



Role of actuarial accounting in enhancing banks performance

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Abstract: This study aims to shed light on the significance of actuarial science in the banking sector from an accounting point of, And try to find out of the role he plays of actuarial accountant in the Sudanese banking sector and added value that he can add especially In light of a local economy which suffers from violent economic fluctuations that cast a shadow over on. financial stability, and the extent of its ability and contribution to the effectiveness of performance. The study found that Actuaries are active in banking roles despite the weakness of the actuaries who work in the banking sectors in sudan, The study also showed there's a direct relationship between economic fluctuation risks and financial crises need to adopt actuarial accounting methods, also, they have a major role to play to supports the improvement of the quality of financial reporting. The Study recommended necessity of educating decision- makers in the banking sector on the importance of actuarial science and actuarial accountants, who play a key role through actuarial methods that effectively contribute to the bank's ability to overcome economic fluctuations and financial crises.

Keywords: *Actuarial science; Actuarial Accounting; Actuaries in Banking; Financial reports.*

1. Introduction

In light of the increasing global competition with the emergence of many financial crises that hit the global economy, which is still a lot of institutions suffering from its effects, especially in the banking sector, so all financial institutions strive to maintain their balance and ability to continue by adopting strategies that help them to deal with such These circumstances, and the most prominent of these strategies, which many institutions are seeking to build upon are the methods of actuarial accounting.

Actuarial science is commonly regarded as part of the business sector, which covers a variety of interrelated fields such as mathematics, statistics, probability, finance, economics and accounting. Actuarial science draws supports and provides technical assistance to professionals in many fields of endeavor. (Jugu, 2015).

Grubbs (1999) referred to the actuaries evaluate to the statistical probability of an event occurring in the future and estimate the likely financial impact of that event. and also Trowbridge (in Jugu, 2015).referred to an actuarial science is a branch of science that encompasses complex calculations and models derived from other sciences such as mathematics, statistics, probability, finance, economics and accounting. It is an applied science which deals with the financial and economic consequences of events involving risk and uncertainty.

Sharma (2019) referred to recently became there's a lot of demand for actuaries in other financial institutions, as the number of unforeseeable events increase like trade wars, global slowdown, cyber-attacks, economic fluctuations and financial crises, etc. Actuaries could play very important role in factoring these uncertainties while making business decisions. There are many areas where activities of an actuary interact with that of the accountant. One of the perceived areas relates to issues of pension schemes, insurance policies and the associated entity's pension costs and disclosures. (Lepădatu, 2012).

The key link between accounting and actuarial science is financial mathematics. Accounting and Actuarial science apply models and techniques in financial mathematics to problems related to financial risk or asset management. While accountants and actuaries give answers on how finances should be handled, a financial mathematician deals with investment banks, hedge funds and commodity traders. Another fact about financial mathematics is that it is related to computational finance (Yohanna G. Jugu, 2015). And also the financial reports is one of the main points where accounting meets actuarial science, so actuaries need to understand the accounting rules and Generally Accepted Accounting Principles (GAAP), under which the financial impact is being reported. (Odomirok et al, 2014).



The opening of accounting towards the actuarial calculation is but a natural consequence of its evolving spirit. The 21st century capitalist spirit leads us to an actuarial accounting approach based on future cash flow estimates with an actuarial rate dependent on a number of external factors such as: economic, financial and monetary policy; inflation levels and their evolution. After the period in which the accounting presented only a static position (18th–19th century), then also a dynamic one (20th century) of a company's financial reports, now we are witnessing a tendency towards future cash flows being updated (Gheorghe V, P 65:2012).

The significance of this study is to shed light on the importance of actuarial science in the banking sector from an accounting point of view. This study also seeks to find out the role of actuarial accountant in the Sudanese banking sector and to highlight the added value that can be added, particularly in the light of the local economy, which is suffering from violent economic fluctuations that cast a shadow on financial stability.

Hypotheses of Study:

The study has formulated hypotheses that will be subjected to a statistical test, it posed three main hypotheses as the following:

- **H.1.:** The actuarial accountant in the banks supports the improvement of the quality of financial reports.
- **H.2.:** Actuarial accounting methods contribute effectively to the bank's ability to overcome economic fluctuations and financial crises
- **H.3.:** Actuarial accountant plays a pivotal role in reducing acute banking credit risk.

2. Literature Review

In the context of highlighting actuarial accounting, Lepadatu (2012) has indicated in his study by the end of the year 2000 the terms of "accounting in market value" or "accounting in fair value" and recently, the term of "actuarial accounting" appeared. The opening of the accounting to the actuarial calculation is a normal consequence of its evolving spirit. At the origin of the international accounting standards lies the framework for preparing, presenting and disclosing the financial statements. The framework stays as a reference matrix, as a standard of standards, as a constitution of financial accounting. Also Rafejameel, (2016) indicated in his study the role of actuarial accounting to create maximize value through services provided by using accounting expertise, audit and knowledge in the field of science Statistics and Mathematics and employment in finance and financial risk assessment of current or expected. Several studies have pointed to the role of actuarial accounting in the banking sector, (Sinkis, Scott, 2013) a survey was conducted to better understand the growth of the actuarial profession in the banking sector at a time of heightened focus on Australia's financial system, where the study showed that actuaries are working in a wide range of banking roles, with a slight bias towards credit risk and Treasury modeling. The high combined percentage in Investment Banking and Markets (29%) shows actuaries are active in 'front-office' roles as well as the often stereotyped corporate and middle-office roles.

While Sharma (2019) referred in his study that to Actuaries are financial engineers and figure out future sense by using actuarial modeling techniques. They also look at macroeconomic risks like interest rate risk, liquidity risks, etc. Actuaries' are evaluating of these risks and seeking to reduce, minimize and hedge those risks. Sharma added, "Actuaries can play a critical role in the assessment of the Minimum Capital Requirement and the solvency ratio as required under the Basel III using Actuarial Modelling Techniques. Also (Peabody, 1994) referred to that large of members of accountant actuaries work in Credit Risk roles on banks sector based on the anecdotal recognition of this area as the more natural 'cross-over' point from statistical modeling roles, and the uses of quality data available in this sector for certain products such as credit cards, loans and deposits and regulatory and market focus on funding and liquidity within banking. As such, the breadth of banking positions that actuaries occupy is healthy and a symbol of its members' broad applicability of actuarial skill-set, experience, and motivation.

Referred Tichareva (2016) in the Executive summary on the significant work initially performed by the Actuarial Society of South Africa ("ASSA") in 2009 in their investigations on the role of actuaries in banking: their roles typically relate to risk management. This ranges from credit risk, market risk, liquidity risk, operational risk, Design and pricing of all banking products (credit and non-credit related), Balance sheet management, i.e. asset-liability mismatching risk management and liquidity risk management, Capital modeling and other business risks. that because they have the relevant skills and knowledge like Quantitative and modeling skills and Business and regulatory awareness in the banking sector.

Nowadays, banking seems like an ideal industry for actuaries to be able to help. Several studies dealt with the relationship between actuarial science and financial reporting in the banking sector, where Jugu (2015) showed in his study to that an Actuary contribute significantly to the work of an accountant, particularly in the financial reporting domain. With this key discovery, he found that the meeting point of commonness between accounting and actuarial science is in the financial reporting field. And that accounting and actuarial science are disciplines relating to the importation of financial reporting and risk assessment / management knowledge. In another aspect Walker (2017) detailed the skills required to implement IFRS 9 and how these translated directly to the actuarial skill set, making actuaries well-suited to implement IFRS 9 in banks. The skills range from strong quantitative skills, risk management, strategy and project management. Transferring skills from IFRS 9 to other fields of

practice is clear, making IFRS 9 a good training ground for actuaries looking to work in banking, while also developing the skills needed to be effective in other environments. Vyas (2019) indicated in that Earlier banks used IAS 39: Financial Instruments: Recognition and Measurement which is an international accounting standard for financial instruments. It has been replaced by International Financial Reporting Standard 9 (IFRS 9), which takes effect from January 2018 onwards. As a result, banks need to switch from the loss model incurred to the expected loss model. Today, the Indian banking scenario is such that they hardly have any professional who does possess modeling skills to the extent required to cope up today with the changes taking place. (Luchik, Yevdoshchak & Manachynska (2018) to need of a new "Actuarial Financial Statements" development, comparing it with "General Requirements to Financial Reports" to face globalization and crisis trends in the domestic economy in Ukraine, the study showed The result of the introduction of actuarial accounting will be the formation of a new basis of accounting and analytical support for the management of the domestic enterprises activities.

3. Methodology

Data collection for this paper took two forms. The first was a survey questionnaire with the sample of members of whom working primarily in Banking Practice, Academics, Actuaries, Financial Analysts and Auditors, the second, a one of interviews conducted with self-selected survey respondent (Khalid, Aug 17/2019).¹ Survey questionnaire includes three constructs: role of actuarial accounting enhance banking performance (improvement of the quality of financial reports, reducing acute banking risk.), overcome economic fluctuations and financial crises. It also includes personal information. The survey was available for over two months from December 2019 to January 2020, through email, SMS and Google drive and hence convenience sampling technique has adapted to collect the data, see Table (1).

Measures and Instrument--In order to achieve the objectives of this study, the questionnaire included 18 items. All items were measured using 5-point Likert's scale from 1 (strongly disagree) to 5 (strongly agree). The questionnaire is first drafted in English version and then translated in Arabic version since the national language is Arabic. The questionnaire was further revised after pilot test is conducted to assess the suitability and reliability. Two interviews were conducted from mid-December 2019 to January 2020, and those responses were captured along with our discussion of the results of the survey below. These discussions were wide ranging and featured actuaries with a range of banking experience in a diverse set of roles.

4. Data Analysis and Discussion of Findings

100 (Hundred) questionnaires were sent out to your target respondents, there were 83 respondents, representing 83 % from the target. (See Table 1), An exploratory factor analysis was performed for obtaining initial factor structure of Actuarial Accountant, Enhancing Banking Performance and Economic Crisis. Reliability and validity of obtained factor structure is tested using cronbach's alpha and then, a confirmatory factor analysis was conducted in order to verify the characteristic of convergent validity of the measurement items (Anderson and Gerbin, 1998; Bagozzi and Foxall, 1996).

For checking sampling adequacy, Kaiser-Meyer-Olkin (KMO) and Bartlett's test of Sphericity were performed. The value of KMO (0.87) and Bartlett's test of Sphericity ($\chi^2 = 1246.45$, $df = 210$ and $p \leq 0.000$) represented the adequacy of sampling for further analysis.

Cronbach's alpha for all factors scale was 0.946 which exceeded the minimum standard of 0.7 recommended by Nunnally, 1978 and Peterson 1994 for scale reliability.

Table (1): Demographic Profile of the Samples

Demographic Factors	Count	Percentage
Education		
Graduation	19	22.9
Master	33	39.8
PhD	31	37.3
Total	83	100.0
Job Positions		
Academic	27	32.5
Banking actuary	1	1.9
Actuary	10	12
Banker	18	21.7
Financial Analyst	12	14.5
Auditor	15	18.1
Total	83	100.0
professional qualifications		
Fellowship of Accountants	14	16.9
fellowship actuarial	4	4.8
Other	34	41.0
N/A	31	37.3
Total	83	100.0

Source: source: own survey, 2020

¹ Khalid, Yassir, Interview, Aug 17/2019, Who a chief of TASC For Actuarial & Financial Consulting - One of the long-standing consulting offices Sudan.

To answer the questions sequence and hypotheses of the study, means, standard deviations of the study were extracted and then arranged in descending order according to the arithmetic means for each hypothesis : Table (2) shows means and standard deviations for the paragraphs contained in the questionnaire for the respondents' answers. The level of importance of these paragraphs to each other was determined based on the average consensus.

1. Decision rule for the Descriptive Analysis

If mean < 3 the respondents do not agree.

If mean ≥ 3 the respondents agree. (The decision rule depends on the 5-point likert scale for each statement, if the respondent scored a maximum of ≥3 points, they would be categorized as having a positive attitude and those who scored ≤3 points would be considered to have a negative attitude. That according to the formula $(\frac{1 + 2 + 3 + 4 + 5}{5} = 3)$).

Table (2): Descriptive statistics

Q.NO	Items	Mean	SD	Cronbach Alpha
H.1 The actuarial accountant in the banks supports the improvement of the quality of financial report.				
1	The presence of actuarial accountant in the audit committee leads to improve the quality of financial reports	4.24	.774	0.946
2	The various methods of actuarial accounting help predictive financial reporting	4.14	.783	
3	The analytical ability enjoyed by the actuary accountant helps prepare good financial reports	4.13	.600	
4	The actuarial accountant assists the organization in the continuous development of the accounting information system and leads to avoid some deficiencies in the control.	3.95	.795	
5	Actuarial accounting methods take into account the disclosure of financial and non-financial information that helps in making good decisions	3.94	.755	
6	The importance of the actuary accountant in the bank is not less than the importance of the financial controller	3.71	.849	
H.2 Actuarial accounting methods contribute effectively to the bank's ability to overcome economic fluctuations and financial crises.				
7	The presence of actuarial accountant in the financial management reassures stakeholders in the ability of the facility to overcome economic fluctuations.	4.11	.812	0.946
8	Actuarial accounting methods helps to face globalization and crisis trends in the domestic economy .	4.11	.681	
9	actuarial accountant can able appropriately judge the adequacy of capital to withstand financial crises.	3.81	.788	
10	The actuarial accountant assists in studying the financial protection systems as a means of reducing or avoiding potential economic fluctuation risks in the light of uncertainty.	3.77	.860	
11	Volatility of Macroeconomics factors affect the actuarial accountant's ability to assess financial market risks.	3.75	1.09	
12	The more severe financial crises the more the need to adopt actuarial accounting methods.	3.71	.877	
H.3 Actuarial accountant plays a pivotal role in reducing acute banking credit risk.				
13	The Actuarial accountant helps to Design and pricing of banking products and Credit and liquidity risk management.	4.29	.574	0.946
14	The presence of an actuarial accountant in risk management committees contributes to the effectiveness their work.	4.17	.621	
15	The economic, statistical and mathematical background helps the actuary accountant in the high predictive ability in banking risk management .	4.12	.651	
16	actuaries play a critical role in the assessment of the Minimum Capital Requirement and the solvency ratio as using Actuarial Modeling Techniques.	4.04	.689	
17	The relevant skills and knowledge helps the actuary to build cutting edge models, to optimize the risk environment and to work on the forefront of policy development.	3.96	.803	
18	The actuary contributes to helping banks do project appraisals, estimating likely default rates based on uncertainties.	3.72	.979	

Source: own survey, 2020

2. Discussion the hypotheses of the study:

H.1: the actuarial accountant in the banks supports the improvement of the quality of the financial report. This hypothesis is tested with the help of Table (3) by using Chi-square Test ,the results showed that Mean was (4.02) and the direction of the study sample answers to this hypothesis tends to be (high) based on the decision rule earlier stated, a (mean ≥ 3). This confirms the respondents 'approval of the phrases at high rates, as stated in the table (2) H1, the results also showed that the value of the Chi-Square was (52.4) at the significance level (0.00) and it is less than the level of significance (0.05), This confirms the approval of the respondents sample on all statements of the first hypothesis, and this confirms its validity.

Table (3): Chi-Square Test (first hypothesis test)

Mean	Std. D	Chi-Square	df	Sig.
4.02	.601	52.4	14	.000

H.2: Actuarial accounting methods contribute effectively to the bank's ability to overcome economic fluctuations and financial crises. This hypothesis is tested with the help of Table (4) by using Chi-square Test ,the results showed that Mean was (3.87) and the direction of the study sample answers to this hypothesis tends to be (high), based on the decision rule earlier stated, a (mean ≥ 3), this confirms the respondents 'approval of the phrases at high rates, as stated in the table (2) H2. The results also showed that the value of the Chi-Square was

(59.1) at the significance level (0.00) and it is less than the level of significance (0.05), This confirms the approval of the respondent sample on all statements of the second hypothesis, and this confirms its validity.

Table (4): Chi-Square Test (second hypothesis test)

Mean	Std. D	Chi-Square	df	Sig.
3.87	.6532	59.1	15	.000

H.3: Actuarial accountant plays a pivotal role in reducing acute banking credit risk. Given the table (5), the results showed that Mean was (4.05) and the direction of the study sample answers to this hypothesis tends to be (high) , based on the decision rule earlier stated, a(mean ≥ 3), This confirms the respondents 'approval of the phrases at high rates, as stated in the table (2) **H.3.**The results also showed that the value of the Chi-Square was (36.9) at the significance level (0.00) and it is less than the level of significance (0.05), This confirms the approval of the respondent sample on all statements of the second hypothesis, and this confirms its validity, That an actuarial accountant plays a pivotal role in reducing acute banking risk.

Table (5): Chi-Square Test (third hypothesis test)

Mean	Std. D	Chi-Square	df	Sig.
4.05	.560	36.9	13	.000

5. Discussion of Finding

Indication of the result of the statistical analysis to accept the first hypothesis, which is represented in that the actuarial accountant in the banks supports the improvement of the quality of financial report. Despite the weakness of the actuaries who work in the banking sectors, The predictive and analytical ability enjoyed by the actuary accountant helps prepare good financial reports, also assists the organization in the continuous development of the accounting information system which leads to avoid some deficiencies in the control. as indicated Kalid (Interview,Aug17/2019) There are only three actuaries in Sudan they have full qualified actuaries, and there are many practitioners of the actuarial profession partially-qualified, and there are many graduates who have obtained a bachelor's or master's degree in actuarial science. There are two working in the Ministry of Finance in the state of Khartoum in addition to only one person working for the Central Bank of Sudan, and all of them have a master's degree and Fellowship in actuarial sciences. This result was further supported by the study of (Luchik et al.,2018) , (Jugu, 2015) (Vyas , 2019), (Tichareva,2016) and study of (Walker 2017).

Indication of the result of the statistical analysis to accept the second hypothesis which is represented in that Actuarial accounting methods contribute effectively to the bank's ability to overcome economic fluctuations and financial crises. the study showed that there's a direct relationship between economic fluctuation risks and need to adopt actuarial accounting methods, and also showed actuarial accountant can able appropriately judge the adequacy of capital to withstand financial crises , and assists in studying the financial protection systems as a means of reducing or avoiding potential economic fluctuation risks in the light of uncertainty. Y.K(2019) also indicated in the interview, the sudanese banking sector is fraught with many risks that require actuarial analysis and advice, especially In light of a local economy which suffers from violent economic fluctuations that cast a shadow on financial stability. In addition to the main obstacles facing actuaries in Sudan is the ability to deal with international actuarial bodies under the American financial sanctions imposed on Sudan.This result is supported by a number of studies(Luchik et al. 2018)Refered Tichareva (2016).

Indication of the result of the statistical analysis to accept the thaird hypothesis which is represented in that the Actuarial accountant plays a pivotal role in reducing acute banking credit risk.Where the results of the study showed that The Actuarial accountant helps to Design and pricing of banking products and Credit and liquidity risk management, also that the statistical and mathematical background helps him in the high predictive ability in banking risk management. In addition to that Khalid (2019) pointed out in an interview, the banking sector is fraught with many risks that require actuarial analysis and advice. Credit and liquidity risk analysis is one of the most important services in which actuaries can play a prominent role in the banking sector and also he referred the main obstacles facing actuaries in Sudan is the ability to deal with international actuarial bodies under the American financial sanctions imposed on Sudan. This is supported by a study (Tichareva,2016) , (Luchik et al.,2018) and (Sinkis ,Scott , 2013) .

6. Conclusions

Based on the analysis of the data, some conclusions are presented as follows:

The results of the survey support the basic assumption that the actuarial accountant would work in a range of banking roles and support the improvements in the quality of the financial report.

The diversity of the banking roles of actuaries is healthy and a sign of the broad applicability of the actuarial skills , experience and ambition of its members. Actuaries are active in banking roles as well as the wide array of risk and product management roles. The survey results confirmed that actuarial accountants have a major role to

play through Actuarial accounting methods which contribute effectively to the bank's ability to overcome economic fluctuations and financial crises, in addition to that the presence of actuarial accountant in the financial management reassures stakeholders in the ability of the facility to overcome financial crisis. The actuaries assist with their economic, statistical and mathematical background and the high predictive ability in studying the financial protection systems as a means of reducing or avoiding potential financial risks, especially in the light of uncertainty.

Recommendations:

- Promote awareness of importance of the profession among managers and educate decision-makers in the banking sector about actuarial science In order to be able to deal with the expected changes in the financial services regulations, which will impose many requirements for the banking sector in Sudan After removing sanctions.To promote the involvement of actuaries in the Banking field.
- Support a banking fellowship focus on the application of actuarial concepts learned to solve complex problems within banks.
- Encourage and support actuarial associations to embrace banking as an actuaries practice area and to introduce their members' banking curricula.
- Work to remove obstacle obstacles facing actuaries in Sudan to able to deal with international actuarial bodies under the American financial sanctions imposed on Sudan.

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