

The background of the cover is a vibrant blue. In the upper right, there is a white arrow pointing upwards and to the right, with a line graph showing an upward trend. In the lower right, there is a faint, semi-transparent pie chart. The central focus is a close-up of a hand with the index finger pointing upwards. The hand is positioned in the lower half of the frame, with the wrist and a dark suit sleeve visible at the bottom. The overall aesthetic is professional and business-oriented.

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ARTICLES

Research

- The methodological profile of scientific publications on public transparency: An analysis of the African scenario** 196
Belchior Pedro Cole*, Maurício Vasconcellos Leão Lyrio, Sérgio Murilo Petri and Rogério João Lunkes
- Effects of microfinance services on the performance of small and medium enterprises in Kenya** 206
Irene Rotich, Charles Lagat* and Japhet Kogei
- Scrutinising the effectiveness of customer loyalty programmes: A study of two large supermarket chains in South Africa** 212
Justin Beneke*, Simon Blampied, Ryan Cumming and Justin Parkfelt
- Value-at-risk in times of crisis: An analysis in the Brazilian market** 223
Luiz Eduardo Gaio*, Tabajara Pimenta Junior, Fabiano Guasti Lima and Carlos Alberto Grespan Bonacim
- Interdependence between GCC stock market and oil prices and portfolio management strategies under structural breaks** 233
Nizar Harrathi* and Ahmed Almohaimeed

Full Length Research Paper

The methodological profile of scientific publications on public transparency: An analysis of the African scenario

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This study seeks to analyze the methodological profile of scientific publications completed on public transparency within the context of the African continent. The following are the specific objectives of this study: to present the research methods commonly utilized in academic investigation concerning public transparency in Africa, to survey compilation of a sample of articles on public transparency contained in the Scopus, Portal de Periódicos CAPES, and Web of Science databases, within the time period of 2001-13, and to identify the activity sectors, approaches and research methods utilized in the studies making up the sample. In terms of these objectives, the methodology employed is characterized as exploratory and descriptive, while, in regard to the technical processes undergone, the study is bibliographic and documentary in nature. It was carried out using quantitative data. The study concludes that the existing research in this field is not limited to specific activity sectors, but rather relevant to the public sector in general. The survey also showed a predominate use of a quantitative approach; the principal research tool is the descriptive method.

Key words: Transparency, public administration, research methods.

INTRODUCTION

This study is framed within the context of public administration, and its goal is to reflect the methodological processes utilized by researchers during the formulation of academic research on public transparency in the African continent. Along these lines, the study seeks to analyze the methodologies employed by the authors of these existing studies, and to better understand the circumstances under which said works were completed.

What led to the research of the topic in question is the fact that many African countries are indicated to be the most corrupt in the world (Transparency International, 2013). As a result, this work aims to identify the methodological profile used in scientific publications on public transparency produced in Africa. Within this study, methodological profile is understood as the approaches and research methods employed in scientific publications

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in the African context.

Studies on transparency and accountability reporting process within national governments have received significant attention in academic publications in the past years. Along with this, empirical studies show that transparency in public administration is fundamental for citizens to remain informed regarding how public resources are used (Dea et al., 2013; Witvliet et al. 2013; Bowen et al., 2012; McFerson, 2009). This justifies the continuation of research in this field. On the one hand, a reflection on the ways in which these studies on public transparency in Africa are being developed is important. It leads to a deeper understanding of the field's theoretical and practical advances, as well as its leanings and limitations. Further, the study is justified by its specific concern for the field of public administration, as it shows how transparency can lead to better distribution of resources across activities, promoting both development of nations and better performance of states.

In terms of researchers and students within this field, the analysis contained in this study draws attention as it is a compilation of works on the topic, beginning with a methodological analysis. Additionally, once provided with an awareness of the trends in related research, researchers and students might easily identify the approaches commonly used by the scientific community, as well as the models utilized in the production of these existing works, serving as a base for continued works and guidance for their own investigations in the field.

To meet the goals of the study, articles published in the Scopus, *Portal de Periódicos CAPES*, and Web of Science databases from 2001-13 were selected. The techniques of this selection are explained in research methodology. The selected works were read with a purposefully critical perspective, considering the activity sectors, approaches, and methods employed by researchers in this realm.

Following this introduction, the second section, which handles the research methodology, will detail the characteristics of the techniques employed in the collection of data, and the procedures applied throughout the same. In the third section, which concerns a review of existing academic literature on the topic, the question of transparency in public administration will be addressed. Subsequently, the results of several previous studies on the topic in question pertaining to the African continent are presented. The fourth part contains the results of the study, while fifth part contains conclusions based on those findings, including the limitations of the present work, as well as suggestions for further research.

LITERATURE REVIEW

The purpose of a literature review in this context is to

bring several considerations regarding public sector transparency to light, being the subject of this work. Below, the researcher seeks to understand the nature of previous works within the realm of public transparency in African nations, striving to orient the reader with the current state of research on the topic in said countries. This discussion serves as a base for an analysis of the results of this current study, which are presented in the fourth section of the same.

Transparency: brief considerations on the topic

In modern nomenclature, transparency refers to something (or someone) in respect to which (or whom) no doubts are cast. Transparency is related to the principle of publicity and it is one of the main objectives set for in modern public administration. Transparency appears in the realm of public administration along with increasing demands, on part of society, for knowledge of how public resources transferred to the State, so that it may build a public infrastructure, are used. Key issues within this context are the periodic release of information on activities, the regular organization of public hearings, and the presentation of accountability reports to society in general. Culau and Fortis (2006) indicate that transparency is indispensable to good governance since it permits citizens to have access to information concerning the management of public assets.

According to Souza et al. (2009, pg. 12), transparency in public administration entails impeding both current and future inappropriate actions, such as the undue use of public funds by governing or administrative entities, which increases citizens' access to public information concerning a variety of issues. This will build a democratic country within which each part of society is able to successfully carry out social control, contributing to a more efficient and effective public administration. Along these lines, Sacramento and Pinho (2007) state that transparency is associated with accountability and it provides for greater trust between citizens and their government, aiding in the reduction of corruption in public offices and building a more democratic relationship between the state and civil society.

Stemming from this, it can be gathered that transparency makes it possible to access any information about how a given government functions. It is said that public administration is transparent in as much as it operates openly, based on ethical principles, and is capable of being questioned at any time as a function of the ease of access to information available to citizens and other interested parties. It can be measured by way of how decisions are made and by the efficiency of the means of interaction between the government and society overall. As the study seeks to analyze this topic

within the realm of African countries, the following section of this theoretical framework presents several studies, which, in broad terms, discuss the concept within that region.

Previous works on transparency in African countries

Witvlet et al. (2013) carried out a study that sought to explore the association between a nationwide perception and the precariousness of health in different layers of society. By way of a multilevel logistical regression model, these authors analyzed data collected in a worldwide study concerning 72,524 adult residents of 20 African nations, seeking to establish a relationship between health issues and perception of corruption within them while taking into account individual considerations, as well as the Human Development Index (HDI). Witvlet et al. (2013) conclude that the perceived national corruption in the 20 countries sampled is associated with precariousness, in general, of men's and women's health, across all socioeconomic rungs, with a higher incidence among the less educated. The authors made a case for more studies, on more countries, to evaluate the magnitude at which corruption and the lack of public transparency bear relevance to a nation's health.

In another study, Smith et al. (2012) critically analyzed the nature and quality of governance in community representation, and the role of civil society in the panorama of transnational mining operations, based on the case of the Anosy region, in Southeast Madagascar. The authors referred to an analysis of the relationship between the government, the mining company, and the local communities, which revealed a lack of legitimacy on part of the civil society actors nominated by the government to defend the interests of community residents in the region home to the mining company, contributing to their loss of power. This work engendered a debate on transparency and governance within mineral extraction companies in African countries home to abundant mineral wealth, based on a case study on Madagascar, given that the study outlines political perspectives concerning interactions between societies on the whole and its formal institutions, with a focus on transparency. Smith et al. (2012) concluded that it is necessary that the government not manipulate civil society, so that it can effectively defend the interests of the inhabitants of Anosy, and that the mining company complies with its corporate social responsibility as proposed by the Initiative for Transparency in Extractive Industries (EITI).

Finally, McFerson (2009) completed a study with the objective of reflecting on corruption and the lack of public transparency in resource-rich African countries, such as Angola, Congo, Gabon, and Nigeria. McFerson's recom-

mendation was that the mechanisms brought forth by the Initiative for Transparency in Extractive Industries (EITI) be adopted, obligating governments to publically disclose any funds received and payments made by this companies (taxes, fees, etc.) resulting from the exploitation of mineral and oil resources. The author concluded that, should these companies make what they pay public, and the governments in question do the same in respects to the payments they receive, these nation's civil societies will have the opportunity of comparing the data and, in the event of the misuse of said funds, hold their governments responsible.

Transparency aspects in African countries

Table 1 organizes the sampled articles according to year, author, objectives, results/conclusions, and the aspects of transparency presented in the work (i.e. the models and approaches utilized in the study).

RESEARCH METHODOLOGY

In terms of methodological framing, this study is characterized as descriptive as it aims to describe the traits of a given population or phenomenon, and its inter-relationships, in accordance with Gil's (1999) definition. The population taken into consideration is the collection of articles resulting from the survey carried out in the research, and the phenomenon of interest is the methodological makeup of the research outlined in the sample. The relationships established between variables within the population are based on the methodologies previously utilized by researchers in the same field, following the analysis proposal developed by Lyrio et al. (2013).

A quantitative approach is adopted to address the problem, as well as statistical analysis to "[...] guarantee accuracy in the results, avoiding distortions in analysis and interpretation, allowing for a degree of certainty in the inferences" (Richardson, 1999, pg. 70). The data generated by the survey were examined using Excel® spreadsheets, given the expectation that the way that the data were gathered be described and, possibly, replicated, as Bryman (1998) asserted quantitative studies must be. In terms of technical procedures, the study is described as documentary (Gil, 2007; Richardson, 1999) since it was made up of articles selected for examination.

The study was implemented by mapping out the Scopus, *Portal de Periódicos CAPES*, and Web of Science databases, comprising the period 2001-13. Despite the fact CAPES journal database is not largely known in other countries, it was used as mapping object in the study because it is the most-widely used database in Brazil, employed in various studies. The methodological procedures proposed by Lyrio et al. (2013), taking into account that they had already been validated by the scientific community, were put into practice, with a particular focus on public transparency in the case of Africa. The time frame was selected so as to encapsulate the first decade of the 21st century, in congruence with the existing article used as a reference point.

The selection of the articles sampled in the study was done by way of a structured, non-purposeful survey, in four stages. In order to identify the research population, the key word 'public

Table 1. Aspects of transparency in African countries.

Year	Author	Objective	Results	Transparency aspects presented (models, approaches used)
2001	McCormic	Explore the process of liberalization of the telecommunications sector in Botswana.	The study recommends that African countries adopt the same strategy of Botswana to liberalize the telecommunications sector.	<ul style="list-style-type: none"> • Public governance • Qualitative approach • Case study
2004	Nel and Lekalake	Analyze the transparency of monetary policy of South Africa in the light of the WB and IMF codes.	It is necessary to clarify the functions of the South African Reserve Bank; The South African Reserve Bank should make public their meeting minutes.	<ul style="list-style-type: none"> • Public governance • Quantitative approach • Descriptive method
2005	Deininger, K. and Mpuga, P.	Explore how accountability and transparency can improve the quality of public services.	The econometric results of the study suggest that a better knowledge of how to report bad behavior by civil servants can help reduce not only bribery, but also improve the quality of public services.	<ul style="list-style-type: none"> • Public governance • Quantitative approach • Descriptive method
2007	De Grauwe, A. and Lugaz, C.	Examining the challenges that a core actor in education, namely the education district staff, faces in a context of decentralization in four West African countries.	The study argues for stronger autonomy in the management of financial and human resources by school directors and some limited forms of community empowerment, reflecting the lack of support and control from the government, especially in rural and remote areas.	<ul style="list-style-type: none"> • Public governance • Quantitative approach • Descriptive method
2009	NAPM	Analyze transparency in the generic medications market in South Africa.	Advocates for the creation of a price committee that could serve to promote transparency in medicine pricing structure, so that patients not be harmed by the wave of price speculation.	<ul style="list-style-type: none"> • Public governance • Quantitative approach • Descriptive method
2009	Mutula, S. and Wamukoy, A. J. M.	Overview of information management in the public sector in countries of the East Africa and South.	The study suggests that, for the fortification of democracies in Africa, accountability and the transparency, it is essential to make reforms designed to guarantee the right of access to information for citizens and of mechanisms to require public institutions to disclose this information on their websites.	<ul style="list-style-type: none"> • Public governance • Quantitative approach • Descriptive method
2009	Mcferson, H.	Analyze transparency in African countries dynamically.	The companies publish the amounts they pay as taxes to governments and that these in turn disclose this information to ensure that civil society hold their governments to account in case of bad management of these resources.	<ul style="list-style-type: none"> • Public governance • Quantitative approach • Descriptive method

Table 1. Contd.

2009	Omar, M.	Analyze the urban governance and the quality of service delivery in Municipalities of Nigeria.	Recommends the strengthening of transparency and accountability to citizens and improved relations between the citizens of the cities and local governments.	<ul style="list-style-type: none"> • • • 	<ul style="list-style-type: none"> Public governance Qualitative approach Case study
2010	Singh, G. et al.	Reflect on e-government in the provision of public services: case Ethiopia	The study concluded that there is a high level of perception that the introduction of the electronic platform e-Government can improve the provision of public services and consequent reduction of corruption.	<ul style="list-style-type: none"> • • • 	<ul style="list-style-type: none"> Public governance Quantitative approach Survey method
2010	Tshamdu and Kariuki, S.	Reflect on the contours of public administration reform after Apartheid in South Africa.	The authors state that the assumptions that were at the origin of the adoption of the New Public Management have not been achieved, because public institutions are not efficient and effective.	<ul style="list-style-type: none"> • • • 	<ul style="list-style-type: none"> Public governance Quantitative approach Descriptive method
2010	Osei, T. et al.	Analyze the practices of corruption in the public contracts in infrastructures projects in Ghana.	The study states that a downgrading of the law governing public bids has contributed to the lack of transparency in this sector.	<ul style="list-style-type: none"> • • • 	<ul style="list-style-type: none"> Public governance Quantitative approach Descriptive method
2011	Fouda, A.	Analyze transparency in the extractive industries of Central Africa.	The survey recommends that the countries of this region enact a transparent management of revenues from oil exploration in order to reduce social tensions and improve economic performance.	<ul style="list-style-type: none"> • • 	<ul style="list-style-type: none"> Quantitative approach Econometric method
2011	Clarke, G.	Analyze the impact phenomena, stemming from corruption, cause in the accounts of African companies.	The surveyed companies between 2005 to 2007, in 15 countries where the study took place, reported spending between 2% to 5% of their sales on payment of bribes for the acquisition or renewal of their licenses.	<ul style="list-style-type: none"> • • 	<ul style="list-style-type: none"> Quantitative approach Survey method
2012	Bowen, P. et al.	A thematic analysis on corruption in the South African construction industry.	The South African construction industry (particularly its statutory professional councils and contractor affiliation bodies), together with public sector agencies and private sector client associations, should collaborate to adopt a more proactive stance against corruption, and be more engaged with detecting and reporting it.	<ul style="list-style-type: none"> • • 	<ul style="list-style-type: none"> Quantitative approach Survey method
2012	Elbadawi, I. A et al.	The study investigates the relationship between foreign and assisted development, the exchange rate and economic growth in sub-Saharan Africa countries.	The study found that aid promotes economic growth, but its impact is negative in many countries of sub-Saharan Africa due to lack of transparency and the participation of all interested parties in the development process.	<ul style="list-style-type: none"> • • 	<ul style="list-style-type: none"> Quantitative approach Econometric method

Table 1. Contd.

2012	Smith, S. et al.	Analyze critically the nature of relations between government, mining companies and communities of Anosy region in Madagascar.	The authors concluded that civil society members named to defend the interests of local communities are abused by the government; mining companies do not comply with corporate social responsibility codes.	<ul style="list-style-type: none"> • • 	<ul style="list-style-type: none"> • Quantitative approach • Econometric method
2012	Walker, H. and Brammer, S.	This study examines the relationship between sustainable procurement and e-procurement, two recent initiatives in public procurement in many countries.	The study concluded that the E-procurement and communication with suppliers might help environmental, labor, health and safety aspects of sustainable procurement. Conversely, e-procurement may hinder buying from small local firms that are not e-enabled.	<ul style="list-style-type: none"> • • 	<ul style="list-style-type: none"> • Quantitative approach • Survey method
2013	Witvliet, M. et al.	Detail corruption and precariousness in public health in 20 African countries.	The study says that the national perception of corruption in the countries studied is associated with a higher prevalence of health problems;	<ul style="list-style-type: none"> • • • 	<ul style="list-style-type: none"> • Public governance • Quantitative approach • Econometric method
2013	Dea, M. et al.	Analyze the dominant logic in government procurement from lessons learned from Ghana.	The study recommends that the Ghana enter public bidding law reforms with a view to minimize the lack of transparency in government procurement.	<ul style="list-style-type: none"> • • • 	<ul style="list-style-type: none"> • Public governance • Qualitative approach • Case study

Source: Survey data.

transparency' was searched for under the "All Text" field in each of the databases previously mentioned. This initial search produced 14,123 results, of which not all were necessarily related to the present research topic.

Following this, the data were refined. A second key word was used – 'Africa' – in the Refine Search field, modifying the results of the initial search. Following this initial filtering, 1,654 articles remained, all of which dealing in some way with the topic of public transparency as well as Africa. From that point, results were subsequently filtered manually, by way of the deletion of articles not falling within the established timeframe of 2001-13, which yielded 65 remaining articles.

Finally, in the fourth stage, each of these article's abstracts were read and checked for relevance, leading to the removal of 42 more articles from the sample.

After these four stages, 23 articles made up the research sample, and each was read in its entirety so as to frame it within the study's analysis criteria, keeping with Lyrio et al.'s (2013) proposal. Within the authors' criteria, the following were employed:

- a) Sector: regards the discipline in which the study was completed;
- b) Approach: refers to the approach utilized in the development of the study, meaning, one of either qualitative, quantitative, and quali-quantitative approaches.
- c) Method: deals with the research methods used in the study.

PRESENTATION AND ANALYSIS OF RESULTS

This section presents and discusses the results obtained

during research. Initially, there is an analysis of the selected articles in the databases Scopus, *Portal de Periódicos Capes* and Web of Science. Following this, the activity sectors making up the study and the research approaches adopted, and methods used, by various authors in related fields were analyzed. Finally, the results of the study are summarized and discussed.

Presentation of findings

The survey carried out in the Scopus, *Portal de Periódicos CAPES*, and Web of Science databases produced a sample of several previous studies related to the present work's topic. These are examined in this section, in accordance with the criteria stated in the section related to research methodology. Figure 1 represents the proportional representation of the activity sectors about which the sampled articles were composed.

The data showed that the larger portion of the previous studies (52.4%) deals with transparency within public administration in general, rather than in application to specific activity sectors. In this way, 12 works dealing with public administration that envision good governance and citizens' access to information were identified (Mpuga, 2005; Omar, 2009; Willet, 2009; McFerson, 2009; Wamukoya, 2009; Osei-Tutu 2010; Singh et al.,

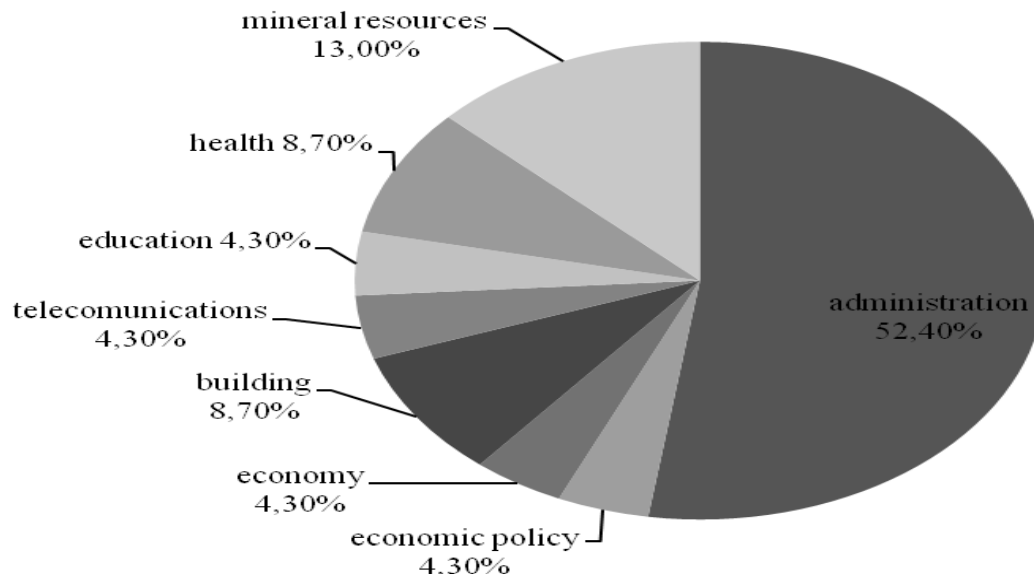


Figure 1. Activity sectors. Source: Survey data.

2010; Kariuki, 2010; Clarke, 2011; Hu; Lin, 2011; Brammer, 2012; Dea et al., 2013).

The remaining works were based on the notion of transparency as a guide for promoting economic efficiency. Along these lines, Elbadawi et al. (2012) studied the relationship between outside (i.e. foreign) aid and the transparent management of the same, with the goal of promoting economic growth in Sub-Saharan Africa, given that, currently, the impact of such programs is insignificant. This results from the lack of a total participation on part of all parties affected by the development process. Nelake and Lekalake (2004) refer to transparency in South African monetary policy, recommending that its methods be improved by way of an adherence to World Bank (WB) and International Monetary Fund (IMF) codes. Finally, McCormick (2001) highlights the political liberalization of telecommunications in Botswana, suggesting that other African nations adopt the same model of transparency within their own telecommunications sector reforms, as a way of ensuring the participation of domestic users while also protecting their interests.

The studies concerning the mineral resources sector report elevated levels of corruption and largely opaque processes underlying exploration licensing. Smith et al. (2012) comment on the perspective of local representation in extractive resources, basing their findings on the situation examined in Madagascar. The authors state that such circumstances as those found in Madagascar are results of the manipulation of civil society members, designated by government officials, which threatens the

interests of communities surrounded by mining companies. McFerson (2009) writes on hypercorrection and a lack of transparency in African nations rich in natural resources such as Angola, Congo, Gabon and Nigeria. McFerson recommends that the Initiative for Transparency in Extractive Industries (ITIE) guidelines, which obligate governments to make public any payments or collections received from companies (taxes, fees, etc.) in mineral or petroleum extraction activities, be made public. Fouda (2011) seeks, through his research, to make a connection between the increase in state revenues originating from petroleum exploration and the growth of generalized corruption in mineral-rich Central African nations, stating that a decrease in social conflicts would occur, should those countries prioritize transparency in managing those funds.

Regarding the studies on the health sector, Witvliet et al. (2013) illustrate that the perception of national corruption levels has an effect on a country's health situation. This research was completed in 20 African countries, using the International Corruption Perception Index (ICPI) to show that a lack of transparency in the health sector and generalized corruption are linked to health system deficiencies, across all socioeconomic levels in the countries examined. In its own analysis, the National Association of Pharmaceutical Manufacturers (2009) studied transparency in pricing structures of generic medications combating infectious diseases such as HIV/AIDS and tuberculosis, with the hopes that patients being treated for these diseases might not have to pay speculative prices. The Association advocates for

the creation of a price committee that would serve to promote transparency in medications pricing.

Bowen et al. (2012) completed a thematic analysis on participative research within the civil construction sector. The authors describe the degree of corruption in sub-Saharan Africa civil construction industries, exploring the nature and scope of this phenomenon, and going on to state the need for creating a Corruption Authority to regulate public works contracting in this region of the continent. Concurrently, Osei-Tutu (2010) analyze the practices inherent in public contracts related to infrastructure construction in Ghana, with a focus on the economic gains made possible through transparency in such civil projects. The only article related to the education sector present in the sample (Lugaz, 2007) reflects on the challenges stemming from the process of decentralization in Benin, Guinea, Mali, and Senegal. The authors draw the conclusion that, with increased autonomy, schools must counterbalance the augmented power of their (local) directors in terms of human and financial resources, which could be possible through clear accountability norms.

To better understand the characteristics of the sampled article's research methodologies, it is necessary to first identify the approaches employed by their authors: qualitative or quantitative. It was noted that, as shown in Figure 2, quantitative approaches are predominant in the works examined.

Within those using quantitative approaches, nine articles were selected for their descriptive characteristics (Nelake and Lakalake, 2004; Lugaz, 2007; McFerson, 2009; Mutula, and Wamukoya 2009; Osei-Tutu, 2010; Kariuki, 2010; Brammer, 2012; Gujba et al., 2012). In the six works that used a quantitative approach, the econometric method was also represented (Witvliet et al., 2013; Smith et al., 2012; Elbadawi et al., 2012; Fouda, 2011; Deininger, 2005). In addition, five articles carried out survey research (Singh, G. et al., 2010; Clarke, 2011; Gujba et al., 2012; Bowen et al., 2012; Paul, 2013). No article recounting a use of an experimental method was found.

Among the qualitative studies, there was a predominant incidence of case study methods, appearing in three articles (McCormick, 2001; Omar, 2009; Dea et al., 2013). One study was completed using a critical analysis of a speech (Hu; Lin, 2001). Figure 3 presents the proportional distribution of research methods used by the authors of the sampled articles.

The descriptive method stands out among those used by the authors. Deininger and Mpuga (2005) used econometric research to analyze the ways in which transparency might improve the quality of public services. Tshamdu and Kariuki (2010) write on public administration reforms in South Africa following the end of apartheid in 1994. Mutula and Wamukoya (2009) describe informa-

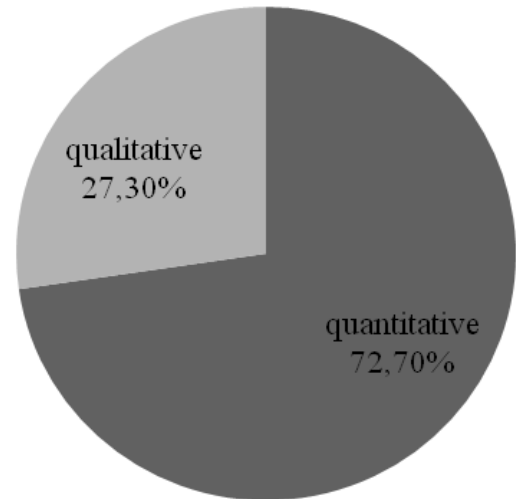


Figure 2. Research approaches. Source: Survey data.

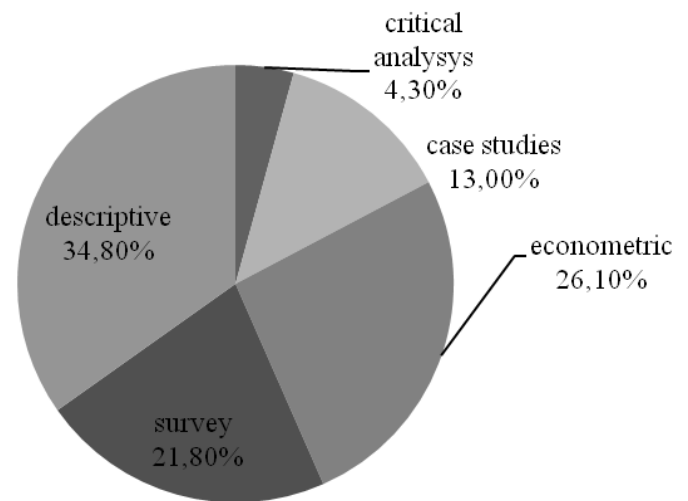


Figure 3. Research methods. Source: Survey data.

tion management in the public sector in East and Southern Africa, including the implications that this process bears in terms of the transparent use of public resources. Nelake and Lakalake (2004) analyze the degree of transparency in monetary policy in South Africa. De Grauwe and Lugaz (2007) discuss autonomy, professionalism, and accountability reporting process in the context of education sector reforms in Benin, Guinea, Mali, and Senegal. McFerson (2009) analyzes governance and hypercorruption in mineral-rich African nations. Osei-Tutu (2010) write on practices inherent in contracting public works and infrastructure projects in Ghana. Walher and Brammer (2012) illustrate relationships

between sustainable acquisitions and 'e-procurement' in the realm of the public sector. Finally, Gujba et al. (2012) draw conclusions regarding the politics of access to energy in Africa.

Econometrics is the second-most frequent research method observed in the selected works. Witvliet et al. (2013) utilize this method to study the degree of corruption perceived in 20 African countries, and its effect on health problems in those populations. Smith et al. (2012) used this method to analyze a variety of perspectives in terms of the representation of community interests in extractive industries in southeast Madagascar. Elbadawi et al. (2012) illustrate the potential influence of transparency in the management of foreign aid, steering it towards economic efficiency and a greater participation in development processes by concerned parties. Finally, Fouda (2011) used econometrics to study transparency within extractive industries' value chains in Central Africa.

As to the survey method, Singh et al. (2010) sought to explore how "e-government" can improve performance in public services in Ethiopia. Bowen et al. (2012) used questionnaires to analyze commentaries on corruption levels in construction industry in Southern African nations. Further, Paul (2013) carried out survey research to draw conclusions on the water privatization process currently taking place in various African nations. Lastly, Clarke (2011) made use of the survey method to elaborate on corruption in Africa.

Case studies were observed in just three articles. McCormick (2001) wrote on reforms that culminated in the privatization of the telecommunications sector in Botswana, in attempts to understand up until what point the process was advantageous to the country, and what lessons might be taken from the example so as to promote transparency and domestic user rights, suggesting the creation of an oversight authority to regulate competition within the sector. Omar (2009) sought to outline the ways in which a lack of transparency puts social services at risk in Nigerian municipalities. Finally, Dea et al (2013) sought to present major logical arguments evidenced in public acquisitions, based of lessons learned in Ghana. Through a critical analysis, Hu and Lin (2011) evaluated oversight and informational transparency in African governmental reporting.

Analysis of results

Following the presentation of the data gathered, the results of the study are presented here. Regarding activity sectors, the study demonstrated that previous research in this field deals mainly with public administration, which account for 52.4% of the articles sampled. More specifically, the study shows that the most-represented sectors are health and civil construction,

each one representing 8.7% of the sample.

Among prevalent research methods, the descriptive method was shown to be the predominant one as it represented 34.8% of the articles examined. Following this, econometric methods held 26.1%, while survey methods, 21.8%. Concerning the qualitative approach, there was a predominance of case studies at 13%, and 4.3% of the sampled articles adopting the critical analysis methodology. The similarity between the findings of this present work and the results of Lyrio et al.'s (2013) research is noteworthy, as they too, identified frequent use of econometric methods in studies conducted on public budgets. This congruence might suggest that researchers working in the field of public administration tend to use these methods to work towards answering their research questions, given that econometrics stands out in both budgets and public sector transparency articles, in the case of Africa as well as that of Brazil. From that, it is evident that, in studies concerning public transparency in the African scenario, the predominant approach is quantitative incorporating statistical analysis to identify trends in the data. Regardless, the articles making up the survey sample of this study could not explain whether the lack of transparency in African countries was the prevailing cause of poor service in public administration, if it is due to inefficient public institutions, or if it results from low education levels in some countries, which prevents oversight in government's activities. This missing link might provide course for further research in this field.

Final considerations

This study sought to analyze the methodological profile of academic research regarding public transparency in the African scenario. The research question that drove the study was: *what is the current state of the research methodologies employed in academic research on public transparency in Africa?* To meet this objective, a survey of academic articles was compiled, searching in the Scopus, *Portal de Periódicos CAPES*, and Web of Science online databases, with the results limited to the time period of 2001-13. In this way, sectors of interest, approaches, and methods contained within the existing research were selected.

Within the data analyzed, it was found that 52.4% of the articles sampled deal with public transparency in general, without concerning a given sector in particular. Also, a strong tendency towards a utilization of the quantitative approach while carrying out research in this field was observed, accounting for 72.7% of the sample. In terms of the methods used by the researchers examined, the descriptive method was shown to be the most frequent, representing 34.8% of the sample.

Taking this all into account, it is concluded that the

research question was answered, in as much as the specific objectives of the study were reached. A limitation, in the context of the present work, is the fact that it did not compare its findings to those of studies completed on public transparency in other scenarios. For further research, the author recommends a study on methodological trends in studies on public transparency in parallel circumstances or continents, such as the Americas or Europe, with the goal of establishing comparisons between the results.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Effects of microfinance services on the performance of small and medium enterprises in Kenya

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The Micro, Small and Medium Scale Enterprises (MSMEs) sector in Kenya has grown tremendously over the last two decades but its growth is characterized by low productivity and survivalist enterprises. The sector is however very strategic in providing future employment for the economy. This paper reviews the effects of microfinance services on the performance of MSMEs using an explanatory research design. The study targeted 429 MSMEs registered by the Kiambu Municipal Council and sampled 270 enterprises. The study utilized multiple regression analysis set draw inferences on the study using SPSS statistical package. The study found access to savings schemes, managerial training and loan grace period to be statistically significant in determining the performance of MSMEs. This study concludes that increasing provision levels of micro finance will result in increased performance of micro enterprise. The study makes recommendations for microfinance service providers and policy development partners.

Key words: Microfinance, MSMEs, enterprises, performance, financial services.

INTRODUCTION

The Consultative Group to Assist the Poor (CGAP) defines a Microfinance Institution (MFI) as an organisation that provides financial services to the poor in the form of credit, savings and insurance. Microfinance is also defined as provision of small-scale financial services to the low-income people (Robinson, 2001; Nair, 2001). Financial services provide the poor an opportunity to improve their livelihoods and, alongside with social services, can contribute to poverty reduction. People living in poverty, like everyone else, need a diverse range of financial services to run their businesses, build assets, smooth consumption, and manage risks (CGAP, 2012).

The microfinance industry was borne primarily out of a desire to help the world's vulnerable and poor (Campion

et al., 2008). Over the years, following numerous studies and models, it has become clear that the poor are actually bankable. Thus the microfinance industry today forms an integral part of the formal financial sector in many countries around the world. By 2006 there were more than 133 million microfinance clients, 70% of whom were among the world's poorest people (Campion et al., 2008). Providers of financial services who enable people to cross such a poverty line have focused on credit, in particular credit for small enterprises, including agricultural production (Johnson and Rogaly, 1997).

The ability to both borrow and save with an MFI may increase micro entrepreneur's profits through lower interest rates and access to appropriately designed loan

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products. This also improves their ability to manage working capital needs through borrowing and savings at different times as required (Ledgerwood, 1998). MFIs that target potential entrepreneurs often have poverty alleviation as an objective. The belief is that by aiding potential entrepreneurs to start up their own businesses, they will increase their incomes and consequently reduce their level of poverty. Most MFIs prefer to focus on existing businesses, with perhaps a small portion of their portfolio invested in start-up businesses, thereby reducing their risk horizon (Ledgerwood, 1998). However, potential entrepreneurs often need more than financial services. Many need skills training or other inputs to make their enterprises a success (Ledgerwood, 1998).

According to the Kenya Micro and Small enterprises bill, 2006, micro and small enterprises are defined as enterprises in both formal and informal sector, classified in farm and non-farm categories, employing not more than fifty employees and have a turnover not more than four million shillings. Small and medium enterprises in Kenya contribute between 18-25% to the country's GDP and employ over about 17% of the total labour force in Kenya, (CBS, ACEG and KREP Holdings, 1999). Most small business enterprises are self-financed or financed by loans from family or other informal sources. Small and medium enterprises in Kenya make a contribution for between 18-25% to the country's GDP and employ over about 17% of the total labour force in Kenya (CBS, ACEG and KREP Holdings, 1999).

Kenya has a developing economy, agriculture being the chief economic activity. Most people in Kenya work in agricultural sector. Some practice subsistence farming while a very small number practice large-scale farming. Some people work as wage labourers in coffee farms or tea plantations. They depend on the small wages and life become rather unbearable at times. For those who practice small scale farming, their source of income is mainly from the sale of the farm produce. Some are engaged in small businesses such as the selling of agricultural goods in market places while others trade in livestock and selling of milk. There are all sorts of small businesses related to agricultural sector.

Kenyan microfinance has shown resiliency despite local droughts and high inflation rates that afflicted the economy in 2008 and 2009. With the Kenyan government and the Central Bank of Kenya (2005) emphasizing financial access as a key to modernizing the economy, the sector has been strengthened by progressive policies and innovative approaches to delivering financial services. A large deposit base, along with the existence of well-developed MFIs, has allowed financial and operational expenses to remain relatively low and has led to some of the highest profitability measures in the region.

The purpose of the study was to assess the contribution of microfinance institutions to the performance of the economically active low income traders in Githurai market, Kiambu County, Kenya, through delivery of microfinance products and services.

As with many developing countries, there is limited research and scholarly studies on the contribution of the MFIs to the growth of the economy. It is generally recognized that small businesses face unique challenges in their financing and management structure, which affect their growth and profitability and hence, diminish their ability to contribute effectively to sustainable development (Mead, 1998). The general objective of the study was to find out the effect of microfinance services on the performance of micro, small and medium enterprises in Githurai market.

LITERATURE REVIEW

SMEs (Small and Micro-enterprises) within the manufacturing sector have not seen much development since independence due to financial constraints and other factors. *Jua Kali* Sector, a Kiswahili term for a hot sun, comprises low scale artisans who mostly apply appropriate intermediate technology. This sector, given all conditions for growth can bring about industrial revolution in Kenya. The phrase itself can tell it all.

Micro and small enterprises have potentiality of boosting economic growth. Although they are faced with many challenges, they still have opportunities to grow. These include linkage with multinational companies, networks with other businesses, diversification of market and products, enabling environment and franchising opportunities. Such opportunities, if well utilized by the micro and small enterprises, can turn around their future in many developing countries (Wanjohi and Mugure, 2008).

Small businesses tend to have a poor collateral base and therefore get excluded from the credit market (Kimuyu and Omiti, 2000). Among other reasons for poor access to credit facilities are lack of information of credit sources, weak contract enforcement mechanisms and high transaction costs (Farchamps et al., 1994). Credit access for business expansion and capital investment are out of reach for MSMEs for the same reasons given above.

According to the CBS, ACEG and KREP Holdings (1999) many Small and Medium Enterprises (MSMEs) commence business while undercapitalized and this suggests major operational difficulties and problems in accessing credit. Unlike larger enterprises, MSMEs require less capital though such business owners are unlikely to belong to high income households and have low savings (Kimura, 1999). For 80% of MSMEs their main source of capital was personal savings (CBS, ACEG and KREP Holdings, 1999) and 19% from family contributions and sale of personal assets. Only a very small percentage of SME owners have access to credit for start-up. Eventually when these MSMEs commence business they encounter the challenge of working capital and this was where credit access plays a big role. Performance is a widely used concept in many areas. In

enterprise management, Moullin (2003) defines an organization's performance as "how well the organization is managed" and "the value the organization delivers for customers and other stakeholders." Measuring performance is a multi-dimensional concept. Effectiveness and efficiency are the two fundamental dimensions of performance (Neely et al., 2002). Performance of small businesses is defined as their capability to lead to the creation of employment and wealth by business start-up, survival and sustainability (Sandberg et al., 2002).

The URT MSMEs policy recognizes that MSMEs are confronted with unique problems including heavy costs of compliance resulting from their size. Other constraints include insufficient working premises and limited access to finance, Business Development Services, namely services related to entrepreneurship, business training, marketing, technology development and information are undeveloped and not readily available. MSMEs lack information as well as appreciation from such services and can hardly afford to pay the services. As a result, operators of the sector have rather low skills. Institutions and associations supporting SMEs are weak, fragmented and uncoordinated partly due to lack of clear guidance and policy for the development of the sector (URT, 2003).

A study by Amin et al. (2003) used a unique panel dataset from northern Bangladesh with monthly consumption and income data for 229 households before they received loans. They found that while microcredit is successful in reaching the poor, it is less successful in reaching the vulnerable, especially the group most prone to destitution (the vulnerable poor). Coleman (1999) also finds little evidence of an impact on the programme participants. The results, Coleman further explains, are consistent with Adams and von Pischke's assertion that "debt is not an effective tool for helping most poor people enhance their economic condition" and that the poor are poor because of reasons other than lack of access to credit.

According to Mosley (1999), microfinance makes a considerable contribution to the reduction of poverty through its impact on income and also has a positive impact on asset level. But the mechanism through which poverty reduction works varies between institutions. Generally, institutions that give, on average, smaller loans reduce poverty much more by lifting borrowers above the poverty line, whilst institutions giving larger loans reduce it much more by expanding the demand for labour amongst poor people. Hulme and Mosley (1998) found evidence of a trade-off between reaching the very poor and having substantial impact on household income. They found that programmes that targeted higher-income households (those near the poverty level) had a greater impact on household income.

Mosley (2001), in his research on microfinance and poverty in Bolivia, assessed the impact of microfinance on poverty, through small sample surveys of four microfinance institutions. Two urban and two rural, using a range of poverty concepts such as income, assets

holdings and diversity, and different measures of vulnerability. All the institutions studied had on average, positive impacts on income and asset levels, with income impacts correlating negatively with income on account of poor households choosing to invest in low-risk and low-return assets. The studies revealed also that in comparison with other anti-poverty measures, microfinance appears to be successfully and relatively cheap at reducing the poverty of those close to the poverty line. However, it was revealed to be ineffective, by comparison with labour-market and infrastructural measures, in reducing extreme poverty.

Nichols (2004) used a case study approach to investigate the impact of microfinance upon the lives of the poor in the rural China and found that the participation of poor in MFI program had led to positive impact in their life. Aczel (2000) conducted a study in Thailand on the role of microfinance in supporting micro entrepreneurial endeavor. The findings of the study indicated that the involvement of microfinance institutions in promotion of micro enterprise and processing industry plays a key role in economies of developed countries as a source of goods and services, income, savings and employment. Mochona (2006) studied the impact of microfinance in Addis Ababa-Ethiopia. He assessed the impact of microfinance on women micro enterprises that were clients of Gasha Microfinance Institution. The research findings indicated that only a few of the women clients of the Gasha Microfinance Institution reported increased incomes from their micro enterprise activities. Rahmat and Maulana (2006) researched on the Impact of Microfinance to Micro and Small Enterprise's Performance Indonesia.

Bowen et al. (2009) researched on Management of business challenges among small and micro enterprises in Nairobi Kenya. The findings of the research indicated that over 50% of MSMEs continue to have a deteriorating performance with 3 in every 5 MSMEs failing within months of establishment. K'Aol (2008), in his research paper on the role of microfinance in fostering women entrepreneurship in Kenya, assessed the impact of Microfinance funding on women entrepreneurship in Kenya. The population consisted of women entrepreneurs who had benefited from four major Kenya Rural Enterprise Program (K-REP) microfinance schemes within Nairobi and Nyeri. The findings revealed that most of the respondents in this study reported that their business had expanded and their house hold income had increased significantly as a result of having taken microfinance loans from K-REP. Simeyo et al. (2011)'s study revealed that loan provision, training and saving mobilization had the largest significant effect on performance. This study will utilize Simeyo (2011)'s framework that savings mobilization, access to capital and managerial training impacted positively on MSMEs performance in Kenya.

Research has shown that access to external finance was the most significant factor contributing to the growth

of small firms (Brown et al., 2003). Furthermore, the majority of SMEs have been found to be heavily dependent on bank finance (Norton, 2003; Group of Ten, 2001) and Kenya MSMEs are not the exception.

Many MSME owners or managers lack managerial training and experience. The typical owner or managers of small businesses develop their own approach to management, through a process of trial and error. As a result, their management style is likely to be more intuitive than analytical, more concerned with day-to-day operations than long-term issues, and more opportunistic than strategic in its concept (Hill, 1987). Although this attitude is the key strength at the start-up stage of the enterprise because it provides the creativity needed, it may present problems when complex decisions have to be made. A consequence of poor managerial ability is that MSME owners are ill prepared to face changes in the business environment and to plan appropriate changes in technology. Majority of those who run MSMEs are ordinary lot whose educational background is lacking. Hence they may not be well equipped to carry out managerial routines for their enterprises (King and McGrath, 2002).

In order to achieve the objectives of the study, the following hypotheses were formulated;

H_0 : Access to credit has no effect on the performance of micro, small and medium enterprises in Kenya.

H_0 : Managerial training has no effect on the performance of micro, small and medium enterprises in Kenya.

H_0 : Savings mobilization has no effect on the performance of micro, small and medium enterprises in Kenya.

METHODOLOGY

This study adopted explanatory research design in investigating the effect of microfinance services on the performance of small medium micro enterprises in Kiambu county Kenya. Explanatory research design was chosen because in business research, the cause-effect relationship is less explicit (Cooper and Pamela, 2006). The target comprised the 429 MSMEs registered with Kiambu Municipal Council and operating within the Githurai Market. The MSMEs in Githurai Market largely deal in shoes, new clothes, Mitumba (imported used cloths), green vegetables, various accessories, fruits and consumables. Stratified random sampling technique was used in deriving the desired sample of 270 MSMEs.

The study relied on primary sources of data using structured questionnaires which were self-administered to owners of the MSMEs to gather primary quantitative data. The five-point-Likert scale questionnaire was divided into five sections: demographic information, access to credit information, managerial training, savings mobilization and performance of MSMEs. Data on access to credit was measured through respondents' perception on whether it was easy to access loans from micro finance institutions. Data on savings mobilization was obtained using the five point scale Likert questionnaire where respondents' satisfaction was measured. Data on managerial training focused on the three key business acumen skills namely capital investment decisions, basic business skills and risk management skills. The performance of MSMEs was measured using the growth in income. The research study was carefully planned to ensure all ethical standards are met and that the chances of misleading results were

minimized.

Descriptive and inferential statics were used in data analysis. Multiple linear regression analysis was used to establish the relationship and magnitude between micro finance services (independent variables) and performance of micro enterprise (dependent variable) where SPSS statistical package was used for this purpose. This analysis was based on the Simeyo et al. (2011)'s model which is specified as follows:

Micro enterprise performance = f (Loan, Savings mobilization and Training)

Thus, the model $ROA = \alpha + \beta_1LS + \beta_2SM + \beta_3MT + \epsilon \dots \dots \dots 1$

Where, ROA – Micro enterprise performance, measured by growth in ROA,

α – Constant (autonomous performance),

LS – Access to credit,

SM – Savings mobilization,

TM – Managerial training

$\beta_1, \beta_2, \beta_3$ – Coefficients of the independent variables and ϵ – Error term.

RESULTS

Out of 270 questionnaires distributed 243 of them were received and used for analysis, which was a 90% response rate. Out of these, 243 were found usable for the study and 10 questionnaires were discarded due to incompleteness and large number of missing values. The majority (51.3%) of the respondents fell within the 31- 40 years age bracket, 25.3 per cent were below 30 years while 23.4% were over 40 years of age. 34% of the respondents were male and 66% of the respondents were female owners of micro and small enterprises which is a reflection of the target population.

On education, the majority of the respondents (45.6 %) completed secondary school followed by those who had completed primary education (35.1%). Only a small proportion of the respondents had acquired college (16.8 %) or university level (2.5%), showing low levels of education among the MSMEs owners and managers.

Pearson correlation coefficient was used to determine the strength and direction of association between provision of micro finance and performance of MSMEs (Table 1).

From the results all correlations are significant ($P < 0.01$). The correlations 0.947, 0.945 and 0.945 show a strong positive relationship between access to credit, savings mobilization and training respectively (as independent variables) and performance (as dependent variable). It was also necessary to check the possibility of multicollinearity between predictors. The correlations among the independent variables (predictors) are less than 0.900, indicating absence of collinearity (Field, 2005).

Multiple regression analysis was used to establish the effect of access to credit, savings mobilization and managerial training on performance of micro enterprise. The analysis also shows the relationship between the variables. The coefficients of regression results are

Table 1. Pearson's coefficient correlation matrix.

Variable	Performance of MSMEs	Access to credit	Savings mobilization	Managerial training
Performance of MSMEs	1			
Access to Credit	0.947***			
Savings Mobilization	0.945***	0.746**		
Managerial Training	0.945***	0.748***	0.656*	1

*** Significance at 99%, ** significance at 95% and * significance at 90%. Source: Field survey (2013).

Table 2. Regression analysis results.

Variable	Coefficient	Std. Error	t-Statistic	Prob.
LS (Access to Credit)	0.358	0.053	3.181	0.002
SM (Savings Mobilization)	0.272	0.098	3.715	0.000
TM (Training)	0.281	0.109	0.109	0.004
C (Constant)	0.507	0.402	0.402	0.211
R-squared	0.896206	Akaike info criterion		-2.612085
Adjusted R-squared	0.890101	Schwarz criterion		-2.466097
Durbin-Watson stat	2.263715	F-statistic		146.7866
		Prob (F-statistic)		0.000000

Method: Least Squares. Dependent Variable: ROA. Source: Field survey (2013).

presented in Table 2 and when these beta coefficients are substituted in the equation, the model becomes:

$$ROA = 0.507 + 0.385 LS + 0.272 SM + 0.281 TM + \epsilon \dots \dots \dots \{Equation 2\}$$

This means that even without the three independent variables (access to credit, savings mobilization and training), the performance of micro enterprise is expected to stand at 0.507 (Y-intercept). The coefficients of access to loan, savings mobilization and training are 0.385, 0.272 and 0.281 respectively. They are all positive, meaning that as the magnitudes of the independent variables (access to credit, savings mobilization and training) increases, the magnitude of the dependent variable (performance) also increases.

Table 2 also shows the beta values converted in the same scale to enable comparison. Access to credit, having the largest beta of 0.385 has the largest effect on performance. The second most important variable was training with a beta of 0.281. The least important predictor of these three variables is savings mobilization with a beta of 0.272.

CONCLUSION AND RECOMMENDATIONS

The findings indicated that the access to credit, savings mobilization and training in micro enterprise investment was on average satisfactory to the micro entrepreneurs. The study concluded that there existed a relationship

between extent of provision of microfinance and performance of microenterprises and that micro finance significantly affected performance of micro enterprises. It therefore implies that improvement in the provision levels of micro finance will result in increased effect on performance of micro enterprise. Training in micro enterprise investment as a component of micro finance help clients in business management and minimizing transaction related risks. The results are in line with that of Kithae et al (2013) that the financial sector had very high positive correlation with performance of women entrepreneurs and also Lagat (2012) on the impact of youth enterprise fund in Kenya.

The study recommends that microfinance service providers and policy development partners could consider including a micro-insurance scheme in the micro finance package. Also extension of the current loan grace period of one month would give the entrepreneurs adequate time to invest the loan and use the returns from the investment for loan repayment. The government and development partners could consider channeling more funds for micro financing programs to bring on board many unemployed people that are currently out of reach of the programs as this will help spur economic development and alleviate unemployment.

The current study was a cross sectional survey based on a small sample size taken from only Kiambu county, Githurai market. It is therefore recommended a similar study but employing longitudinal survey on a larger sample.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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Full Length Research Paper

Scrutinising the effectiveness of customer loyalty programmes: A study of two large supermarket chains in South Africa

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There is a worldwide trend toward loyalty marketing, and companies are implementing loyalty strategies aimed at cultivating strong relationships with their customers. Due to this increased importance and relevance that is attached to loyalty programmes, most retailers have been committed to sustaining customer loyalty and cultivating an enduring and favoured relationship with customers who are expected to regularly return for additional purchases. This particular study investigates the effectiveness of two different customer loyalty programmes on customer satisfaction and customer retention, and aims to deduce the most important elements of the programmes that influence customer preferences. Two major supermarket retailers in South Africa, Woolworths and Pick n Pay, were used in the study to determine and compare the effectiveness of the two different types of loyalty programmes. The extant literature suggests that customer loyalty programmes' main objectives are to establish a higher level of customer retention by delivering increased satisfaction and value to certain customers. However, there are a number of critics and studies that suggest that loyalty programmes are wholly ineffective at delivering a competitive value proposition, and merely serve to increasing marketing costs. The contribution of this study gives insight into the effectiveness of different designs of loyalty programmes and, more importantly, points to the elements of the programmes design that influence customer preferences and could be utilized to create the optimal customer loyalty programme.

Key words: Customer loyalty programmes, customer satisfaction, customer retention, accumulated point reward programmes, item-based discount reward programmes, retail, South Africa.

INTRODUCTION

There is a worldwide trend toward loyalty marketing, and companies are implementing loyalty strategies aimed at cultivating strong relationships with their customers (Duffy, 1998). Due to this increased importance and rele-

vance that is attached to loyalty programmes, more retailers have been committed to sustaining customer loyalty and cultivating an enduring and favoured relationship with customers, who are expected to regularly return

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for additional purchases (Dowling and Uncles, 1997). This study investigates the effectiveness of two different customer loyalty programmes on customer satisfaction and customer retention, and aims to deduce the most important elements of the programmes that influence customer preferences (Bridson et al., 2008). The literature of previous studies suggests that customer loyalty programmes' main objectives are to establish a higher level of customer retention by delivering increased satisfaction and value to certain customers (Gable et al., 2006). However, there are a number of critics, such as Shugan (2005), that suggest that loyalty programmes are wholly ineffective at delivering a competitive value proposition, and are merely responsible for increasing marketing costs. The contribution of the following study gives insight into the effectiveness of different designs of loyalty programmes, and aims to determine the elements of the programme's design that influence customer preferences and could conceivably be utilized to create the optimal customer loyalty programme. Furthermore, the effectiveness of each programme on customer satisfaction and retention is explored. This may prove unlightening as there is a dearth of such research in an emerging market context.

The primary aim of this study is to determine the difference in effectiveness of Accumulated Point Reward (APR) and Item-Based Discount (IBD) loyalty programmes on customer retention and customer satisfaction, as well as determine the customers' optimal preferences within a customer loyalty programme. This is contextualised by considering two supermarkets in South Africa, namely Pick n Pay and Woolworths.

More specifically, the research objectives of this study are stated as follows:

1. To determine the customers' optimal preferences of elements within a customer loyalty programme
2. To determine if there is a difference between effectiveness of APR and IBD loyalty programmes in terms of customer satisfaction
3. To determine if there is a difference between the effectiveness of APR and IBD loyalty programmes in terms of customer retention

This paper proceeds by means of a scholarly literature review, an overview of the methodology, discussion of the findings and managerial implications and, finally, a note on the limitations, as well as future research opportunities stemming from the study.

LITERATURE REVIEW

Customer loyalty programmes

Customer loyalty programmes are widely defined as an

integrated system of marketing actions that aims to make customers more loyal by developing personalized relationships with them (Sharp and Sharp, 1997; Meyer-Waarden, 2008). These programmes are utilized as value-sharing instruments in order to increase and enhance consumers' perceptions of the firms overall offerings (Bolton et al., 2000; Yi and Jeon, 2003). This value development function is vital because the ability to provide superior value is instrumental to customer relationship initiation and retention (Sirdeshmukh et al., 2002). O'Brien and Jones (1995) stated that enhanced value perception is considered necessary to a loyalty programme's success.

The effectiveness of loyalty programmes has proven to be difficult to empirically deduce and remains a widely debatable subject. There are various researchers that have found positive effects through many different studies (Bolton et al., 2000; Leenheer and Bijmolt, 2008; O'Brien and Jones, 1995), while others have not been able to categorically prove the effects of the systems (Sharp and Sharp, 1997; Dowling and Uncles, 1997).

As a result of the lack of empirical evidence to substantiate these claims, there are a number of limitations and gaps in the literature pertaining to customer loyalty and customer loyalty programmes (Zhang and Breugelmans, 2012). The majority of literature within previous studies suggests that customer loyalty programmes main objectives are to establish a higher level of customer retention by delivering increased satisfaction and value to certain customers.

The effectiveness and value of customer loyalty programmes are heavily influenced by a few key attributes that combine to create the structure and design of the programme. These elements are important as they appeal and relate directly to the preferences of the consumer. As stated by O'Brien and Jones (1995), they are vital measures of the programmes value. The five key attributes that form the basis of the measure of value of any loyalty programme are outlined as follows (O'Brien and Jones, 1995): the cash value of the redemption rewards (ratio of points to purchase, or percentage of discount received); the range of choice of these rewards; the aspirational value of the rewards (accumulated points or cash back); the perceived likelihood of achieving the rewards (e.g. how many points are required to qualify) and the schemes ease of use. Bridson et al. (2008) subsequently explored these elements and also add a further element in the timing of a receiving a reward. These are described as hard, qualitative elements due to their practical application and value (Bridson et al., 2008). It is important to note that these attributes are common to every loyalty programme; however they will vary according to the design requirements and specificity of the firms' value proposition. The ease of use element will not be explicitly included in this study as it is not relevant to the specific programmes being analyzed.

Based on the aforementioned text, it is therefore hypothesized that:

Hypothesis 1: The importance of individual elements of customer loyalty programmes varies according to consumers' preferences

The specific elements or attributes of customer loyalty programmes are vitally important as they inherently represent customers' preferences and can be used to measure the success of loyalty programmes. The prevalence of certain elements may represent a greater influence on the systems overall effectiveness on both customer satisfaction and retention. Furthermore, an ideal loyalty programme could be developed using the most significant attributes.

Accumulated Point Reward (APR) Loyalty Programmes

This style of programme allows consumers to accumulate points in order to eventually gain free rewards when they make repeated purchases with a firm, and is therefore aimed towards fostering customer loyalty over a long period of time (Liu, 2007). These programmes are appealing to customers on a cost-benefit analysis, if they are convenient, due to the fact that there is no joining fee and each transaction is handled with an easy-to-use magnetic strip card or membership card (Dowling and Uncles, 1997).

The effectiveness and value of the APR loyalty programme is heavily influenced by a few key elements that combine to create the structure and design of the programme. These elements are important as they appeal and relate directly to the preferences of the consumer, and as stated by O'Brien and Jones (1995), they are vital measures of the programmes value. These attributes have been classified by Bridson et al. (2008) as hard elements due to their qualitative nature. The specific elements which comprise the APR programme are as follows: i) time, which in this case is defined as long term, ii) type of reward, which is clearly accumulated points, iii) reward range, this element relates to the basket of goods that accommodate the accumulation of points, and iv) likelihood of achieving the reward, which relates directly to how many points are required to qualify for the reward. These measures were developed by Bridson et al. (2008) in order to understand and gauge the effectiveness of a loyalty programme with regard to customer satisfaction and retention.

Item-Based Discount (IBD) Loyalty Programmes

This type of loyalty programme is similar to the

Accumulated Point Reward programmes, as the customer is issued with a membership card that is utilized at the point of purchase (Dowling and Uncles, 1997). The key difference of this design, as compared with the accumulated points reward system, is that price discounts for particular individual items replace the points awarded based on the total amount purchased within the store (Zhang and Breugelmans, 2012).

There is research to suggest that consumers prefer immediate rewards over delayed ones (Dowling and Uncles, 1997; Leenheer and Bijmolt, 2008). In addition, the price discount reward is a guaranteed and measurable form of reward for a customer which requires far less effort than accumulating and obtaining points (Zhang and Breugelmans, 2012).

The specific elements, originally based on the literature of O'Brien and Jones (1995) and, more recently, Bridson et al. (2008), which make up the IBD programme are: i) time, which in this case is defined as immediate, ii) type of reward, which is a cash discount, iii) reward range, which is the particular product selected by the store, and iv) likelihood of achieving the reward, which relates to whether selected items that offer discounts are purchased. These elements are similar to the compared system, however it should be noted that the design of the programme dictates their influence on consumers.

The attributes of timing and type of reward clearly play an important role in the design and successful implementation of a customer loyalty programme. In terms of the IBD programme, these attributes could be more heavily impacted by consumer preferences than the other elements previously outlined and therefore could lead to increased customer satisfaction and retention.

Customer satisfaction within loyalty programmes

Customer satisfaction represents an important aspect of a firm's value delivery process, and researchers as well as practitioners recognise it as the main antecedent of loyalty, which in turn influences a firm's profitability (Bodet, 2008; Anderson et al., 1994; Heskett et al., 1994). Therefore, it can be concluded that satisfaction should have a positive effect on both loyalty dimensions and hence customer loyalty (Walsh et al., 2008). According to Lowenstein (1995), retailers can only utilize their marketing tools and programmes to create customer loyalty with customers who are satisfied, which leads to understanding that customer satisfaction cannot be ignored or substituted as dissatisfied customers can do real harm to retailer.

Pertaining to the model described by Yi and Jeon (2003), the value derived from participating in a loyalty programme positively influences satisfaction levels. The authors identified that satisfaction levels with loyalty programmes are directly influenced by benefits of

belonging to the programme. This study recognises measures relating to the customer's choices within the programme, evaluation of the programme, advantages received from the programme and most notably the satisfaction level created by the programme in order to gain an overall satisfaction rating for a customer loyalty programme (Yi and Jeon, 2003).

Based on the aforementioned, the following hypothesis is postulated:

Hypothesis 2: There is a significant difference between the effect of APR and IBD programmes on customers' satisfaction

Finally, it is vitally important to note that it cannot be assumed that satisfaction equates to loyalty. Gable et al. (2008) assert that customers may be satisfied, but not loyal, and use the example that customers who regularly shop at the same supermarket over the course of years, and appear to be satisfied, could easily switch to a new store for numerous reasons. Thus, they conclude that loyalty is a relationship based on the overall customer experience. Oliver (1999) substantiates this view and states that both practitioners and academics acknowledge that consumer loyalty and satisfaction are inextricably linked. To this end, most typically satisfied customers are intrinsically progressed towards loyalty as well as retention through the use of marketing tools such as customer loyalty programmes and processes that directly impact the customer experience.

Customer retention within loyalty programmes

Customer retention is commonly viewed as an important and core objective with regard to relationship marketing. Sheth (1996) defines relationship marketing as the retention of profitable customers through the on-going collaborative, partnering and value delivering activities of a firm. The importance and relevance of customer retention is evident is the widely recognised fact that retaining customers is, in aggregate, more cost effective than creating new ones (Gable et al., 2006; Thorsten and Klee, 1997). Thus customer retention has important implications for both the operational and internal processes of a firm as it represents an effective means to increase the overall value of a firm's delivery process.

Customer retention is influenced by a number of key determinants which affect the repurchase intent of a customer. This is substantiated by Keaveny (1995) who found that customers repurchase behaviour varied for many reasons other than satisfaction - including pricing, relative convenience, failures relating to service and experience, responses to these failed service encounters, competition and ethical problems. Each of these determinant influences the construct of customer reten-

tion in a different manner, however the literature (Bolton et al., 2000; Lemon et al., 2002) asserts that satisfaction is the most important and significant aspect in relation to customer retention. Based on the model by Bolton et al. (2000), the re-patronage intention can be measured by the likelihood of the customer recommending, renewing or increasing their usage of a particular loyalty programme. This model is similar to the measurement of customer loyalty programmes on loyalty to the programme as contended by Yi and Yeon (2003). Based on the aforementioned text, it is therefore hypothesized that:

Hypothesis 3: There is a significant difference between the effect of APR and IBD programmes on customer retention.

METHODOLOGY

This quantitative study serves to investigate customers' preferential customer loyalty programme in the consumer goods market by using the elements of two customer loyalty programmes, IBD and APR. Furthermore, this study serves to investigate the effectiveness of each loyalty programme on customer satisfaction and customer retention, contextualised by considering two specific supermarkets in South Africa.

Research design and method

This study is of a quantitative research design, lending itself to a descriptive research method (Malhortra, 2010). A quantitative, descriptive research approach gives a general overview of the significance of variables being studied, as well as allowing for specific hypotheses (theoretical assertions) to be empirically tested. In practice, such an approach allows this study to identify which loyalty programme generates a higher level of customer satisfaction and retention, the dependent variables. Here, customers preferences, the attributes or elements of the two programmes, represent the independent variables in the statistical calculations and the indicated preferred loyalty programme represents the dependent variable.

Population and sampling

The target population of this study was broadly defined as users of at least one type of loyalty programme (i.e. APR or IBD). These consumers comprised the population frame. The respondent profile was defined as consumers who were 18 and older and had experience with either, or both, type(s) of programmes. For accurate results, respondents were intercepted, at random, in pre-determined Woolworths and Pick n Pay outlets. In terms of the research context, an example of each loyalty programme needed to be identified. Hence, this study adopted the Pick n Pay Smart Shopper card as the APR programme example and Woolworths W Rewards as the IBD programme example.

Fieldwork

The data for this study were collected using a Mall-intercept method. Structured questionnaires, consisting of 10 questions,

were used in the mall-intercept to collect data. Respondents were assisted, if necessary, throughout the questionnaire by the interviewer to ensure more accurate findings. This technique was appropriate because of the advantages of personal interaction and face-to-face interviews. Certain irregularities within the fieldwork stage were apparent, most relating to the fact that some respondents faced a difficulty in general understanding due to language barriers. Interviewers were on hand to clarify any misunderstandings or misinterpretations and responded to any queries on the spot. This ensured that the response rate was high as questionnaires were completed and collected simultaneously.

Measurement scales

For questions primarily relating to the research objectives and hypotheses, two separate 7 point Likert scales were used. No reverse coding was required.

Question 3 consisting of V3-V10 was designed to measure consumer preferences towards IBD and APR programmes. V3-V10 and the multi-item 7 point Likert scale were adapted from the previous study compiled by Bridson et al. (2008) as well as O'Brien and Jones (1995) proposed attributes of loyalty programmes. Bridson et al. (2008) obtained a Cronbach alpha score of 0.83 for loyalty programme preferences with regards to hard attributes which was satisfactory as it exceeds 0.7 (Nunnally, 1978). In this study, the hard attributes are timing of reward, type of reward, reward range and likelihood of receiving a reward. Question 4 consisting of question V12 –V20 was designed to measure the effectiveness of an IBD and APR programmes on customer satisfaction and customer retention. Yi and Jeon (2003) and Mimouni-Chaabane and Volle (2008) proposed a 7 point Likert scale to measure the effect of a customer loyalty programme on satisfaction and retention. Bolton et al. (2000) proposed a similar scale to measure the effect of customer loyalty programs on repatronage or retention. Mimouni-Chaabane and Volle (2008) obtained a Cronbach alpha score of 0.92 for satisfaction with a programme. Kannan and Bramlet (2000) obtained a Cronbach alpha score of 0.69 for retention with a programme. Both these scores are satisfactory for reliability.

RESULTS

The data were initially subjected to reliability and validity testing, as explained in the sections below. Thereafter, hypothesis testing was conducted. The statistical analysis was performed using IBM SPSS 22.

Cronbach's Alpha

A Cronbach's Alpha or Item reliability analysis is a statistical technique that is used to determine whether a group of items are reliable indicators of the underlying theoretical construct that they are meant to probe (Malhotra, 2010). Basic statistics provides a guide to determine valid internal consistency; it indicates that all Cronbach's Alpha's higher than 0.6 values are accepted as being internally consistent and reliable (Burgess and Steenkamp, 2006). Table 1 represents the Cronbach's Alpha's for the constructs related to the three hypotheses in this study.

Accumulated Point Reward Programme was a construct measured by 4 manifest variables. Table 1 shows a Cronbach's Alpha of 0.712, which suggests that the items have a high internal consistency and are reliable indicators of Accumulated Point Reward Programmes. Item Based Discount Programme, a construct measured by 4 manifest variables had a Cronbach's Alpha of 0.655, suggesting that all 4 manifest variables are reliable indicators of Item Based Discount Programmes. Customer Satisfaction was measured by 4 manifest variables and had a very high Cronbach's Alpha of 0.920 and Customer Retention measured by 5 manifest variables also had a very high Cronbach's Alpha of 0.923; thus suggesting that all manifest variables are perfect indicators of the constructs they were designed to measure.

Factor analysis

Factor analysis is a statistical technique that examines interrelationships (interdependence) of variables through correlations. Manifest variables that are highly correlated are grouped together to form a new national variable called a factor. A factor is a linear combination of the manifest variables (Malhotra, 2010). Table 2 represents a factor analysis of all the constructs related to the three hypotheses in this study.

Table 2 illustrates the factor loadings of the four constructs. The number of significant factors (number of factors to retain in the factor analysis model) can be chosen using two guidelines. The first being Kaiser's criterion where factors with Eigen values > 1 are retained. The second is looking at the Screen Plot where the Eigen values plotted begins to level off or the point where the plotted line changes slope.

For Accumulated Point Reward Programme, one factor is retained, with an Eigen value of 2.166 and a cumulative explained variance of 54.2%. For Item Based Discount programmes, Customer Satisfaction and Customer Retention, the same applies, with Eigen values of 1.927 (49.3%), 3.236 (80.1%) and 3.828 (67.6%), respectively. On this basis, the validity of the data was affirmed.

Hypothesis tests

Hypothesis 1

The first hypothesis (H1) focuses on the elements of both APR and IBD programmes and how they vary depending on consumers' preferences. These elements are: timing of reward, reward type, reward range and the likelihood of receiving a reward.

The alternative hypothesis is stated below.

Hypothesis 1: The importance of individual elements of

Table 1. Cronbach's Alpha for constructs.

Variable	Cronbach's Alpha	Cronbach's Alpha of standardized items	No of items
Accumulated Point Reward	.712	.706	4
Item Based Discount	.655	.652	4
Customer Satisfaction	.920	.921	4
Customer Retention	.923	.923	5

Table 2. Factor analysis for variables.

Extraction sums of squared loadings			
Variable	Component	Total	Cumulative % of variance
Accumulated Point Reward	1	2.166	54.161
Item Based Discount	1	1.927	49.297
Customer Satisfaction	1	3.236	80.889
Customer Retention	1	3.828	67.567

Table 3. Paired sample T-test on each element of both loyalty programmes.

Paired sample statistics		Mean	t	df	Sig. (2-tailed)
Pair 1	V3- Timing of Reward (IBD)	5.33	2.674	150	.008
	V4- Timing of Reward (APR)	4.71			
Pair 2	V5-Reward type (IBD)	5.82	5.069	150	.000
	V6-Reward type (APR)	4.90			
Pair 3	V7-Reward range (IBD)	4.44	-4.314	150	.000
	V8-Reward range (APR)	5.23			
Pair 4	V9- Likelihood of receiving the reward (IBD)	4.72	-1.918	150	.057
	V10- Likelihood of receiving the reward (APR)	5.09			

customer loyalty programmes vary according to consumers' preferences

This hypothesis was tested at a 5% level of significance and a paired sample T-test was conducted in order to compare the means of the two different programmes with regards to each element. A Paired Sample T-Test was used as it computes the difference between the two variables (APR and IBD) for each case (each element) and tests to see if the average difference is significantly different to zero (Schloesser, 2000).

In order to perform a paired sample t- test, both variables in each pair have to be normally distributed (Schloesser, 2000). To test for normality a Q-Q plot for each pair was performed. All variables were found to be normally distributed.

Once the T-test was performed, a selection of the variables with the highest mean scores was used to predict the ideal loyalty programme in terms of customer

preferences. Each manifest variable, V3-V10 was measured on a seven point Likert scale.

The results are shown in Table 3.

Summary of results for H1

Referring to Table 3, it can be seen that Pair 1, Timing of Reward, with a t-stat of 2.674 and a p-value of .008, is significant at a 5% level. Moreover, comparing the means of Pair 1 (5.33 and 4.71), consumers have a preference for V3, the Timing of Reward from an IBD programme.

Pair 2 has a t-stat of 5.069 and a p-value of .000 and is thus significant at a 5% level. Moreover, comparing the means of Pair 2 (5.82 and 4.90), consumers have a preference for V5, the Reward Type, from an IBD programme.

Pair 3 has a t-stat of -4.314 and a p-value of .000 and is thus significant at a 5% level. Moreover, comparing the

means of Pair 3 (4.44 and 5.23), consumers have a preference for V8, the Reward Range from an APR programme.

Pair 4 has a t-stat of -1.918 and a p-value of .057 and it may thus be concluded that Pair 4 is not significant at a 5% level. Moreover, comparing the means of Pair 4 (4.72 and 5.09), consumers have a preference for V10, the Likelihood of receiving the reward from an APR programme. However this information is insignificant as Pair 4 is statistically insignificant and is therefore of little value in the analysis.

In summation, the null hypothesis is therefore rejected at a 5% significance level for Pair 1, 2 and 3. It may therefore be concluded that the importance of individual elements of customer loyalty programmes vary according to consumer preferences. For Pair 4, the element of the likelihood of receiving the award is only significant at a 10% significance level and, thus, at a 5% significance level the null hypothesis cannot be rejected and one can conclude that importance of the likelihood of receiving the award does not vary according to consumer preferences.

In terms of the first research objective (i.e. to determine the customers' optimal preference of elements within a customer loyalty programme), measured at a 5% significance level, only three out of the four elements were validated. The first element is "Timing of Reward". Consumers preferred receiving rewards immediately in store for use there and then, with a mean score of 5.33 out of a possible highest score of 7. The second element is "Reward Type". Consumers preferred receiving cash discounts on certain products that they purchased, with a mean score of 5.82 out of a possible 7. The third element is "Reward Range". Consumers enjoyed receiving rewards based on the value of all the products in basket of goods that they had purchased, with a mean score of 5.23 out of a possible highest score of 7.

In summation, it was found that consumers preferred a loyalty programme that would pay out rewards immediately in store, the rewards being in the form of a cash discount, with this discount based on the value of all the products in the basket of goods purchased.

Hypothesis 2

The second hypothesis (H2) focused on whether there is a significant difference between APR and IBD programmes in terms of customer satisfaction. The alternative hypothesis is stated below.

Hypothesis 2: There is a significant difference between the effect of APR and IBD programmes on customer satisfaction.

As this is comparing the difference in effect on customer satisfaction that APR and IBD programmes have, an

Independent Sample T-Test was used as it compares the mean score of two groups (APR and IBD) on a given variable (i.e. customer satisfaction) (Schloesser, 2000).

In order for an Independent Sample T-test to be performed, the following assumptions have to be met (Schloesser, 2000). First, the dependent variable has to be normally distributed. To test for normality, a Q-Q plot for customer satisfaction was plotted and the residuals were found to be normally distributed. The second assumption is that all observations must be independent of each other. To ensure that the observations are independent, each respondent contributes their data independently and in no way was affected by other respondents' scores (Price, 2000). The last assumption is homogeneity of variance. A Levene's test for equality of variances was performed, with a resulting significance of 0.004. Thus, equal variances cannot be assumed, therefore one must report significance from "Equal Variance Not assumed". This is known as a Welch's t-test, an adaption of the T-test intended for use with two samples having unequal variances (Dale, 2012).

The four manifest variables designed to measure customer satisfaction were summated into one scale, labelled Cust_Satis. The Hypothesis was tested at a 5% significance level and the results are shown in Table 4.

Summary of results for H2

With reference to Table 4, based on the t-value (-4.429) and the p-value ($0.000 < 0.05$), the null hypothesis is rejected at a 5% significance level and it can be concluded that there is a significant difference between the effect of APR and IBD programmes on customers' satisfaction. The mean score for IBD's effect on customer satisfaction (5.6176) is higher than the mean score of APR's (4.7249). Thus it may be concluded that customers who partook in IBD programmes are more satisfied than those who partook in APR programmes.

In addressing the second research objective (i.e. to determine if there is a difference between effectiveness of APR and IBD loyalty programmes in terms of customer satisfaction), measured at a 5% level, it may be concluded that there is indeed a significant difference. Moreover, IBD programmes have a greater effect on customer satisfaction than do APR programmes.

Hypothesis 3

The third hypothesis (H3) focuses on whether there is a significant difference between APR and IBD programmes on customer retention. The alternative hypothesis is stated below.

Hypothesis 3: There is a significant difference between

Table 4. Independent sample T-test on customer satisfaction.

Cust_Satis	N	Mean	Std. Deviation	t	df	Sig. (2-tailed)
1- APR	83	4.7249	1.48124	-4.429	143.185	.000
2- IBD	68	5.6176	.98256			

Table 5. Independent sample T-test on customer retention.

Cust_Reten	N	Mean	Std. Deviation	T	df	Sig. (2-tailed)
1- APR	83	4.6012	1.47636	-3.906	149	.000
2- IBD	68	5.4941	1.29452			

the effect of APR and IBD programmes on customer retention.

As this is comparing the difference in effect that APR and IBD programmes have on customer retention, an Independent Sample T-Test was used as it compares the mean score of two groups (APR and IBD) on a given variable (customer retention) (Schloesser, 2000).

In order for an Independent Sample T-test to be performed the following assumptions have to be met (Schloesser, 2000). The dependent variable has to be normally distributed. To test for normality, a Q-Q plot for customer retention was plotted and the residuals were found to be normally distributed. The second assumption is that all observations must be independent of each other. To ensure that the observations are independent, each respondent contributed their data independently and in no way was affected by other respondents' scores (Price, 2000). The third and final assumption is homogeneity of variance. A Levene's test for equality of variances was performed with a significance of 0.159, thus Equal variances can be assumed.

The five manifest variables designed to measure customer retention were summated into one scale, labelled Cust_Reten. The Hypothesis was tested at a 5% significance level and the results are shown in Table 5.

Summary of results and findings for H3

With reference to Table 5, based on the t-value (-3.906) and the p-value ($0.000 < 0.05$), the null hypothesis is rejected on a 5% significance level and it can be concluded that there is a significant difference between the effect of APR and IBD programmes on customer retention. The mean score for IBD's effect on customer satisfaction (5.4941) is higher than the mean score of APR's (4.6012). Thus it can be concluded that consumers who partook in IBD programmes are more likely to be retained than those who partook in APR programmes.

In terms of the third research objective (i.e. to deter-

mine if there is a difference between effectiveness of APR and IBD loyalty programmes in terms of customer retention), measured at a 5% level, it can be concluded that there is indeed a significant difference. Moreover, IBD programmes have a greater effect on customer retention than APR programmes.

DISCUSSION AND CONCLUSION

The main aim of this study was to determine the difference in effectiveness of APR loyalty programmes and IBD loyalty programmes on customer retention and customer satisfaction within specific supermarkets in South Africa, as well as determine the customers' optimal preferences of elements within a customer loyalty programme.

The literature provided valuable insight into the importance of elements and design of loyalty programmes, however appeared to be a gap with regards to actual qualitative evidence of the influence and the importance of each element. Therefore, due to the highlighted importance that the design of a loyalty programme plays (Leenheer and Bijmolt, 2008; Liu and Yang, 2009), it was critical to examine specific elements of the programmes with regard to consumer preferences in order to critically investigate loyalty programmes effectiveness.

The first hypothesis (H1) focused on the elements of both APR and IBD programmes and how they vary depending on consumer preferences. These elements are Timing of reward, Reward type, Reward range and the Likelihood of receiving a reward.

The hypothesis is re-stated below:

Hypothesis 1: The importance of individual elements of customer loyalty programmes varies according to consumer preferences.

This hypothesis was tested at a 5% level of significance and a paired sample T-test was conducted in order to compare the means of the two different programmes with

regards to each element. The null hypothesis was rejected and it was concluded that the importance of individual elements of customer loyalty programmes varies according to customer preference.

The above results of the paired sample T-test provide important insight into consumers' preferences with regards to the individual elements of loyalty programmes in South Africa. It is evident that a significant section of consumers preferred the Timing of Reward element which is associated with the IBD programme and therefore represents immediate rewards. Further analysis also revealed that consumers preferred the Type of Reward element associated with IBD programmes which is represented by cash discounts. The last inference which can be gathered from this result is that consumers preferred the element Range of Reward associated with the APR programme, which is a representative of the preference for receiving rewards based on all goods purchased. The element of Likelihood of receiving the Reward, was found to be insignificant on a 5% level. This is most likely explained due to the fact that respondents did not fully understand the question and therefore the data was skewed and did not represent a significant and viable solution on a 5% level. Respondents may have been more likely to have given the APR statement a higher rating due to the wording of the IBD statement being too negative. In summation, it was found that consumers preferred a loyalty programme that would pay out rewards immediately in store, the rewards would in the form of a cash discount and this discount would be based on the value of all the products in the basket of goods they purchased.

The formulation of the second and third hypotheses aimed to build on the literature which states that, in general terms, the goal of these programmes is to establish a higher level of customer retention in profitable segments by providing increased satisfaction and value to certain customers (Gable et al., 2006). The managerial justification for these programmes is that increased customer satisfaction and loyalty have a positive influence on long-term financial performance (Anderson, Fornell, and Lehmann 1994; Reichheld and Sasser 1990). However, there remains a gap in literature as the effectiveness of loyalty programmes has proven to be difficult to empirically deduce and remains to be a widely debatable subject. There are various researchers that have found positive effects through many different studies (Bolton et al., 2000; Leenheer and Bijmolt, 2008; O'Brien and Jones, 1995), while others have not been able to categorically prove the effects of the systems (Sharp and Sharp, 1997; Dowling and Uncles, 1997). Therefore, the second and third hypotheses aimed to target this discrepancy in literature.

The second hypothesis (H2) focused on whether there is a significant difference between APR and IBD programmes in terms of customer satisfaction. The hypothesis is re-stated below:

Hypothesis 2: There is a significant difference between the effect of APR and IBD programmes on customer satisfaction.

The results associated with this hypothesis proved that at a 5% level, it can be concluded that there is indeed a significant difference between programmes. Moreover, IBD programmes have a greater effect on customer satisfaction than APR programmes.

This result is strongly supported and significant as the extant literature suggests that consumer prefer immediate rewards over delayed ones (Dowling and Uncles, 1997; Leenheer and Bijmolt, 2008). In addition, the price discount reward is a guaranteed and measurable form of reward for a customer which requires far less effort than accumulating and obtaining points (Zhang and Breugelmans, 2012).

Following the results achieved with regard to APR and IBD systems and their effectiveness with regard to customer satisfaction, it is important to analyze the same programmes effectiveness on customer retention. Bolton et al. (2000) found that customers' decision to repurchase is based on future expectations of the firm's value proposition, and these predictions are influenced by previous satisfaction with the firm. This brings about the important satisfaction-retention linkage.

The third hypothesis (H3) focused on whether there is a significant difference between APR and IBD programmes in terms of customer retention. The hypothesis is re-stated below:

Hypothesis 3: There is a significant difference between the effect of APR and IBD programmes on customer retention

The results indicate that at a 5% significance level, there is indeed a significant difference between APR and IBD programmes in terms of customer retention. Moreover, IBD programmes have a greater effect on customer retention than do APR programmes.

This result is, once again, strongly aligned with the extant literature, as it is widely believed that customer satisfaction is often viewed (in terms of relationship marketing) as the central determinant or necessary premise for customer retention (Rust and Zahorik, 1993; Kotler, 1994). Kotler (1994) simply states that customer satisfaction is a key aspect to successfully retaining customers. This clearly represents the important correlation between the results of the two hypotheses and the IBD loyalty programme.

MANAGERIAL IMPLICATIONS

The first research objective was to determine customers' optimal preference of elements within a customer loyalty programme. It is clear that customers do not want to

collect points over time, they prefer immediate returns and they prefer receiving rewards based on all their particular products in their basket and not merely on selected items. The second research objective was to determine if there is a difference of effectiveness of APR and IBD Loyalty programmes in terms of customer satisfaction. The results found that IBD programmes have a greater effect on customer satisfaction than APR programmes. Marketing managers should implement or change present loyalty programmes to include the elements of IBD programmes or to follow the design considerations of IBD programmes in order to have the greatest effect on customers' satisfaction and, thus, customers' profitability. The third research objective was to determine if there is a difference between effectiveness of APR and IBD loyalty programmes in terms of customer retention. APR programmes are argued in the literature to create a "lock in" affect and are said to be more likely to lead to customer re-patronage than IBD programmes. However, the results of this particular study contradict these findings, as it was found that IBD programmes had a greater effect on customer retention than APR programmes. This may be partially explained by the satisfaction-retention link. Customers who are satisfied with a programme are more likely to continue using the programme, shopping at the store and recommending the programme to others. This underscores the need for marketing managers in the retail sector to follow IBD loyalty programme principles in order to have the greatest effect on customer retention and, thus, customer profitability.

STUDY LIMITATIONS

The study only took two specific loyalty programmes into consideration. In this respect, Pick n Pay's smart shopper system was chosen for the APR programme and Woolworths W-rewards system was chosen to represent the IBD programme. It is entirely possible that the brand images of these respective companies may have had an effect on responses. Furthermore, these programmes have particular characteristics in their own right and it is conceivable that the innate structure and reward levels may have influenced the specific outcome of this study, as detailed above.

FUTURE RESEARCH OPPORTUNITIES

At the outset, it should be noted that this research project was limited to South Africa and two major retail chains (i.e. Pick n Pay and Woolworths). Thus, a different market, perhaps considering a developed country, may lead to a different set of results. Likewise, the retail chains under the microscope may also influence the specific outcomes.

The outcome may also be a function of the research design chosen. Future research in the form of an experimental design could look into the effect of each element of loyalty programmes on customer preferences and then attempt to measure the elasticity of each element by changing the reward offering.

Research into the effect of loyalty programmes on profitability is becoming ever more necessary. This necessity is even more prevalent in competitive markets where lots of loyalty programmes exist alongside each other. Firms that provide the most preferential programme to customers stand to gain a substantial competitive advantage. However, does this perceived success really influence the bottom line in a meaningful way? Further studies may shed fresh light on this.

Conflict of Interests

The authors have not declared any conflict of interests.

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Full Length Research Paper

Value-at-risk in times of crisis: An analysis in the Brazilian market

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The present study aimed at evaluating the predictive ability of the models of market risk estimation in times of financial crises. To this end, models were tested to estimate the financial indicator Value-at-Risk (VaR) applied to the daily returns of the BM&FBovespa, the Ibovespa index. Traditional models and those based on the Extreme Value Theory (EVT), considered as two types of distribution, the Generalized Extreme Value (GEV) and generalized Pareto distribution (GPD) were tested. The data relating to two periods of international financial crises termed the 1997 Asian Financial Crisis and the U.S. Subprime Meltdown in 2008 were explored in the study. The results indicated the inefficiency of most statistical models for VaR estimation in moments of high volatility for both periods of crisis. In contrast, the exception refers to the model based on EVT, GPD distribution that proved satisfactory in the estimates in both periods of crisis. The results are in agreement with other studies in the field.

Key words: Value-at-risk, Ibovespa, Extreme Value Theory (EVT).

INTRODUCTION

Over recent decades, the "risk" issue has been widely argued in the financial market. The onset of the debate dates back to the 1970s with the growth of the financial industry and the rise of market volatility. The popularization of the capital markets has enabled the exponential growth of turnover on the stock exchange. What was once restricted to financial institutions would then be open to the public domain, increasing the exposure of investments to their inherent risks.

Financial disasters in recent decades, marked by the bankruptcies of large corporations, as well as liquidations of major financial institutions (many of them caused by

failure of risk management systems and the awareness on the need for the adoption of regulatory measures by countries), led to the creation of a Committee on Banking Supervision, denoted by the Basel Committee, an advisory body of the Bank for International Settlements (Bank for International Settlements - BIS).

Before the requirements stipulated by regulatory bodies, and in accordance with international agreements, the financial institutions have developed several tools for measurement and control of risk inherent to markets through a statistical and mathematical background.

Despite the increasing evolution and improvement of

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methodologies for calculating and measuring risk, Value at Risk (VaR), developed in the 90s by the US Bank, JPMorgan, has become a benchmark tool for market risk estimation, as pointed out by Jorion (1997). VaR reflects the maximum loss that an investment may reach in a particular period at a given confidence level.

Given the above, the question arises: In the face of the market risk control requirements, as stated in the regulation of financial institutions (Basel Convention) and, in view of the various estimators of Value at Risk (VaR) in the academic literature, will the existing models be able to provide good estimates of risk at moments of international financial crises?

The present study has as its general goal to evaluate the performance of market risk estimators generated by the application of models based on Value at Risk (VaR), in times of global financial crisis, applied to the Bovespa index, of the BM&FBovespa.

Specifically, this paper seeks to: (a) evaluate the performance of estimation models applied to market risk in periods of the financial crises denominated as the 1997 Asian Financial Crisis, and the 2008 U.S. Subprime Meltdown; (b) test the predictive ability of the results obtained from the application of the models based on the Extreme Value Theory as a risk measure.

THEORETICAL REFERENCE

In this section, the theoretical concepts governing market risk are presented, starting with Value-at-Risk (VaR) and its estimation metrics and a review of the major studies upon the topic.

Value-at-risk (VaR)

Market risk occurs by means of the variations in asset prices over time, which creates uncertainty with future values. The higher the fluctuations of returns from an investment, the higher the market risk inherent in such investment. That risk applies to the entire global financial market; it is linked to fluctuations in the prices of stocks, options, bonds, commodities, currencies, sovereign bonds, or other assets traded.

Resolution 3464 of the Central Bank of Brazil defines market risk as the possibility of incurring losses of the resulting fluctuation in market values of positions held by a financial institution. That includes the risks of transactions that are subject to foreign exchange, interest rates, stock prices and the prices of goods (commodities). A more robust measure to control the fluctuations of the values indicated by the regular organs of the financial market is Value-at-Risk (VaR). Such as in Brazil is also referred to as Value at Risk in several specialized publications.

VaR is a measure that estimates the maximum expect-

ed loss of an asset at a pre-set period at a given confidence interval (or probability of occurrence). According to Jorion (1997), VaR is a value that represents, for a portfolio or asset, the maximum expected loss arising from market risks for a set period of time and with a probability of occurrence. With its application, the risk manager seeks to predict, with any degree of statistical reliability, the maximum variation in the market value of a portfolio at a given time segment which is generally the period required to effect the settlement of the position. VaR is a risk measurement method that uses robust statistical techniques heavily used in other fields. Best (1998) simplifies the concept by saying that VaR is the maximum amount of money that can be lost in a portfolio at a given time.

According to Kimura et al. (2009), there are three important features for consideration in the calculation of VaR:

1. The maximum loss estimate - VaR is a major statistical technique to estimate the maximum potential loss;
2. The time horizon - refers to the projection period for VaR. VaR is not very suitable for estimating very long time horizons. It is a measure of risk for short-term;
3. The confidence level - Reflects the desired confidence level for the VaR estimates.

In the light of those details, the Basel Accord established some parameters for analysis and calculation of VaR. The standard set the confidence interval by 99 and 95% for the period of one (1) business day or, for some institutions, one (1) month. The volatility of returns shall be calculated using a robust measurement and the calculation of risk should be assessed via stress measurements. Most risk managers of financial institutions adopt a daily basis for the calculation of VaR, thus determining the maximum loss for one day. The daily VaR is called Daily Earnings at Risk (DEAR).

Kimura et al. (2009) point out that although the use of VaR forecasts for one (1) day is quite usual, the characteristics of the market or of the investment portfolio may cause the time horizon to be extended for more days. One can take the example of a hedge investment in illiquid assets, in which managers need to estimate the inherent risk over a period exceeding one day. In this case, a longer-term VaR, assuming five days for the institution to undo the position would be more appropriate to assess the risk of their portfolio. All in all, such increased time horizon would reflect the characteristics of the portfolio more appropriately.

Despite being seemingly simple as a measure, the estimated VaR requires complex approaches, which require specific statistical techniques. The assertive prediction of the market risk shall depend on reliable predictions of the future fluctuations of the asset's returns. Several approaches have been developed over

the past decades to estimate the risk. Fittingly, these approaches are based on forecast volatility models.

According to Jorion (1997), the Value-at-Risk assessment requires a comprehensive knowledge of the data distributions. The identification of the features concerning the behavior of the time series considered directs the choice for the best estimation method.

The models dedicated to VaR estimation can be classified in various ways. To Jorion (1997), the models can be divided into two classes: those based on local assessment methodology and the full-evaluation ones. Crouhy et al. (2004) divide the models for VaR estimation into: parametric models based on the parameter estimation of a theoretical distribution and non-parametric models, where the distribution is built through the use of scenarios. The classification that experts and institutions in the financial markets refer to as the most consistent and usual is one that separates the VaR estimation models into two classes: one focuses on the conditional distribution of the process, given the past volatility and another comprises models that focus on the marginal distribution. The former generates the so-called Conditional VaR; the latter includes the Non-Conditional VaR. The most widely used models for estimating VaR Conditional consist of RiskMetrics and those based on ARCH processes. The most widely used models in the estimation of the Non-Conditional VaR include the Empirical simulation, the Delta-Normal, the Delta-Gamma-Normal, the Monte Carlo simulation, and the one based on the Extreme Value Theory.

Studies conducted

The research works on the Value-at-Risk have their onset in the early 1990s, especially those linked to studies that explored the traditional, non-conditional estimating models such as Normal VaR, Historical VaR, the Delta-Normal VaR and extensions. The evolution of the risk estimation techniques based on non-conditional distribution of the process has occurred based on the Extreme Value Theory, hereinafter referred to as EVT. Most of the published studies on the estimation of Value-at-Risk use non-conditional models within the literature to apply the EVT.

McNeil (1998), who is among the pioneers in the use of EVT applied to the field of finance, conducted a study considering the estimation of quantiles in the tail of the marginal distribution of financial return series, using extreme value statistical methods. The researcher proposed a simple method for quantification of extreme values. The distribution used in the study was the GEV (Generalized Extreme Value), adjusted by the Extremal Theta index of the return time series offered by the variations in the share prices of BMW, referring to the period between the years 1973 to 1996. Although it was not a comparative study, the findings evidenced well-

adjusted estimation results generated by the application of the GEV model, especially with regard to risk.

Two years later, McNeil and Frey (2000) proposed an alternative method to estimate Value-at-Risk and the risk measurements present in the financial market. The method involved an approach that combined the volatility adjustment by a GARCH process and elements of the Extreme Value Theory. In the study, the estimation of extreme values was carried out over a distribution GPD (Generalized Pareto Distribution) of the time series of returns on stock exchange indexes, the S&P 500 index (USA), the DAX index (Germany), the shares of BMW, and the US dollar for the period 1960-1993. It was assumed the GPD distribution for EVT. Through the backtesting of historical daily return series, it was possible to note that the best estimate of VaR was obtained by the method based on conditional distribution.

Ho et al. (2000) conducted a study similar to McNeil (1998). To this end, the GEV modeling for estimating the risks associated with the behavior of stock indices of the stock exchanges in Asian countries was applied. The sample consisted of historical series of returns of the indices of stock markets in Japan, Taiwan, Korea, Indonesia and Malaysia, for the period between 1984 to 1996. The study showed that the risk modeling by EVT proved more accurate in comparison to the estimation obtained by applying traditional techniques. The results also revealed that considering the occurrence of a normal distribution would lead to underestimated values for the VaR.

In the study by Gençay et al. (2003), the performance of EVT in VaR calculation was compared with the results of other well-known modeling techniques, such as GARCH, variance-covariance and the historical simulation method applied to stock markets. The models were classified into two groups. The former group consisted of GARCH (1,1) processes, and GARCH (1,1) with t-student distribution. The Latter group comprised historical simulation, the Var-Cov approach, adaptable to the generalized Pareto distribution (GPD) and non-adaptive GPD models. The data utilized include the returns the principal index of the stock of Istanbul, referring to the period 1987-2001 market. Quantile forecasts of GARCH (1,1) proved to be much more volatile compared to the GPD quantile forecasts. That caused the GPD model to consider a more robust forecasting tool, being more practical for implementation, and displaying a more regular performance for VaR measurements.

Silva and Mendes (2003) sought to use the EVT to analyze ten stock market indices in Asia, identifying which type of extreme value and asymptotic distribution best fits into extreme historical market events. The empirical tests indicated that the distributions of returns were not characterized by normality, and that the minimum and maximum of the return series could be modeled in a satisfactory manner within a framework of extreme values.

The sample included returns of stock indices of the markets of China, India, Japan, Indonesia, Korea, Malaysia, Singapore, Philippines, Taiwan and Thailand referring to the period from 1990 to 1999. The results showed that the method of VaR estimation by extreme values would be a more conservative approach to determining capital requirements than traditional methods (SILVA E MENDES, 2003)

In a similar investigation to Gençay et al. (2003), Gençay and Selçuk (2004) focused on the relative performance of the Value-at-Risk measure applied to the stock markets of nine countries referred to as emerging. The authors used the EVT approach to perform a comparison with the application of traditional models of variance-covariance, historical simulation to generate VaR estimates and provide the tail forecasts of daily returns at the 0.999 percentile. The survey data were the time series of returns of the major indices of stock markets in Brazil, Argentina, Hong Kong, Indonesia, South Korea, Mexico, Singapore, Taiwan and Turkey, referring to the period from 1973 to 2000. The GPD distribution was considered in the estimate of extreme values. The results showed that the EVT-based VaR estimates proved more accurate at higher quantiles. According to estimated parameters of the GPD, some of the moments of the distributions do not exist for some of the indexes. Furthermore, the daily return distributions showed different properties on their left and right tails, suggesting that the risks were not equiprobable in such economies.

Brooks et al. (2005) compared different models based on extreme values to determine the VaR three LIFFE's futures contracts, working with prices referring to the period from 1991 to 1997. A semi-parametric approach, where extreme events were modeled using the GPD and normal market conditions captured by the empirical distribution function was proposed. The amounts of VaR to this approach were compared with the non-parametric pattern, with an approach that considers the extremal index, and those calculated based on the initialization from unconditional density, and the initialization from a GARCH (1,1). Results showed that, for a test sample, the approach of the proposed semi-parametric extreme value produced superior results to other methods, but the tail index technique also showed consistent results.

Likewise, Bekiros and Georgoutsos (2005) conducted a broad and interesting research, with a comparative evaluation of the predictive performance of various models for Value-at-Risk (VaR). Notably, two methodologies relating to EVT deserved distinction, the Peaks Over Threshold (POT) and Blocks Maxima (BM). The study was applied to historical series of returns of US dollars, from the Dow Jones stock index, and from the Cyprus Stock Exchange. The aim was to compare the performance of various estimation techniques in markets with different capitalization and trading practices. The sample included the period from 1997 to 2002. The

period from 2001 to 2002 was kept for backtesting. The results reinforced previous studies, according to which, at very high levels of trust, the EVT-based methodology produces the most accurate forecasts of extreme losses.

The following year, in view of the electricity market, Chan and Gray (2006) conducted a study that proposed the use of autoregressive models based on EVT as estimators of VaR in the electricity market. According to the authors, the recent deregulation of the electricity markets has increased the importance of risk management. The VaR assessment within electricity markets is undoubtedly more difficult than in the traditional financial markets. That is because the characteristics of the market result in an unusual distribution of returns. Effects such as seasonality, are present in these markets. EVT was adopted to model the tails of the return distribution explicitly. The study involved historical series of daily returns of the electricity markets from Australia, Scandinavia, Canada, New Zealand and the United States, referring to the period 1999-2004. Compared to the results obtained with the application of parametric models and based on simple historical simulation approaches, the proposed EVT-based model worked well for predicting the VaR. Overall, the results were encouraging in suggesting that the proposal based on EVT model is a useful technique in forecasting VaR in the electricity markets.

Also in the industry of energy, but applied to the oil market, Marimoutou et al. (2009) conducted a comparative analysis of models for estimating VaR applying EVT under both unconditional and conditional models for predicting Value-at-Risk. The results from these models were compared with those obtained by means of other known modeling techniques, such as GARCH, historical simulation and Filtered Historical Simulation. The data sample corresponded to the historical series of daily returns of the price of Brent oil and WTI, referring to the period from 1984 to and 2006. The results showed that the conditional EVT and procedures of filtered historical simulation provided a better estimation over conventional methods. In addition, the GARCH model (1.1) also provided good results, comparable to the results of two combined procedures. Finally, the results confirmed the importance of the filtering process for successful standard approaches.

Dimitrakopoulos et al. (2010) conducted a study similar to that proposed in this paper. In effect, these authors investigated the quantification of market risk of portfolios of stocks in emerging and developed countries during the crisis and post-crisis periods. The EVT models were compared to historical simulation model and Monte Carlo model, the latter two models referred to as traditional tools. In the sample, the historical returns of the stock indices of the stock exchanges in 16 emerging countries (Argentina, Brazil, Chile, Colombia, Mexico, Venezuela, India, Indonesia, Malaysia, Philippines, South Korea, Thailand, Taiwan, China, Hungary and Turkey) and four

developed countries (USA, UK, Germany, Japan) were used referring to the period from 1999 to 2002.

Accordingly, the findings of Dimitrakopoulos et al. (2010) indicated that despite the documented differences between emerging and developed markets, the most successful VaR models were common to both asset classes. Moreover, in the case of stock portfolios in emerging markets, most VaR models produce conservative estimates of risk, in contrast to portfolios of developed markets, where most models underestimate the VaR held. Subsequently, estimating VaR during periods of a financial crisis seems to be a daunting task, especially for emerging markets. VaR estimation models are less affected at times of crisis when applied in developed markets. The performance of parametric models of the VAR estimation improves during the post-crisis period due to the inclusion of extreme events in the estimation sample.

Accordingly, with the evolution of EVT, Cifter (2011) presented a study of the extreme value theory based on wavelet to estimate the univariate VaR. Wavelets and EVT were combined to forecast the volatility to estimate a hybrid model. In the first stage, wavelets have been used as a general threshold for the Pareto distribution, and in the second phase, EVT was applied with a wavelet-based limit. This new model was used to two emerging stock markets: Istanbul and Budapest. The analysis period was from 1986 to 2010, with daily data. The relative performance of wavelet-based EVT was evaluated against RiskMetrics, ARMA-GARCH, GPD, and conditional GPD models. Empirical results show that the EVT-based model, considering wavelets increased the predictive performance according to the number of violations and tail loss tests. The superior performance of the EVT prediction model based on wavelet was also consistent with the requirements of Basel II and demonstrated that such a model can also be used by financial institutions.

From the most current studies, Jesús et al. (2013) tested the EVT to estimate the risk of the foreign exchange market Dollar / Peso. For the study, a sample of daily returns of exchange rates referring to the period 1970-2007 was used. The models tested were of Historical Simulation, Delta Normal and EVT. The results corroborate the findings of previous studies, pointing the best estimation of VaR by EVT, pursuant to backtesting verification.

The analysis of extremes in financial returns series is oftentimes based on the assumption of observations that are independent and identically distributed (i.i.d.). Nevertheless, stylized facts, such as clustering and serial dependence, usually violate the assumption of independence. This notion has been the main motivation for proposing an approach that is able to overcome those difficulties, considering the time between extreme events as a stochastic process. One of the advantages of the method consists of their ability to capture the short-term behavior of extremes without involving a stochastic

volatility or a pre-filtration of data, which certainly shall affect the estimate. With that in mind, Herrera and Schipp (2013) proposed a model, denoted ACD-POT, seeking a better estimate for the VaR. The model was compared with several competing approaches such as CAViaR and the GARCH-EVT model. For the study, the returns for the period 1990 to 2008, the shares of Bayer, DAX index and a portfolio prepared by the authors were used. The backtesting results indicated that the method works properly in risk prediction, thereby providing a more accurate estimate. According to VaR estimates, ACD-POT and the GARCH-EVT methods are the only methods that, more often eradicated the threat of clustering violation.

Matos et al. (2014) do a study that analyzed the risk exposure of Brazilian Exchange-Trade Funds (ETFs) compared to Ibovespa and the corresponding BM&FBovespa indexes. Methodology used was risk by Value-at-Risk (VaR) in 5% confidence level, with historical simulation, and Expected Shortfall (ES). The Monte Carlo simulation was used to replicate the verified values. The results showed frequency distributions for the losses, and those lower than the VaR, which characterize the expectation of loss measured by the ES. All ETFs presented losses and exposure to risk greater than those observed for the Ibovespa benchmark and its respective benchmark indexes.

METHODOLOGY

Data

The data used include the daily returns of the index of the leading stock exchange in Brazil, BM&FBovespa. Termed as Bovespa, the index exhibits the behavior of companies with greater liquidity on the exchange. The period of analysis was from January 1995 to December 2013. In fact, this period covers the two most recent international financial crises: the 1997 Asian Financial Crisis, and the subprime meltdown, 2008. Data were collected from Economática database and operationalized in R, using the *Ismev* package.

The calculation of returns was performed by the relationship between the price of a given day in relation to the previous day. The following expression shows the formulation of return calculation.

$$R_t = \ln\left(\frac{P_t}{P_{t-1}}\right) = \ln(P_t) - \ln(P_{t-1}) \quad (1)$$

Where

P_t refers to the closing price on day t ;

R_t refers to the return on day t .

The Bovespa index returns were divided into three samples, described as follows:

1. The period of the Asian Financial Crisis - The first sample comprises a series of daily returns for the period between July 1997 to June 1998, which was used to adjust the estimate of the VaR model. This period was considered the apex of the crisis. For forecasting and test efficiency models a sample of approximately three months, from July 1998 to September 1998 was used;

2. The period of the Subprime Meltdown - The second sample was composed by series of daily returns for the period between July 2007 and September 2008, which was used for the adjustment of the estimation of the VaR model. For prediction and efficiency of test models, a sample of approximately three months, between October and December 2008 was used;

3. The Entire Period - The third sample was composed by series of daily returns for the whole period, between January 1995 and September 2013, which was used for the adjustment of the estimation of the VaR model. For prediction and efficiency of test models, a sample of approximately three months, between October and December 2013 was used.

Data analysis

The data analysis was initially performed using descriptive statistics of the time series. This stage consisted of the calculations of the following values: mean, standard deviation, maximum, minimum, skewness, kurtosis, normality test and stationarity. The idea was to analyze the behavior of the series, by checking for possible volatility clusters and stationary data. The normality test used was that of Bera and Jarque (1981).

The next step was to estimate the Value-at-Risk (VaR) for nine statistical methods, six of which were guided by the Extreme Value Theory (EVT). The risks were estimated In-Sample and Out-of-Sample for quantiles of 5 and 1%. Predictions were made for a one-step-ahead daily basis, in accordance with the proposals of the Basel Agreement and Circular (Internal Regulation) 3464, 2007, issued by the Central Bank of Brazil.

The VaR was estimated by EVT, considering the GEV (Generalized Extreme Value) distribution and GPD (Generalized Pareto Distribution). For each distribution, the extremal index θ was also considered, as well as an adjustment for larger r . The extremal index θ is the ratio Ku blocks, where the maximum exceeded a specific threshold u , and the number of daily returns to u exceeded during the entire period under consideration, Nu . These adjustments by EVT followed the methodology postulated by Mendes (2004).

For GEV distribution, the VaR was given according to the following expression:

$$VaR_p = H_{\xi, \mu, \sigma}^{-1}((1-p)^n) \tag{2}$$

Where

$H_{\xi, \mu, \sigma}$ is the limiting distribution function to the maximum.

$$H_{\xi, \mu, \sigma}((1-p)^n) = \begin{cases} \mu - \frac{\sigma}{\xi}(1-y^{-\xi}), & \text{para } \xi \neq 0 \\ \mu - \sigma \log y, & \text{para } \xi = 0 \end{cases} \tag{3}$$

$$y = -\log(1 - (1-p)^n)$$

Considering the extremal index θ , the VaR by the GEV distribution is given by the following expression:

$$VaR_p = H_{\xi, \mu, \sigma}^{-1}((1-p)^{n\theta}) \tag{4}$$

The VaR at larger r , with GEV distribution is equal to the GEV based on the expression 02, with the difference in the estimation of the parameters ξ, μ, σ , which was considered the r -largest order statistic, instead of the maximum only.

The VaR adjusted for the generalized Pareto distribution is estimated by the following expression:

$$VaR_p = u + P_{\xi, \psi}^{-1} \left(\frac{P}{P^*} \right) \tag{5}$$

Where:

$$P_{\xi, \psi}^{-1} = u + \frac{\psi}{\xi} \left(\left(\frac{P}{P^*} \right)^{-\xi} - 1 \right) \tag{6}$$

$$\psi = \sigma + \xi(u - \mu)$$

The estimate with extremal index θ is:

$$VaR_p = u + P_{\xi, \psi}^{-1} \left(\frac{P}{p^* \theta_u} \right) \tag{7}$$

The last stage of the method was the final assessment of the estimated risks for both regular periods as to the financial crisis. The test used for this evaluation was proposed by Kupiec (1995), given by the expression:

$$LR = -2 \ln[(1-\alpha)^{N-x} \alpha^x] + 2 \ln \left[\left(1 - \frac{x}{N} \right)^{N-x} \frac{x}{N} \right] \sim \chi^2(1) \tag{8}$$

Where:

- x refers to the number of returns that exceed the calculated VaR;
- N refers to the total sample;
- α refers to the established quantile.

According to Kupiec (1995), x follows a distribution $x \sim \text{Binomial}(N, f)$ in which the probability of x in sample N is given by $P(x, f, N) = C_x^N (1-f)^{N-x} f^x$. The test follows a chi-square distribution with 1 (one) degree of freedom.

RESULTS AND DISCUSSION

Figure 1 shows the daily returns of the Ibovespa index between the years from 1995 to 2013. As shown in Figure 1, the moments of crisis generate large oscillations in the Ibovespa returns over time, also referred to as volatility clustering; the variations accumulate in precise periods and dissipate in the short term. Accordingly, the oscillations in returns in periods of the Asian Financial Crisis of 1997 and the Subprime Meltdown 2008 are visible on the graph.

Table 1 shows the descriptive statistics of the behavior of returns of Ibovespa throughout the period under consideration in the study (1995-2013).

The data in Table 1 indicate that all returns sample exhibited a non-normal behavior. The results of the Jarque-Bera Normality Test rejected the normality

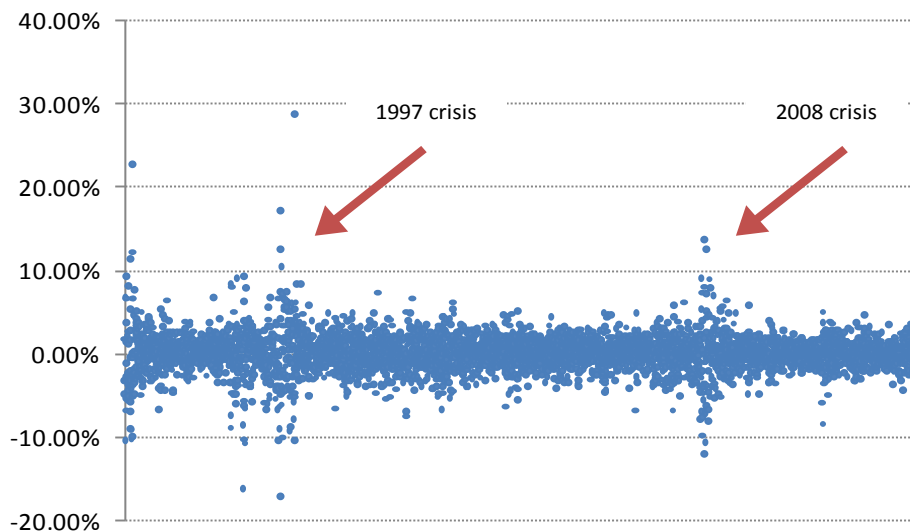


Figure 1. Returns of Ibovespa between 1995-2013.

Table 1. Descriptive statistics of the return series of Ibovespa.

	All period	Period of the Asian crisis	Period of the sub prime crisis
Mean	0.0005	-0.0016	-0.0008
Median	0.0011	0.0013	0.0012
Maximum	0.2883	0.1713	0.1368
Minimum	-0.1721	-0.1721	-0.1210
Std. Dev.	0.0223	0.0369	0.0292
Skewness	0.4824	-0.2513	0.0990
Kurtosis	16.2200	6.4423	6.3871
Jarque-Bera	34426.7800	189.0931	188.0191
P-value	0.0000	0.0000	0.0000

hypothesis for the behavior of all indices, at the 1 % level of statistical significance, with p-value statistic below 0.01. All distributions presented some degree of excess kurtosis; given that the calculated values for this statistic are superior to three. The non-normality of the returns of the index brings crucial implications, to the extent that it is an indication that the option pricing models (Black-Scholes), asset pricing (CAPM) and risk management (RiskMetrics) can be flawed when applied to these markets. Such models presuppose the normality of distributions they process.

The samples of Ibovespa exhibited a distribution closer to the mesokurtic over the period considered. It means that the returns offered by the variations in this index prices were more scattered (not concentrated in proximity to zero).

Table 2 presents the estimation results of the VaR for the period from the apex of the Asian crisis, between 1997 and 1998 and projected in 1998.

According to the data presented in Table 2, one can observe that some VaR estimators had a significant

performance as shown by the values of the Kupiec test lower than 3.48. The GPD distribution estimators obtained a better performance since, in both cases, either in the traditional way or corrected by the extremal index θ , the VaR could be better adjusted. Consequently, the results corroborated the findings of Geyçay et al. (2003), Silva and Mendes (2003), Geyçay and Selçuk (2004), and Cifter (2011), which pointed out the EVT-GPD as the finest VaR estimators.

Notwithstanding, in light of an analysis of performance, including all models of Table 2, one can observe that, in most cases, those models failed to acceptably generate the market risk estimation. In fact, the models underestimated the inherent risk at the levels of 5% as well as 1%. Thus, the maximum loss calculated by the models ended up below what the crisis, in reality, occasioned.

Another point to rule refers to the estimation for different confidence levels. The values presented herein demonstrate that the models are better evaluators of market risk for the 1% level than for the 5% level.

Accordingly, Table 3 presents the estimation results of

Table 2. Estimated VaR for the Asian financial crisis of 1997.

	VaR		LR Test		Is model appropriate?	
	5%	1%	5%	1%	5%	1%
VaR empiric	-0.051	-0.072	5.35	11.45	No	No
VaR Normal	-0.056	-0.093	2.50	2.51	Yes	Yes
VaR t-Student	-0.051	-0.077	5.35	11.45	No	No
VaR GEV	-0.040	-0.087	40.06	11.45	No	No
VaR GEV adjusted by teta	-0.059	-0.112	2.50	0.00	Yes	Yes
VaR major r	-0.050	-0.097	7.09	2.51	No	Yes
VaR major r adjusted by teta	-0.050	-0.091	5.35	5.00	No	No
VaR GPD	-0.058	-0.126	2.50	0.00	Yes	Yes
VaR GPD adjusted by teta	-0.068	-0.127	0.14	0.00	Yes	Yes

Note: The asymptotic limit of the LR test is 3.48.

Table 3. Estimated VaR for the sub prime meltdown crisis of 2008.

	VaR		LR Test		Is model appropriate?	
	5%	1%	5%	1%	5%	1%
VaR empiric	-0.036	-0.067	45.99	13.73	No	No
VaR Normal	-0.038	-0.053	34.63	32.50	No	No
VaR t-Student	-0.037	-0.057	34.63	22.56	No	No
VaR GEV	-0.033	-0.055	45.99	27.40	No	No
VaR GEV adjusted by teta	-0.036	-0.058	38.29	22.56	No	No
VaR major r	-0.036	-0.059	45.99	22.56	No	No
VaR major r adjusted by teta	-0.044	-0.068	13.02	9.83	No	No
VaR GPD	-0.064	-0.092	1.72	1.19	Yes	Yes
VaR GPD adjusted by teta	-0.076	-0.100	0.01	1.19	Yes	Yes

Note: The asymptotic limit of the LR test is 3.48

the VaR for the period of the apex of the subprime meltdown.

According to the data presented in Table 3, in most cases, the VaR models were not adequate to estimate the market risk for the Ibovespa index during the peak of the 2008 crisis. A statistical test had its values above the asymptotic limit. Again, VaR was the only successful model to estimate the risk appropriately by the GPD distribution, both for significance levels of 1 and 5%. Thus, that result suggests the GPD to be better for estimating VaR at times of significant fluctuations in the financial market caused by global crises.

The maximum losses assessed by the models were lower than those presented by the market. Once again, the estimators underestimate the risks during the financial crisis, which generated negative returns far greater than those expected by the models.

Table 4 presents the results of the estimated VaR for the entire period of analysis of the Ibovespa returns, from 1995 to 2013.

The figures presented in Table 4 were inverse to those

demonstrated in the previous tables. Whereas the risk was underestimated by the models in times of crisis, the total risk period was overestimated. Due to the high volatility of returns, the models were unable to capture the reducing fluctuations that occurred in late 2013, and predicted a maximum loss well above the lower returns evaluated. Maybe the results obey the fact that the inputs of the model base in historical data. Such fact can be verified by the absence of values of the Kupiec LR test. When there are no extreme returns in the calculated VaR, the Kupiec test shows no values.

Conclusion

The present study aimed at evaluating the predictive ability of the models of market risk at moments of financial crises. To this end, the Value-at-Risk (VaR) financial indicator was tested, applied to daily returns of the stock index on the primary stock exchange in Brazil, the Ibovespa. Traditional models were used, in contrast

Table 4. VaR estimate for the entire period (1995 to 2013).

	VaR		LR Test		Is model appropriate?	
	5%	1%	5%	1%	5%	1%
VaR empiric	-0.034	-0.062	-	-	No	No
VaR Normal	-0.066	-0.094	-	-	No	No
VaR t-Student	-0.065	-0.100	-	-	No	No
VaR GEV	-0.025	-0.051	3.58	-	Yes	No
VaR GEV adjusted by teta	-0.037	-0.071	-	-	No	No
VaR major r	-0.028	-0.059	-	-	No	No
VaR major r adjusted by teta	-0.042	-0.081	-	-	No	No
VaR GPD	-0.066	-0.093	-	-	No	No
VaR GPD adjusted by teta	-0.073	-0.103	-	-	No	No

Note: The asymptotic limit of the LR test is 3.48.

with those based on the Theory of Values extremes, with the Generalized extreme Value (GEV) and Generalized Pareto distribution (GPD). Accordingly, the periods of the 1997 Asian Financial Crisis and the 2008 U.S. Subprime Meltdown were considered herein.

The results indicated the inefficiency of most statistical models for estimating VaR at times of high volatility. Effectively, the only model to provide a satisfactory outcome for both crises was based on Extreme Value Theory, utilizing the Generalized Pareto distribution (GPD). The results are consistent with other studies of the area, pointing GPD distribution as superior in terms of adjustment and prediction. The values at risk estimated by the other models were lower than most of the losses observed by negative returns that, in fact, turned out to occur. Consequently, such a discrepancy could expose financial institutions and investment funds to conditions of uncertainty on portfolio allocation.

In view of the above, the present study can contribute to financial institutions and investors in order to bring light and insight to the models used for control and management of market risk. It is crucial to emphasize that, even though in accordance with the legal requirements, risk estimators might work inefficiently at times of high volatility. Thus, the constant reassessment of the parameters of each model becomes essential.

Finally, some inherent limitations as to the study are to be highlighted: first, the use of only two financial crisis; testing the models evaluated in the face three or more times of adversity would be valid; Secondly, the limited number of VaR estimation techniques, suggesting the use of non-conditional models that more accurately capture the market risk; and finally, the use of only a financial index. In conclusion, the results are not chiefly intended to signal a thorough analysis of the risk in times of crisis. It was sought to summon back the discussion and bring light to this issue of paramount relevance to risk management and the pricing of transactions in the domestic financial market.

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Full Length Research Paper

Interdependence between GCC stock market and oil prices and portfolio management strategies under structural breaks

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This paper empirically investigates the interdependence between GCC stock market and oil price by considering structural breaks in conditional volatility. The univariate and multivariate GARCH models are extended by including structural breaks which are determined endogenously by using ICSS algorithm proposed by Inclan and Tiao. Empirical results indicate that the inclusion of structural breaks in the model substantially reduces the volatility persistence and the estimated half-life of shocks. Hence, the conditional volatility of oil price and stock market are more affected by their own shocks and volatility when structural breaks are neglected. Likewise, our results are conclusive on conditional dependency between GCC stock market and oil price revealing that the volatility shifts reduce the shocks and volatility spillover effects. For the portfolio management, the empirical results show evidence of sensitivity of the optimal weight and hedge ratios to structural breaks in conditional volatility.

Key words: GCC stock market, oil price, dependency, multivariate GARCH, structural breaks, ICSS algorithm, portfolio implications.

INTRODUCTION

An abundant literature has investigated the volatility linkage between stock markets (Lieven, 2005; Kanas, 1998; Francis et al., 2001; Worthington and Higgs, 2004; John et al., 2010), and revealed that there is strong evidence of interdependency between stock market and suggested that shocks and volatility can be transmitted across market. Furthermore, a lot of empirical studies have investigated the volatility transmission between oil

price and stock market such as those of Jones and Kaul (1996), Park and Ratti (2008), Apergis and Miller (2009) Nandha and Brooks (2009) and Sadorsky (1999, 2012). Their findings show evidence of stock market reactions to oil price changes. Guesmi and Fattoum (2014) examine the interdependence between oil price and stock market for five oil-importing countries (USA, Italy, Germany, Netherland and France) and four oil-exporting countries

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JEL classification: C12, C32, G12, Q43.

(United Arab Emirates, Kuwait, Saudi Arabia and Venezuela). They use asymmetric DCC-GARCH model and they conclude that dynamic conditional correlation does not differ for oil-exporting and oil-importing economies. However, only oil-exporting countries receive positive oil price shocks. Filis et al. (2011) provide the same results and conclude that time-varying correlations between oil prices and stock market on both oil-exporting and oil-importing countries depend on the origin of the oil shocks. For the GCC stock market, many studies include Hammoudeh and Choi (2006), Malik and Hammoudeh (2007), Lescaroux and Mignon (2008) and Arouri et al. (2011) have focused on the links between oil price changes and GCC stock market and revealed a strong interdependency between them. Hammoudeh and Choi (2006) examine the short- and long-run relationship between GCC stock market and oil price, S&P 500 and US interest rate using vector error correction model and cointegration techniques. The results based on impulse response analysis suggest that GCC stock market receives positive shocks from oil prices. Malik and Hammoudeh (2007) use trivariate GARCH model and make evidence of volatility spillover effects running from oil prices to GCC stock market and suggest that oil price receives volatility effects only from Saudi Arabia.

In the same context, Maghyreh and Al-Kandari (2007) investigate the causal links between oil price and four GCC stock markets (Bahrain, Kuwait, Oman and Saudi Arabia) based on daily data and nonlinear cointegration and conclude that GCC stock market responds to oil price shocks. Recently, Arouri et al. (2012) investigate the relationships between oil price and GCC stock market. The authors find evidence of short-run unidirectional causal links running from oil price to stock market. Awartani and Maghyreh (2013) examine shocks and volatility spillovers between GCC stock market and oil price over the period 2004-2012. They found bidirectional dependency between oil and GCC stock market and conclude that the global financial crisis of 2008 affects the estimated results. In the context of stock sector, Jouini (2013) investigates the volatility spillover effects between oil price and Saudi stock sectors using weekly data from January 10, 2007 to September 28, 2011 and VAR-GARCH model. The results show evidence of bidirectional volatility spillover effect between stock sectors and oil price. More recently Jouini and Harrathi (2014) examine the volatility interactions between GCC stock market and oil price using asymmetric BEKK-GARCH model and weekly data from June 24, 2005 to March 25, 2011. They found that the volatility spillover effects run more from stock markets to oil price, than from oil to stock markets for shocks spillover effects. Moreover, their findings are augmented by the causality test in conditional variance which confirms some evidence of bidirectional causality between GCC stock and oil markets.

Otherwise, many empirical studies such Hamilton and Susmel (1994) and Lamoureux and Lastrapes (1990) show that there was a considerable reduction in the estimated persistence of volatility when structural breaks were incorporated in the standard ARCH model and conclude that structural breaks should be included in the estimated conditional volatility. Hamilton (1994) also indicates that a good model should account for structural breaks. In the same line, Lastrapes (1989) and Lamoureux and Lastrapes (1990) argue that the volatility persistence is overestimated when structural breaks in variance are neglected in estimated GARCH model. Mikosch and Starica (2004) and Hillebrand (2005) found that ignoring structural breaks in the GARCH model induces upward biases in estimates parameters of the volatility persistence. Ewing and Malik (2005) investigate the existence of asymmetry in the predictability of the volatilities of small and large companies in the USA. They report that spillover effects between small and large cap stock returns disappear when volatility shifts are taken into consideration.

Additionally, Hammoudeh and Li (2008) examined the volatility of GCC stock market using weekly data from 1994 to 2001. They found that most of the GCC markets were more sensitive to major global events such as the 1997 Asian crisis and the September 11th attack than local and regional factors. Moreover, Marcelo et al. (2008) use Spanish stock market and weekly data from January 3, 1990 to January 5, 2005 and reveal that including structural breaks detected by using ICSS algorithm in estimated model reduce volatility persistence and shocks and volatility spillover effects. Kasman (2009) examines the impacts of the structural breaks on the volatility persistence in the BRIC stock market for the period 1990 to 2007. They find that the persistence of volatility is reduced significantly when volatility shifts are included in the GARCH model. More recently, Ewing and Malik (2013) use ICSS algorithm and BEKK-GARCH model to investigate the shocks and volatility spillovers between gold and oil futures including structural breaks in the conditional volatility based on daily data from July 1, 1993 to June 30, 2010. The authors make evidence of volatility spillover between gold and oil when structural breaks in variance are included in the model and conclude that the volatility shift reduce the estimated persistence of volatility.

The above empirical studies related to the causal links between GCC stock market and oil price ignore structural breaks in conditional volatility. Our study offers in fact more comprehensive analysis of the volatility dependence and volatility spillover effects between GCC stock market and oil price by including volatility shifts. Also, our findings are important for financial market participants to understand the behaviour of volatility and the volatility spillover between GCC stock market and oil price for portfolio decisions and hedging strategies.

The major objectives of this paper are twofold. The first objective is to examine the interdependence between GCC stock market and oil price incorporating the structural breaks in conditional volatility. The second is to use the estimated conditional volatility for portfolio decision and risk management. For this purpose, we use recent data and BEKK-GARCH model to investigate the causal links among GCC stock market and oil price. Furthermore, the volatility shifts are identified by using iterated cumulative sums of squares (ICSS) algorithms proposed by Inclan and Tiao (1994). The underlying idea in this paper is to examine the impact of structural breaks on the shocks and volatility spillover effects and the volatility dynamics.

We deem this research distinguishable from the related literature on the volatility dependency between GCC stock market and oil price for at least three points: (i) we use recent database covering GCC stock market and oil price; (ii) we include structural breaks in variance detected endogenously by ICSS algorithm to investigate volatility persistence and causal links between GCC stock market and oil price; (iii) we use the estimated conditional volatility for portfolio management. More precisely, we estimate optimal portfolio weights as well as the hedge ratio by considering structural breaks in conditional volatility.

The remainder of the paper is organized as follows: Section 2 covers econometric methodology. Section 3 describes the data and summary statistics. The empirical results are presented and discussed in section 4. Section 5 contains the portfolio management strategies and hedging while section 6 relates the main concluding comments.

ECONOMETRIC METHODOLOGY

The econometric technique employed in this paper to examine the interdependence between GCC stock market and oil price is the BEKK-GARCH model. First, the univariate GARCH model has been used to investigate the volatility persistence and half-life of shocks with and without structural breaks. The structural breaks in variance (volatility shifts) are determined endogenously by using ICSS algorithm developed by Inclan and Tiao (1994). Then, we employ the multivariate GARCH model to investigate the conditional dependency between GCC stock market and oil price. The BEKK parameterization of multivariate GARCH model proposed by Engle and Kroner (1995) allows to capture the shocks and volatility effect across return series. Finally, the estimated conditional volatility is used for portfolio decisions and risk management.

Detecting structural breaks in variance

Inclan and Tiao (1994) provide the iterated cumulative sums squares (ICSS) algorithm to detect structural breaks in the unconditional variance of return series due to a sudden shock. The ICSS algorithm is based on IT (Inclan and Tiao) statistics for testing the null hypothesis of constant unconditional variance against the alternative of a structural break in unconditional variance.

Let z_t denotes independent time series with zero mean and

unconditional variance σ^2 and the variance of each interval given by $\sigma_j^2, j = 1.2. \dots N_T$, where N_T is total number of variance change in T observations and $1 < k_1 < k_2 < \dots < k_{N_T} < T$ are the set of change points. The unconditional variance over the N_T intervals is given by:

$$\begin{aligned} \sigma_t^2 &= \sigma_0^2 & 1 < t < k_1 \\ \sigma_t^2 &= \sigma_1^2 & k_1 < t < k_2 \\ & \vdots \\ \sigma_t^2 &= \sigma_{2N_T}^2 & k_{N_T} < t < T \end{aligned} \tag{1}$$

The cumulative sum of squares from the first observation to the k^{th} point in time is used to detect the number of structural breaks in unconditional variance. Let $c_k = \sum_{t=1}^k z_t$. $k = 1. \dots T$. The test statistic is given as:

$$D_k = \frac{c_k}{c_T} - \frac{k}{T} \tag{2}$$

Where $c_0 = c_T = 0$ and c_T is the sum of the squared residuals from the whole period. The null hypothesis of constant unconditional variance is rejected if the maximum absolute value of D_k is greater than the critical value. Inclan and Tiao (1994) suggest that the critical value of 1.358 is the 95th percentile of the asymptotic distribution of $\max_k \sqrt{(T/2)} |D_k|$. Besides, upper and lower boundaries are established at ± 1.358 in the D_k plot.

Univariate GARCH model without and with structural breaks

The univariate GARCH(1.1) model is used to investigate the volatility persistence. The GARCH model without volatility shifts is defined as follows:

$$\begin{aligned} R_t &= c_0 + c_1 R_{t-1} + \varepsilon_t, \\ \varepsilon_t / I_{t-1} &\sim N(0, h_t) \\ h_t &= c + \alpha \varepsilon_{t-1}^2 + \beta h_{t-1} \end{aligned} \tag{3}$$

Where R_t represents the stock market returns or the oil price returns. ε_t represents the residual term and h_t the conditional variance. The parameters α represents the own past shocks effects and β represents the own past volatility effects. The sum of the parameters α and β measures the volatility persistence.

In order to take into consideration the structural breaks in conditional volatility, the univariate GARCH model is augmented by including a set of dummy variables. The GARCH model with structural breaks is given as:

$$h_t = c + \alpha \varepsilon_{t-1}^2 + \beta h_{t-1} + d_1 D_1 + \dots + d_k D_k \tag{4}$$

Where $D_1 \dots D_k$ is a set of dummy variables taking a value of 1 from each break point structural breaks detected by using ICSS algorithm and 0 elsewhere.

Bivariate GARCH model without and with structural breaks

The interactions between return series can be analyzed by using multivariate GARCH model. The BEKK specification of the conditional variance covariance matrix is more significant than univariate GARCH model to capture the linkage between return series. We present the first and second moments by bivariate VAR(1)-GARCH(1,1) model:

$$\begin{aligned} R_t &= \alpha + \beta R_{t-1} + \varepsilon_t \\ \varepsilon_t / I_{t-1} &\sim N(0, H_t) \end{aligned} \tag{5}$$

With R_t a 2×1 vector of oil price returns and stock market returns, α a 2×1 vector of constant terms and β a 2×2 diagonal matrix of

autoregressive parameters. ε_t is a 2×1 vector of residual terms $\varepsilon_t = D_t \mu_t$ and has a 2×2 conditional variance-covariance matrix H_t . $\mu_t = (\mu_{1t}, \mu_{2t})'$ is a sequence of independently and identically distributed random vectors and $D_t = \text{diag}(h_{11,t}^{1/2}, h_{22,t}^{1/2})$ where $h_{11,t}$ and $h_{22,t}$ are the conditional volatility of oil price and stock market respectively. The market information available at time $t - 1$ is represented by I_{t-1} . The BEKK parameterization for the bivariate GARCH(1,1) model is given as:

$$H_t = C' C + A' \varepsilon_{t-1} \varepsilon_t A + B' H_{t-1} B \quad (6)$$

Where C is a 2×2 lower triangular matrix of constants, A and B are 2×2 square matrix. The diagonal parameters of matrices A and B measures the effects of own past shocks and past volatility of return indices on its conditional volatility. The off-diagonal elements in matrix A and B , a_{ij} and b_{ij} measures respectively the cross effects of shocks and volatility between returns series.

Following Ewing and Malik (2005), the BEKK parameterization given in equation (6) is augmented by including a set of dummy variables in order to include structural breaks. The bivariate GARCH (1.1) with structural breaks takes the following forms:

$$H_t = C' C + A' \varepsilon_{t-1} \varepsilon_t A + B' H_{t-1} B + \sum_{i=1}^n D_i' X_i' X_i D_i \quad (7)$$

Where D_i is a 2×2 square diagonal matrix and X_i is a 1×2 row vector of dummy variables of coresponding return series. The first element of matrix X_i represents the dummy variables of the first return series and the second elements represents the dummy variables of the second return series and n represents the total number of structural break points found in variance of the first and the second return series.

Portfolio designs and risk management

The estimated conditional volatility obtained from the bivariate BEKK-GARCH model can be used for the optimal portfolio designs and risk management. Following Kroner and Ng (1998), the risk minimizing portfolio optimal weight is given as:

$$w_{12,t} = \frac{h_{22,t} - h_{12,t}}{h_{11,t} - 2h_{12,t} + h_{22,t}} \quad (8)$$

Where $w_{12,t}$ is the portfolio weight of the oil relative to the stock market at time t and $h_{11,t}$ and $h_{22,t}$ are the conditional volatility of oil price and stock market respectively. $h_{12,t}$ is the conditional covariance between oil price and stock market. Assuming a mean-variance utility function, the optimal portfolio holdings of the oil portfolio is given as: 0 if $w_{12,t} < 0$, $w_{12,t}$ if $0 \leq w_{12,t} \leq 1$ and 1 if $w_{12,t} > 1$. The optimal weight of the stock market in the considered portfolio is $1 - w_{12,t}$.

In addition to that, the conditional volatility can be used to compute optimal portfolio hedge ratio. Kroner and Sultan (1993) show that to minimize the risk of the oil/stock portfolio an investor should shorten $\beta_{12,t}$ of the stock market that is \$1 longer in the oil price. The hedge ratio is given as:

$$\beta_{12,t} = \frac{h_{12,t}}{h_{11,t}} \quad (9)$$

Data and summary statistics

We investigate the interactions between GCC stock market and oil price. Our sample covers the period from November 11, 2007 to September 18, 2012. All the data are from Datastream, sampled at a weekly frequency. The return index obtained as the first differen-

ce of the natural logarithm of the two successive weekly prices. Table 1 shows summary statistics on stock market and oil returns. This table provides that the highest weekly return is in crude oil and Saudi stock market while the highest volatility is in Qatar, Kuwait and Oman stock market. All return series, except Qatar, Kuwait and Oman are leptokurtic and skewed to the left, while the kurtosis statistics suggest the presence of asymmetry in all return series. As a consequence, the Jarque-Bera statistics reject the null hypothesis of normal distribution for all return under consideration. Furthermore, based on the Ljung-Box (LB) statistic of order 12, we can also reject the null hypothesis of white noise and assert that all series are autocorrelated. An application of the Lagrange multiplier test (ARCH-LM) shows strong evidence of ARCH effect suggesting that the ARCH model is appropriate to examine the volatility behaviour of return series.

Also, we find that the empirical unconditional correlation between GCC stock market and oil price are positive for all market. We also observe that Saudi, UAE and Bahrain stock market are more correlated with oil price, while Kuwait, Qatar and Oman have the lowest correlation with oil price.

As can be seen from Table 1, the results of the Augmented Dickey Fuller (ADF) test reject the null hypothesis of a unit root for all return series at the 1% significance level. As a result, we can conclude that all return time series are stationary. Furthermore, the dynamics of the weekly returns for GCC stock market and oil price plotted in Figures 1 and 2 show evidence of volatility clustering in all returns suggesting the presence of ARCH effect.

EMPIRICAL RESULTS AND DISCUSSION

In this section, we will discuss the empirical results of volatility persistence with and without structural breaks. We also estimate BEKK-GARCH model to examine the causal links between GCC stock market and oil price. The estimated conditional volatility obtained from the model is used for optimal portfolio allocation decisions.

Volatility shifts in unconditional variance

The estimated results reported in Table 2 indicate that the ICSS algorithm identifies four structural break points for the Bahrain stock market, three structural break points for Kuwait and Oman stock market, two structural break points for Saudi stock market and one structural break point for UAE stock market, Qatar stock market and oil price.

The empirical structural break points detected endogenously by using ICSS algorithm in unconditional variance can be caused by economic events or financial crisis¹.

Moreover, we observe that the most of structural breaks occurs during recent financial crisis (2008-2009) and there are common structural break points between returns series (Table 2).

¹ In the present paper we do no attempt to investigate the real causes of the structural breaks but how break points affect volatility behaviour and shocks and volatility spillover effects.

Table 1. Summary of descriptive statistics of return series.

Return	Saudi Arabia	UAE	Bahrain	Qatar	Kuwait	Oman	Oil
Mean	0.13%	-0.72%	-0.57%	-0.18%	-0.48%	-1.34%	0.02%
Std.dev	0.039	0.048	0.017	0.249	0.211	0.238	0.063
Skew.	-1.108	-1.398	-1.166	0.497	0.267	0.234	0.346
Kurt.	4.177	6.069	4.425	80.338	83.637	-0.338	2.497
JB	161.122*	321.834*	180.404*	46531.572*	50425.219*	322.402*	148.401*
LB(12)	23.242	49.232	23.609	40.452	42.833	10.023	20.688
ARCH-LM	11.911*	14.320*	16.513*	41.136*	41.445*	1.249*	9.385*
ADF	-7.161	-5.466	-5.983	-12.628	-11.989	-8.884	-6.271
Corr. Stock /Oil	0.279	0.144	0.182	0.025	0.027	0.020	-

Notes: * denote the significant level at 1%; Std.dev is the standard deviation; JB is the Jarque-Bera normality test; LB is the Ljung-Box test for autocorrelation of order 12; ARCH-LM is the statistics test for conditional heteroskedasticity of order 2; ADF is the statistics test for unit root.

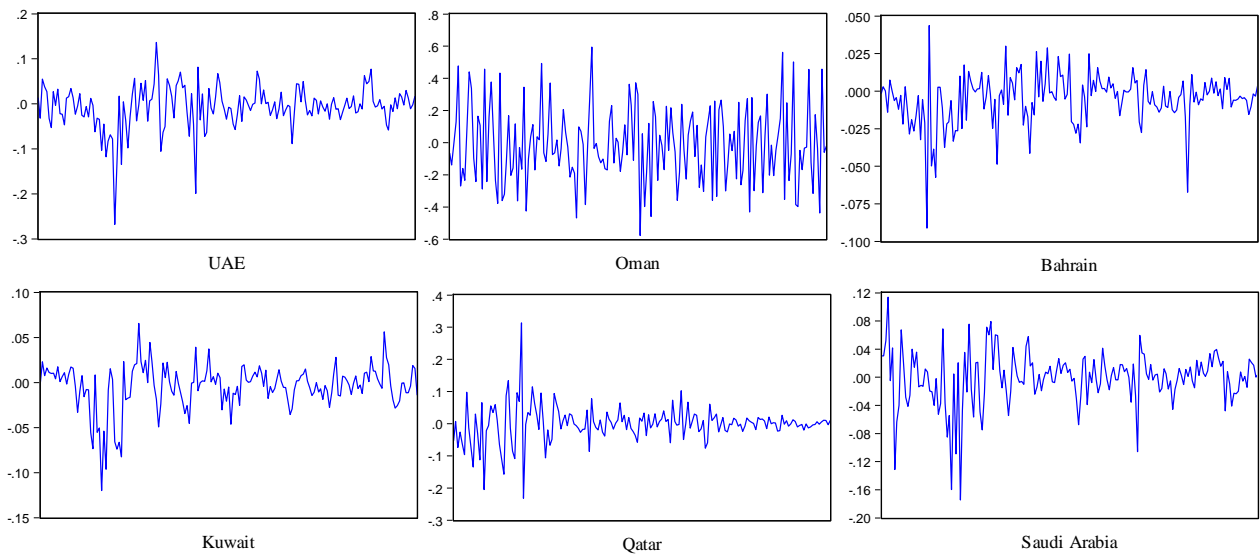


Figure 1. Weekly GCC stock market return

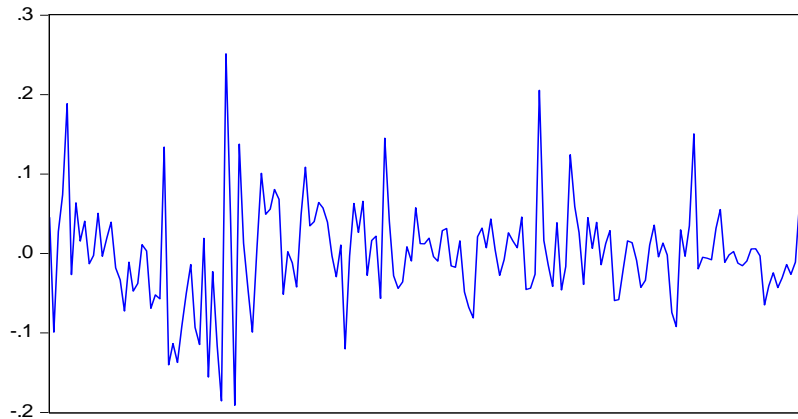


Figure 2. Weekly oil price return.

Table 2. Structural breaks in unconditional variance: The ICSS algorithms results.

Nb. Breaks	Bahrain	Kuwait	Oman	Saudi Arabia	UAE	Qatar	Oil
1	9-Jul-2008	18-Aug-2008	22-Apr-2008	26-Apr-2009	16-Sep-2008	16-Sep-2008	22-Jul-2009
2	16-Sep-2008	24-Jan-2011	18-Aug-2008	27-Sep-2009			
3	17-May-2010	8-Apr-2012	24-Jan-2011				
4	10-Aug-2011						

Table 3. Univariate GARCH(1.1) estimation result without and with structural breaks.

Return	Model	α	β	$\alpha + \beta$	Half-Life shocks	logl
UAE	without structural breaks	0.270	0.671*	0.940	11.224	308.923
	with structural breaks	0.267***	0.542*	0.809	3.276	309.728
Oman	without structural breaks	0.107	0.809*	0.916	7.938	6.479
	with structural breaks	0.054	0.507**	0.561	1.199	6.970
Bahrain	without structural breaks	0.502**	0.440*	0.942	11.617	471.875
	with structural breaks	0.079*	0.048*	0.126	1.177	482.175
Qatar	without structural breaks	0.723**	0.242**	0.965	19.650	188.374
	with structural breaks	0.375*	0.221*	0.596	1.339	251.681
Kuwait	without structural breaks	0.179**	0.729**	0.908	7.201	76.865
	with structural breaks	0.166*	0.330*	0.496	0.989	354.380
Saudi Arabia	without structural breaks	0.559*	0.419*	0.979	32.225	354.867
	with structural breaks	0.415*	0.360*	0.775	2.720	356.885
Oil	without structural breaks	0.323*	0.522*	0.845	4.110	248.364
	with structural breaks	0.258*	0.463*	0.720	2.112	249.033

Notes: The full set of results is available from the authors upon request. Reject of null hypothesis at 1%. 5% and 10% is denoted by *, **, ***.

Volatility persistence without and with structural breaks

The above empirical results about structural breaks are used in order to investigate volatility shifts effects on volatility dynamics. The empirical results of univariate GARCH(1,1) model² without and with structural breaks (Table 3) stress that all GARCH coefficients are highly significant, suggesting that the current values of conditional volatility of the GCC stock market and oil price are sensitive to their past own volatility with and without structural breaks³. Besides, except the UAE and Oman

stock market, the results indicate the past own shocks affect current conditional volatility when structural breaks are ignored. Furthermore, we observe that the current volatility is affected by its past own shocks, except Oman stock market after including structural breaks. Another interesting finding is that the past own volatility (GARCH coefficient) is greater than past own shocks (ARCH coefficient) for Bahrain, Qatar and Saudi stock market, suggesting that past own volatility is more important in predicting current volatility than past own shocks.

Otherwise, the estimated results in Table 3 offer some interesting insights. We observe that the estimated parameters of the univariate GARCH model with structural breaks are smaller than before including structural breaks for all return series. This fact implies that the volatility persistence drops substantially if structural breaks are included⁴. Accordingly, the degree of persistence declines in the model with structural breaks. In the same context, Lamoureux and Lastrapes (1990) show that the results of standard GARCH model indicate more volatility persistence if structural breaks are

² The optimal lag length for the GARCH model was determined by using the AIC and BIC information criteria.

³ The estimated results show that all dummy variables are statistically significant at conventional level, except one breaks point for Bahrain and Oman. However, the joint significance of structural breaks is supported by the likelihood ratio statistic (LR) given by $LR = 2[L(\hat{\theta}_1) - L(\hat{\theta}_0)]$ where $L(\hat{\theta}_1)$ and $L(\hat{\theta}_0)$ are the maximum log likelihood values for the models with and without structural breaks, respectively. The LR statistic is asymptotically distributed as χ^2 with degrees of freedom equal to the number of restrictions. We find that the null hypothesis of no structural breaks is rejected at conventional level for all case. This fact implies that the model which incorporates structural breaks is more appropriate to depict the volatility dynamics over time. The result is not reported due to the large number of estimated parameter but available from the authors upon request.

⁴ This finding is consistent with Kasman (2009) which reveal that the empirical results of previous studies could have overestimated the degree of the volatility persistence.

Table 4. Parameter estimates of bivariate GARCH (1.1) model.

bivariate GARCH(1.1) model without structural breaks						
Coef.	Oil-UAE	Oil-Oman	Oil-Bahrain	Oil-Qatar	Oil-Kuwait	Oil-Saudi Arabia
α	-0.002 (0.0023)	-0.014 (0.0199)	-0.002*** (0.0009)	0.003 (0.0031)	0.007 (0.0062)	0.001 (0.0022)
β	0.317* (0.0778)	-0.159** (0.0772)	0.404* (0.0792)	-0.417*** (0.2486)	-0.176*** (0.1029)	0.339* (0.0882)
a_{12}	-0.185 (0.1027)	0.211 (0.1794)	-0.005** (0.0023)	0.143 (0.1557)	0.074 (0.0649)	0.090 (0.0699)
b_{12}	0.154* (0.0389)	-0.844* (0.1541)	0.170 (0.2410)	0.558* (0.2078)	0.176 (0.5819)	-0.233* (0.0692)
a_{21}	-0.532 (0.4181)	0.005 (0.0291)	-0.271 (0.2059)	0.104 (0.1104)	0.008* (0.0022)	-0.768 (0.5618)
b_{21}	-0.626* (0.1376)	-0.076 (0.0733)	0.342* (0.0473)	-0.130* (0.0372)	-0.006 (0.0084)	0.699* (0.2422)
bivariate GARCH(1.1) model with structural breaks						
α	-0.003 (0.0025)	-0.016 (0.0193)	-0.001 (0.0010)	0.003 (0.0023)	-0.002 (0.0016)	0.004 (0.0025)
β	0.348* (0.0892)	-0.158*** (0.0857)	0.410* (0.0820)	-0.223** (0.1116)	0.353* (0.0679)	0.253* (0.0870)
a_{12}	0.061 (0.0730)	0.217 (0.1575)	-0.026 (0.0237)	-0.142* (0.0416)	0.117* (0.0429)	0.037 (0.0641)
b_{12}	-0.275* (0.0363)	-0.913** (0.4181)	0.088* (0.0217)	0.174* (0.0572)	0.158* (0.0385)	-0.391* (0.1270)
a_{21}	-0.171 (0.1253)	-0.001 (0.0316)	-0.279 (0.3438)	-0.008 (0.0095)	0.005*** (0.0027)	0.649* (0.1749)
b_{21}	0.381 (0.3260)	-0.070 (0.0396)	0.275* (0.0612)	0.033* (0.0105)	0.021** (0.0104)	0.563* (0.2004)

Notes: The oil price return is denoted 1 and stock return is denoted 2. Standard errors are given in parenthesis. *, ** and *** denote rejection of the null hypothesis at 1%, 5% and 10% levels, respectively. The full set of results concerning the diagonal parameters c_{ii} , a_{ii} and b_{ii} are available from the authors upon request.

ignored and conclude that structural breaks should be incorporated into the estimated GARCH model. We also find that the maximum values of log likelihood are smaller than before including structural breaks. Consequently, the model with structural breaks provides a better fit and subsequently more appropriate than the model ignoring breaks.

Additionally, a high degree of persistence in volatility suggests that shocks on volatility die out slowly over time. The estimated results of half-life of shocks given by $(-\log(2)/\log(\alpha + \beta))$ change dramatically for all returns when we include structural breaks. The estimated half-life of shocks changes from 4 to 2 weeks for oil and from 11 to 3 weeks for UAE.

This fact implies that shocks lose their effect after a few weeks when structural breaks are included. Likewise, we find that the GCC stock market and oil price react relatively strongly to incoming news but absorb it fairly quickly. Our finding is consistent with Ewing and Malik (2013) who report that including structural breaks reduce

volatility persistence and the shock effects disappears rapidly.

Shock and volatility spillover effects between stock market and oil

We focus on the relationship between GCC stock market and oil price. The estimated results of the mean equation given by Eqs. 5 and reported in Table 4 indicate that all autoregressive parameters are statistically significant at the conventional levels. This fact implies that the current values of all returns are sensitive to their past own values with and without structural breaks. We also find evidence of short-term predictability in GCC stock market and oil price.

The estimated results of the oil-stock market model⁵

⁵ To the best of our knowledge, there is no empirical research that attempts to examine the interactions between GCC stock market and oil price by considering structural breaks in conditional volatility.

point out that the diagonal parameters a_{ii} and b_{ii} of conditional variance and covariance matrix without and with structural breaks are statistically significant at conventional levels. This fact implies that the conditional volatility is affected by its own past shocks and volatility for all return⁶. The results also indicate that the estimated parameters of past shocks and past volatility are smaller than before including structural breaks. This finding is consistent with the above empirical results of the univariate GARCH model who suggest that including structural breaks on the estimated model reduce the volatility persistence. But this is not all, the cross effects of shocks and volatility are of low importance compared to those obtained if structural breaks are included in the conditional volatility. The latter results are consistent with Marcelo et al. (2008) who reveal that volatility shifts reduce the volatility persistence and the shocks and volatility spillover impacts. Furthermore, the diagnostic tests based on standardized residuals (not reported to preserve space) such as Jarque-Bera test for normality, Ljung-Box tests for autocorrelations of order 12 applied to standardized residuals and squared standardized residuals and ARCH test for conditional heteroscedasticity of order 12 indicate that the model that incorporates structural breaks is suitable to investigate the conditional association between GCC stock market and oil price.

For the interactions between GCC stock market and oil price, the estimated results reported in Table 4 stress that the oil price volatility affects all GCC stocks market⁷, except Bahrain and Kuwait, while only Bahrain stock market reacts negatively to oil price shocks when structural breaks are ignored. On the other hand, the empirical results after including structural breaks indicate that all GCC stock market are sensitive to the past oil price volatility, while oil price shock affects only Kuwait and Qatar stock market volatility. These findings can be explained by the contribution of oil revenues to GDP in GCC countries whose stock market's size indicator as measured by the market capitalization to GDP is positively correlated with the importance of oil in their economies.

Moreover, we find out that UAE stock market receives positive volatility effects when structural breaks are ignored and negative volatility effects when structural

breaks are included. Such results point out that the sign of shocks and volatility spillover effects between GCC stock market and oil price has reversed when the structural breaks are included in the model.

Furthermore, the empirical results for the model without structural breaks show evidence of volatility spillover effects running from GCC stock market to oil price, except Kuwait and Oman while only Kuwait stock market shocks affect oil price. Unlike the later results that exclude structural breaks, the results seem to change after including structural breaks that point out that oil price receives positive volatility spillover from GCC stock market except UAE and Oman. Our finding is more consistent than that of Malik and Hammoudeh (2007) who report that oil price receives volatility spillover effects only from Saudi stock market. Additionally, Arouri et al. (2011) conclude that the causal links are more apparent from oil price to GCC stock market. Moreover, our conclusion contradicts that of Arouri et al. (2012) who provide evidence of unidirectional causal links running from oil price to GCC stock market. A noticeable feature is that there is evidence of negative (positive) sensitivity of Qatar (Oman and Saudi) to oil price changes when structural breaks are included, whereas oil price receives positive shock from Kuwait and Saudi stock market.

To sum up, our results point out that there is evidence of bidirectional causal links between GCC stock market and oil price. These findings are in line with Awartani and Maghyereh (2013) and Jouini and Harrathi (2014) who reveal evidence of shocks and volatility spillover effects between GCC stock market and oil price. Additionally, the obtained findings indicate that the structural breaks change the direction of the causal links among GCC stock market and oil price, the sign of shocks and volatility spillover effects and the magnitude of the estimated parameters.

Portfolio decisions and hedging strategies

We discuss the financial implication for the portfolio decisions and risk management. The estimated results of the optimal weights (average value) for each oil-stock portfolio reported in Table 5 point out that Oman, Qatar and Kuwait stock market have the highest optimal weights. We also find that the estimated results of optimal weights change dramatically when we include structural breaks. As can be seen from Table 5, the optimal weights are increased for all portfolios after incorporating structural breaks in the conditional volatility.

For example, the result suggests that the optimal holding of oil in \$1000 of oil-Kuwait stock market portfolio is \$424, compared with \$576 for the Kuwait stock market while the optimal holding of oil is \$578, compared with \$422 for the same market when we include structural breaks. Hence, the investors in Kuwait should own more stock (oil) than oil (stock) in the corresponding portfolio in

⁶ The best suited-model we obtain for all oil-stock market pairs by using the AIC and BIC information criteria is a VAR(1)-GARCH(1,1). It is shown in the literature that such model allows well capturing the conditional dependency across markets. We also use the quasi-maximum likelihood method to estimate the selected model since the normality hypothesis is rejected.

⁷ The GCC countries account for 52% of the total OPEC oil reserves and 49% of the total OPEC crude oil production. Also, GCC countries produce about 20% of all the oil in the world, accounting for 35.7% of world oil exports, and have 47% of proven oil reserves in the world. Oil and gas represents approximately 73% of total export earnings, roughly 63% of government's revenues and 41% of its GDP. For the GCC countries, oil exports are the main sources of revenues, government expenditures and aggregate consumption demand.

Table 5. Optimal portfolio weight and hedge ratio.

Portfolio	Without structural breaks		With structural breaks	
	$w_{12,t}$	$\beta_{12,t}$	$w_{12,t}$	$\beta_{12,t}$
Oil - UAE	0.635	0.410	0.773	0.483
Oil - Oman	0.584	0.651	0.601	0.686
Oil - Bahrain	0.621	0.598	0.649	0.784
Oil - Qatar	0.783	0.369	0.785	0.513
Oil - Kuwait	0.424	0.433	0.578	0.470
Oil - Saudi Arabia	0.752	0.581	0.844	0.691

Notes: $w_{12,t}$ is the portfolio weight of oil relative to stock market at time t , while average $\beta_{12,t}$ is the risk-minimizing hedge ratio

order to minimize the risk without reducing the expected return if the structural breaks are ignored (included).

For the oil-Saudi stock market portfolio, an optimal portfolio weight of 75.2% implies that an investor willing to invest \$1000 will get a minimum risk if the investor holds \$752 in oil and \$248 in stock market. The results show that the optimal weight becomes 84.4% after including structural breaks which implies that investor holds \$844 in oil and \$156 in stock market. We also find that investor should have more oil (stock) than stock (oil) in their portfolio for all GCC stock market.

From the estimated results reported in Table 5, we find out that the hedge ratios have increased after accounting for structural breaks. The results of the average values hedge ratios indicate that Bahrain, Kuwait and Saudi stock market have the highest hedge ratio. The hedge ratio of oil-Bahrain stock market portfolio implies that \$1000 long in oil should be shortened by \$598 of stock market when structural breaks are ignored compared with \$649 after accounting for structural breaks. For the oil-Saudi stock market portfolio, we find that every dollar which is long in the oil the investor should short 58 cents when structural breaks are ignored and 69 cents after accounting of structural breaks. Our findings show how our estimated results could be used by financial market participants in GCC countries for making portfolio allocation decisions and risk management⁸.

In the result, the obtained findings show that of the optimal weight and hedge ratios differs across GCC stock markets, which can be explained by the fact that GCC countries differ in their levels of dependency on oil price and in their efforts to diversify and liberalize their economies. To sum up, our findings show that the values of the optimal weight and hedge ratios increase when we include structural breaks in the estimated conditional

volatility. Indeed, the results show how structural breaks affect the estimated values of the optimal portfolio weight and the risk minimizing hedge ratios. This has important implications for portfolio selection in financial markets.

Conclusion

The paper aims to investigate the conditional dependency between GCC stock market and oil price and portfolio management strategies under structural breaks. The results suggest that structural breaks reduce the volatility persistence implying that the conditional volatility is more affected by their own past shocks and own past volatility when structural breaks are ignored. We also find evidence of causal links running from oil price to GCC stock market. Moreover, the estimated results show that oil price receives volatility spillover effects from the majority of GCC stock market. Besides, the obtained findings indicate that the sign of shocks and volatility spillover effects has reversed after including structural breaks in the estimated model, e.g. the oil price receives negative volatility spillover effects from Qatar before including structural breaks and positive volatility spillover effects after including structural breaks. The same findings are obtained for the shock spillover effects of Saudi stock market. We also conclude that the structural breaks affect both the causal direction among GCC stock market and oil price and the magnitude of the estimated parameters as well as the degree of persistence in conditional volatility.

Otherwise, the empirical results on the relationship between GCC stock market and oil price may offer insights to investors to know how the value of their portfolios will be affected by large variations observed in oil price. Hence, it is interesting to find that the model ignoring structural breaks gives an optimal weight and hedge ratios smaller than the model that incorporates structural breaks. Our findings show also evidence of sensitivity of optimal weight and hedge ratios to the structural breaks and GCC stock market. These findings can help financial market participants for portfolio

⁸ The slump in global oil market due to the global financial and economic crisis of 2007-2008 slowed the pace of investment, but the recent global economic recovery and the GCC economic reform program, focusing to attract domestic, regional and foreign private investment will result in a sharp rebound in the region's economic activities. Also, the recent economic reform program of the GCC countries could increase resilience against crises and their market transparency.

selection and risk management.

In this paper, we find that structural breaks reduce the volatility persistence on the one hand and affect the shocks and volatility spillover effects on the other hand. Our findings show that ignoring structural breaks in conditional volatility may lead to wrong results about the interdependency between GCC stock market and oil price and the portfolio decisions.

Conflict of Interests

The author(s) have not declared any conflict of interests.

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