorrelated white-noise error terms. The error correction model thus gives an indication of the speed of adjustment from the short-run equilibrium to the long-run equilibrium state. The higher the co-efficient of the parameter ρ, the greater the speed of adjustment.

Granger Causality Test

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[3] β_2 in equation (6) on the other hand measures the short run impact of a change in CAD_t on BD_t.

If the current or lagged terms of a series say X_t determines another Y_t then there is granger causal relationship between the variables where Y_t is granger caused by X_t (Granger, 1969). We specify in equations (7) and (8) as:

$$Y_t = \gamma_1 + \sum_{i=1}^{n} \alpha_i \ X_{t-i} + \sum_{j=1}^{n} \beta_j \ Y_{t-j} + \varepsilon_{1t} \quad (7)$$

$$X_t = \gamma_2 + \sum_{i=1}^{n} \lambda_i \ X_{t-i} + \sum_{j=1}^{n} \delta_j \ Y_{t-j} + \varepsilon_{2t} \quad (8)$$

The coefficients are; α_i , β_j , λ_i δ_j , whiles γ_1 and γ_2 are the constant terms with ε_{1t} and ε_{2t} as the error terms. We test four hypotheses assuming X_t represents budget deficit (BD) and Yt denotes current account deficit :1) BD Granger-cause CAD; 2) CAD Granger-cause BD; 3) Causality is bi-directional (runs in both directions); and 4) BD and CAD are independent.

4. Results and Discussion
Unit Root Tests
We use the ADF test to check the stationarity of our variables of interest. Based on the ADF test results presented in Table 1, BD and CAD appear to be non-stationary at levels but stationary at first difference. Hence we conclude that the two variables are integrated of order one i.e. I (1).

Test for Cointegration
We proceed to test for cointegration between the two variables to ascertain whether there is long-run equilibrium relationship between the budget and current account deficits for Ghana. Table 2 reports the results of the trace and maximum eigenvalue tests and suggest rejection of the null hypothesis of no cointegration in favour of the alternative hypothesis (existence of one cointegration equation between the two deficits at 5% level. This implies that the budget and current account deficits are cointegrated and that there is a stationary linear combination between the two variables.

Table 1: Unit Root Test Results

			Level Test statistic	Mackinnon critical values			1st Diff. test statistic	Mackinnon critical values		
				1%	5%	10%		1%	5%	10%
CAD	Intercept		-2.4938	-3.6394	-2.9511	-2.6143	-7.6126*	-3.6463	-2.9540	-2.6158
	Intercept trend	&	-3.9266*	-4.2529	-3.5485	-3.2071	-7.4927*	-4.2627	-3.5530	-3.2096
	None		-0.7649	-2.6347	-1.9510	-1.6109	-7.6449*	-2.6369	-1.9513	-1.6107
BD	Intercept		-1.9779	-3.6394	-2.9511	-2.6143	-8.2087*	-3.6463	-2.9540	-2.6158
	Intercept trend	&	-4.9618*	-4.2529	-3.5485	-3.2071	-8.5526*	-4.2627	-3.5530	-3.2096
	None		-0.6790	-2.6347	-1.9510	-1.6109	-8.3503*	-2.6369	-1.9513	-1.6107

The superscript * indicates rejection of null hypothesis of unit root at 5% significance level and lag length based on Schwarz Information Criterion.

Table 2: Results of Johansen tests for Cointegration

Unrestricted Cointegration Rank Test (Trace)				
Null	Alternative	Statistic	5% critical value	Prob.
r = 0*		23.3239	15.4947	0.0027
r		2.5109	3.8415	0.1131

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)				
Null	Alternative	Statistic	5% critical value	Prob.
r = 0*		20.8030	14.2646	0.0040
r		2.5109	3.8415	0.1131

Rejection of the null hypothesis of no cointegration equation at 0.05 level of significance is denoted by *.

Error Correction Model

We test the stability of the long-run association between BD and CAD by estimating an error correction model with one cointegrating vector and one lag[1] in both equations. The ECM allows the long-run behaviour of the endogenous variables to converge to their long-run equilibrium relationship while letting a variety of short term dynamics.

Table 3 presents results of the error correction model and reveals that the short-run impact of BD on CAD is insignificant at the 5 percent level. A similar result is achieved with the long-run effect although the coefficient of the error correction term ρ is negative. On the other hand, the ECM results show that the short-run and long-run effects of CAD on BD is significant at the 5 percent level as the adjustment parameter (ρ) is negative indicating that 33 percent of the disequilibrium in the BD is corrected annually. The diagnostic test statistics indicate that there is no evidence of serial correlation in the error terms.

Table 3: Error Correction Model Results

Dependent variable is DCAD		Dependent variable is DBD	
Variables	Coefficient	Variables	Coefficient
Constant	-0.2929	Constant	-0.1063
	(-.6453)		(-.3354)
DBD	0.0292	DCAD	-0.3307*
	(.1271		(-2.1921)
ECM (ρ)	-0.1803	ECM (ρ)	-0.3309*
	(-.9545)		(-3.3193)
R^2	0.1257	R^2	0.374
Adj R^2	0.0352	Adj R^2	0.3093
DW	1.9077	DW	1.4179
F-Stat	1.3892	F-Stat	5.7757
Prob (F)	0.2659	Prob (F)	0.0032
No. of obs.	33	No. of obs.	33

*T-statistics are in parenthesis and *denotes the significance of statistics at the 5 percent level.*

Granger Causality Test Results

We ascertain whether either or both variables help determine each other in line with previous studies probing the twin deficits hypothesis. The current account balance is said to be Granger-caused by the budget balance if BD aids the prediction of CAD or better still, if the coefficients of the lagged BD is statistically significant. Granger-causality test results presented in Table 4 indicates a unidirectional positive causal relationship from the current account balance to the budget balance, and not the reverse, thus, rejecting the twin deficits hypothesis for Ghana in favour of the reverse causality argument. This is in contrast to the findings of Egwaikhide et. al. (2002), who found evidence in support of the twin deficits hypothesis for Ghana in a cross-country study setting. Our results, however, corroborate the findings of Saeed and Khan (2012) for Pakistan, Farajova (2011) for Azerbaijan, Sobrino (2013) for Peru, Lau et al. (2010) for Indonesia and South Korea, and Egwaikhide et al. (2002) for Kenya. As noted by Sobrino (2013), the reverse causality outcome is consistent with small open commodity-based economies such as Ghana.

Table 4: Pairwise Granger Causality Test Results

Null hypothesis	F-statistic	P-value	Decision
BD does not cause CAD	0.2139	0.8087	Cannot be rejected
CAD does not cause BD	5.1829	0.0122	Rejected

5. Conclusion

This paper sought to investigate the twin deficit hypothesis for Ghana in view of the persistent co-movement between the budget and current account deficits over the past three decades. Using time series data for 1980-2014, the paper 1) tests the stationarity of the variables, namely, the budget balance and the current account balance; 2) performs the cointegration test (Johansen test); 3) estimates a vector error correction model; and 4) performs causality tests. The results confirm the existence of long-run equilibrium relationship between the budget and current account balances. The error correction model finds an insignificant effect of the BD on the CAD both in

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[1] Choice of lag one based on optimal lag selection criteria LR, FPE, AIC HQIC and SBC.

the short and long runs. The ECM result was however significant for both the long run and short run regarding the effect of CAD on BD even as the adjustment parameter suggests that 33 percent of the disequilibrium in BD in the previous period is corrected in the current period. Granger causality results found support for the reverse causality argument with causality running from the current account deficit to the budget deficit.

As observed by Sobrino (2013), the reverse causality outcome is consistent with small open commodity-based economies, which are exposed and sensitive to external price shocks. Thus, for a relatively open economy such as Ghana in which trade plays an important role, increased foreign exchange earnings from trade will not only improve the current account balance but also have a positive impact on the budget balance position. Policy initiatives aimed at improving the trade balance and export competitiveness should be given serious attention. For instance, improving trade infrastructure as well as maintaining a conducive macroeconomic environment, including a competitive real exchange rate, will support domestic industries to expand output to meet domestic and foreign demand to engender the much needed foreign exchange as a measure to complement efforts to arrest the country's worsening current account and budget positions which have persisted in recent years.

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