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Article

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

A conceptual model of operational risk events in the banking sector

Suné Ferreira¹ and Zandri Dickason-Koekemoer^{1*}

Abstract: Operational risk constitutes a large portion of a bank's risk exposure. Unlike other financial risks, operational risk is classified as a pure risk (only an opportunity of a loss), as it always leads to a financial loss for a bank. The failure to mitigate and manage operational risk effectively during past operational risk events has led to the demise of several banks and other financial institutions. Operational risk has the possibility to lead to other bank risk and to influence the perceptions of the banks' main stakeholder group i.e. depositors. The rationale behind profiling depositors' behaviour during operational risk events will contribute toward constructing a revolutionised risk management model. A better indication of how depositors react during operational risk events may lead to better prediction of withdrawal risk within banks. Primary data was collected from 417 depositors in Gauteng, South Africa, using a self-structured questionnaire. Statistical techniques such as correlation and significance tests were used in the statistical analysis. A positive relationship was found between depositor likelihood to withdraw during operational risk events for two of the three variables; bank perceptive and behavioural finance biases. A negative relationship was found between depositor's likelihood to withdraw and their risk tolerance level.

Subjects: Corporate Finance; Banking; Credit & Credit Institutions



Suné Ferreira & Zandri Dickason-Koekemoer

ABOUT THE AUTHOR

Dr Suné Ferreira and Dr Zandri Dickason-Koekemoer specialise in financial risk management having obtained their PhD degrees in this field. Their main focus area is on financial risk tolerance, depositor behaviour, investor behaviour, behavioural finance, and the financial well-being of investors. These researchers have already published several articles in accredited journals regarding this field of interest.

PUBLIC INTEREST STATEMENT

Banks have daily exposure to numerous operational risks, where those risks might pose as a threat to bank stakeholders. For banks, depositors might seem like the most important stakeholder group. Up until recently, researchers have focused mostly on how operational risk events influence the share prices of a bank. Therefore, an opportunity emerged to zoom in on how depositors react during hypothetical operational events. This paper analysed whether depositors' tendency to withdraw their money from their bank accounts is influenced by their perception of their bank, the behavioural biases they are subject to and their individual risk tolerance level. The rationale behind profiling depositors' behaviour during operational risk events will contribute toward constructing a revolutionised risk management model. A better indication of how depositors react during operational risk events may lead to better prediction of withdrawal risk within banks, ultimately predicting bank runs.

Keywords: operational risk; behavioural finance; risk tolerance; stakeholder perception
JEL classifications: G14; G21; C3

1. Introduction

Banks are primarily regarded as risk-averse but not always fully risk-aware (Vardy, 2015). Hence, banks are unintentionally exposed to various financial risks, mainly operational risk, due to their economic and monetary role. These financial institutions must furthermore strive in a continuously changing banking regulation and risk management environment, bank automation (non-traditional sources) and consumerism; all of which can be attributed to changing depositor behaviour (Coetzee, 2016). These changes and the uncertainties that stem from them might significantly influence bank revenue and operational costs (Ernst & Young, 2012). The primary fear among regulators is that changing depositor and financial behaviour due to operational risk events in the banking environment will influence global financial markets so severely that the total risk in the banking industry will escalate (Koch & Macdonald, 2006).

The Basel Committee on Banking Supervision (2001) define operational risk as a risk of direct or indirect losses arising from inadequate or failed internal processes, people, systems or from external events. These operational risk events are categorised by the Basel Committee on Banking Supervision (BCBS) (2001) as (1) internal and (2) external fraud, (3) employment practice and workplace safety, (4) clients, products and practices, (5) damage to physical assets, (6) business disruptions and system failures and execution and, lastly, (7) delivery and process management. Internal fraud takes place due to the deliberate embezzlement of bank assets, theft, insider trading or the evasion of laws by any internal party in the bank. Such operational events may include cases of unauthorised trading where transactions were intentionally not reported or unauthorised. Mismatching of a bank's position (i.e. the bank is not as financially sound as reported) is also classified among internal fraud and theft. According to the studies by Ruspantini and Sordi (2011) as well as Moosa and Li (2013), cases of internal fraud were found to be the most severe operational events experienced by banks in terms of the consequences of these events. External fraud includes a breach of system security due to the deliberate embezzlement of the bank's assets or by evading laws and regulations. It encompasses sub-categories such as theft of information or hacking. Hacking in the form of cyber-attacks as well as other technology-driven crimes are considered as a form of fraud instead of information damages (Soprano, Crielaard, Piacenza, & Ruspantini, 2009, p. 17). Employment practice and workplace safety include three subcategories of activities giving rise to operational risks, namely employee relations in the workplace, health and safety as well as any form of discrimination.

The majority of studies regarding operational risk found this event category to be the least severe (Gillet, Hübner, & Plunus, 2010, p. 225). The reason being that information regarding this event is usually internal and confidential and is seldom fully disclosed to the public (Soprano et al., 2009, p. 18). Clients, products and business practices are also seen as some of the most severe types of operational risk events (Soprano et al., 2009, p. 14). This event consists of both the intentional and unintentional failure to act in accordance with the obligations to bank clients, inadequate products or from the wrongful intent of a product. According to the BCBS (2006), five subcategories exist within this event category, the first being suitability, disclosure and fiduciary breaches. This may include any activities where a client's privacy was breached, disclosure or client guideline violations, aggressive loan extensions or severe cases of lender liability (Crouhy, Galai, & Mark, 2014, p. 510). Improper bank or market practices may include insider trading, money laundering or any form of market manipulation by manipulating currencies or interest rates. A third sub-category includes product flaws such as model errors in how a bank structures a product. Selection, sponsorship and exposure are where a bank failed to investigate its clients per guidelines or exceeded the exposure level of a client. The last sub-category includes advisory activities related to disputes over performance advisory activities (BCBS, 2006), p. 305). Damage to physical bank assets encompasses losses due to natural

disasters or due to human-made events such as terrorism or vandalism. The exposure level of this event is calculated by accounting for the aggregate real estate value of a bank. Such events may involve a single local branch or the headquarters of a bank (Crouhy et al., 2014, p. 510).

Business disruptions and system failures include losses due to the disruption in the normal course of business or due to system failures (Chernobai, Rachev, & Fabozzi, 2007, p. 24). System failures may be due to the failure of hardware or software or due to power failures. The severity of this event is often challenging to quantify, as a firm-wide event may be associated with the failure of a single unit within the bank (i.e. power outage due to faulty wire on the ground floor). Execution delivery and process management encompass the failures associated with transactions, monitoring and reporting processes, customer documentation and management as well as losses from traders, vendors and suppliers. The majority of these events occur at a high frequency with a lower severity level (i.e. miscommunication, data entries, accounting errors, missing documents). On the other hand, sub-categories such as monitoring and reporting, where a bank failed to comply with their mandatory reporting obligations, occur at a lower frequency, but at a higher severity level meaning larger losses (i.e. fines or penalties) (Cummins, Lewis, & Wei, 2006).

Financial institutions and local regulatory and financial rating agencies recognised the significance of operational risk but struggled to define it until the BCBS (2001) defined operational risk during its consultative report (Cummins et al., 2006, p. 2607). The BCBS (2006), during the global convergence of capital measurements for operational risk, categorised operational risk events. The BCBS has published three Basel Accords to date and is working on publishing the fourth Basel Accord (Joshi & Morris, 2018). The continuation of banking failures around the globe resulted in the emergence of the Basel II Accord. The Accord was aimed at being more risk-sensitive by providing supplementary guidelines to financial institutions to hedge against additional risks. Among these risks were an operational risk (BCBS, 2001). The integration of operational risk provided the third component of the first pillar of the capital framework. After Basel II, the amended capital framework then included three pillars, first, minimum capital requirements for credit risk, market risk as well as operational risk, secondly, supervisory review to ensure sufficient capital levels and, thirdly, public disclosure to guarantee market discipline (BCBS, 2013). Not only did Basel III provide improved liquidity standards, but also the improved quality of capital to be kept (BASA, 2014, p. 2). The BCBS released a proposed reformed capital framework during December 2017, which is frequently referred to as Basel IV within the financial industry (Joshi & Morris, 2018). With this proposed framework the BCBS aims to improve the capital regulatory framework by making it more resilient and increase confidence within the global banking industry (BIS, 2017).

Banks are exposed to operational risk events on a daily basis and constitute a large portion of a bank's risk exposure (De Jonghe, 2010; Lewis, 2004). Unlike other financial risks, operational risk is classified as a pure risk (only an opportunity of a loss), as it always leads to a financial loss for a bank (Micocci, Masala, Cannas, & Flore, 2009; Rajendran, 2012). The failure to mitigate and manage operational risk effectively during past operational risk events has led to the demise of several banks and other financial institutions (Ferreira, 2015). The consequences of operational risk events can be felt throughout a bank as it can lead to further firm-wide risks to be extreme (Sweeting, 2011). A fine line exists between operational risk and other risks due to the significant social media attention that operational risk in a bank attracts (Ciborra, 2009). Ferreira, 2015 established a relationship between operational risk in a bank and the perception (reputational risk) of a bank. Operational risk events such as internal and external fraud may cause other banking risks such as credit risk, liquidity risk and market risk to be extreme as a result of various irrational stakeholder behaviour (Sturm, 2013). Credit risk is the risk that a bank suffers due to a counterparty that fails to repay a loan i.e. fails to adhere to its debt commitments (Crouhy et al., 2014, p. 30). Often losses occur where banks are uncertain whether to classify a loss as credit risk or operational risk (Soprano et al., 2009, p. 14). South Africa's economy is market-based, so the

banking sector is exposed to considerable market risk. Market risk is the risk of loss in a bank's off-balance sheet position due to adverse market price movements (Rose & Hudgins, 2013, p. 184).

The central function of a bank inherently exposes it to operational risks where each of these risks has the possibility to influence stakeholders' perception. This perception, which is linked to the trustworthiness, credibility and performance of the bank, translates into the reputation of the bank (Vardy, 2015), whereas a brand relates to a specific product or service of any institution (Louisot & Rayner, 2012). The importance or value placed on a corporate reputation has also evolved over time. Globalisation, social media, intangible assets and competitive markets have all contributed towards the importance of the perception of the bank and ultimately its reputation (Spedding, 2014). The most important task of a bank is to establish who their key stakeholders are and to prioritise responsibilities according to these stakeholder characteristics, needs, perceptions, risk tolerance and financial behaviour (Louisot & Rayner, 2012). More than 80 per cent of global companies regard their customers as the most valuable stakeholder's group (Deloitte, 2014). For deposit safeguarding institutions such as retail, commercial and savings banks, depositors are their main customers and, hence, the most important external stakeholders (CIPS, 2014).

Analysing the relationship between depositors' behaviour and operational risk events is therefore imperative to a bank since operational risk constitutes a large portion of bank exposure (Honey, 2012). A change in depositor behaviour may lead to a change in risk exposure of a bank, which could influence bank revenue and cost (Coetzee, 2016). It is therefore vital that banks take depositor behaviour into account when constructing a risk management framework (Vardy, 2015). Previous research studies such as Perry and De Fontnouvelle (2005), Gillet et al. (2010) and Fiordelisi, Soana, and Schwizer (2013) have only focused on reputational risk by analysing the effect on the stock market after operational events. No previous research has focused on analysing participant behaviour rather than the stock market behaviour. The overriding objective was to analyse bank depositors' behaviour after operational risk events based on how they form their perception of a bank, their risk tolerance level and the behavioural biases to which depositors are subjected. The main aim of this paper was to investigate depositors' withdrawal behaviour after operational events, in relation to depositors' perception towards a bank, the behavioural finance biases they are subject to and the level of risk they are willing to tolerate in terms of their bank deposits. The rationale behind profiling depositors' behaviour during operational risk events will contribute towards constructing a revolutionised risk management model. A better indication of how depositors react during operational risk events may lead to better prediction of withdrawal risk within banks. This paper will provide some context into banks' exposure to operational risk in Section 2, while the methodological approach is discussed in Section 3. The results found in this paper are elucidated upon in Section 4. Section 5 provides recommendations for future researchers.

2. Literature review

Banks have always been exposed to operational risks, yet there is a strong reason to believe that the exposure to operational risk will only increase in the future (De Jongh, De Jongh, De Jongh, & Van Vuuren, 2013, p. 371). Operational events such as the ones mentioned above have predominantly increased due to improved transparency as required by regulators as well as the increased reliance on improved technological automation within banks (Cummins et al., 2006, p. 2606). The financial behaviour of depositors is fundamentally affected by numerous risk events, among these are operational risk events (Chernobai et al., 2007). Financial behavioural theories such as the rational choice theory (Scott, 2002) assume that depositors are rational when it comes to their life savings, however, studies have found depositors to be irrational with regard to their perceptions and financial decisions (Jagongo & Mutswenje, 2014). These irrational perceptions and decisions are influenced by psychological factors, which will eventually determine depositors' behaviour. The financial decision-making behaviour of depositors is dependent on behavioural finance biases. Behavioural finance consists of three elements: firstly, knowledge of finance, secondly, knowledge of economics and lastly, cognitive psychology when making financial decisions (Zindel, Zindel, & Quirino, 2014). Behavioural finance originated due to the irrational manner in which market participants make financial decisions.

Behavioural finance biases emanate from previous research that suggests that individual financial choices under uncertainty are contradictory to rational financial decisions (Thaler & Johnson, 1990). These biases are aimed at explaining the causation of depositors' financial decision-making behaviour. Nine behavioural biases exist that might influence depositors' behaviour; representativeness bias, overconfidence, anchoring, gamblers, availability, loss aversion, regret aversion, mental accounting, and the self-control bias (Bodie, Kane, & Marcus, 2013). A connection can also be drawn between depositor's behaviour and the amount of risk that they are willing to tolerate (Jagongo & Mutswenje, 2014). The willingness of a depositor to take on risk is called risk tolerance to, the amount of risk willing to be tolerated by an individual. Grable (2000) defines risk tolerance as the maximum amount of risk tolerance willing to be accepted when making financial decisions. Moreover, Hanna and Chen (1997) add to the risk tolerance definition the emotional acceptance, which can possibly influence the volatility, the risk attitudes of depositors and also the readiness of these depositors to accept possible financial losses. A few previous researchers have analysed depositor behaviour in terms of deposit insurance schemes, bank relationships, performance, perception, trust and bank switching costs. Murata and Hori (2006) focus on the market discipline of depositors by analysing their change in deposit accounts between small deposit-taking institutions in Japan during the year 1990. The study focussed mainly on establishing whether market discipline is affected by changes in the regulatory framework, such as changes in the deposit insurance schemes. Results from this study support the role of effective depositor market discipline. A valuable contribution of this study is the finding that individuals deposit smaller amounts of funds and require higher levels of interest at what they perceive as risky deposit institutions.

Murata and Hori (2006) conclude that the level of sensitivity of depositors has changed over time in accordance with changes in regulation, more specifically, deposit insurance schemes. Brunettia, Cicirettic, and Djordjevic (2016) analysed Italian household depositors and their respective banks over a period of time. Within this sample, the event of bank switching (moving from one bank to another) was quite prevalent, where 25 per cent of depositors changed from one bank to another at least twice a year. The study indicated that bank switching is dependent on the bank relationship as well as the distinctive characteristics of the depositors, as well as the bank. It was furthermore found that the number of banking services used and the extent of the services used also contribute to depositors' decisions to switch banks. Results indicated that if depositors are making use of more than one banking service at the current bank, they are four per cent less likely to switch banks. However, depositors are eight per cent more likely to switch to other banks if they are making use of more than one bank. Similar results were found in an annual banking research study conducted by Accenture (2015) using a 15 000 global sample. Results indicated that 18 per cent of bank depositors decided to switch to another bank whereas, 27 per cent added additional services from alternative banks. Reasons for the switch from one bank to another included bank performance, perception and trust.

Iyer, Ryan, and Puri (2016) examined the diversity in depositor responses in accordance with solvency risk during two different bank failure scenarios. The results showed significant findings that suggested that depositors paying off loans at a specific bank, depositors with older accounts as well as current staff members at the bank are less likely to withdraw their funds and switch banks during a minor solvency risk scenario. These customers were found to be highly likely to withdraw and switch banks during a major solvency risk scenario. Depositors without deposit insurance were found to be more sensitive to solvency risk. The results of this study suggest that the fragility of a bank during solvency risk is influenced by the structure of the bank's depositor base. Boyle, Stover, Tiwana, and Zhlyevskyy (2015) researched the levels of risk perception of depositors regarding a set of hypothetical banking failures and the role that deposit insurance plays towards risk mitigation during a banking failure. The study also considered the risk tolerance levels of 349 student depositors based in the United States, Europe and New Zealand, which indicated how much risk student depositors are willing to take concerning their country's deposit insurance schemes. Depositors without deposit insurance were found to be more sensitive to risk. Previous studies, such as Boyle et al. (2015), indicate that

countries without an explicit DIS face greater withdrawal risk (deposits being largely withdrawn from bank accounts). Hence, an explicit DIS improves depositor confidence regarding the safety of deposits and will most likely reduce the probability of a bank run. At the same time, it reduces time and effort depositors may have spent monitoring the risky activities of their bank, creating an incentive for future bank failures. Further studies by Demirgüç-Kunt, Kane, and Laeven (2014) also found that countries that had an explicit DIS implemented before the GFC of 2008, experienced less depositor-led bank runs. In South Africa, an implicit DIS is adopted where the National Treasury and the SARB protects deposits in the event of banking failure. Several proposals have been made to introduce an explicit deposit insurance scheme in South Africa, however, SARB opposes these proposals due to the cost involved with an explicit DIS (Coetzee & De Beer, 2016, p. 91). Many countries such as South Africa may only consider the implementation of an explicit DIS after a systemic bank crisis. This option, however, assumes that a newly implemented DIS will be just as effective as an established DIS (Boyle et al., 2015, p. 590).

3. Methodology

3.1. Research purpose and design

This study implemented a quantitative research approach by means of a self-structured questionnaire. Furthermore, a positivistic research paradigm was followed since the study aimed to challenge the traditional notion of “the absolute truth of knowledge” (Henning, Van Rensburg, & Smit, 2004). The general objective of positivist researchers is to test theory and try to enhance the predictive understanding of the phenomena in question (McKinney, 1966; Myers, 2013). In the study, the researcher was concerned with passive human behaviour in terms of financial decisions that can be controlled and determined by the external environment and which is based on realism.

3.2. Study area and sample

The target population for the study comprised of bank depositors in Gauteng. According to the SARB (2017) as well as The Banking Association, South Africa (BASA) (2017) 28 banks (excluding mutual banks and foreign representative branches) are registered within South Africa. Due to the extensive number of small, medium and large banks registered in South Africa, a decision was undertaken to only use the top five banks as these represent most of the population. The top five banks in terms of market share (largest customer database) include Standard Bank, Absa Bank, Capitec Bank, First National Bank and Nedbank, with Capitec Bank as the leader (BusinessTech, 2016; Smith, 2017). A comprehensive list is required to ensure a representative sample (Hair, Celsi, Oritinau, & Bush, 2008). The list of characteristics for this sample includes the following participant characteristics:

- 18 years or older;
- have some form of education;
- a bank depositor for more than five years;
- earns a monthly salary which is deposited into a bank account; and
- banks with one of the largest five banks in South Africa.

For this study non-probability purposeful sampling (snowball sampling) was used to filter those individuals who meet the exclusion criteria of the sample; 18 years and older, more than five years banking experience, some form of education, owns a deposit account at the top five banks in Gauteng. The sample size of this study consisted of 417 South African depositors. This figure is in line with the sample used in similar studies of Mäenpää, Kaleb, Kuusela, and Mesirantaa (2008); Zhu and Chen (2012); Zarvrsnik and Jerman (2012); Vazifedoost, Ansar, and Yekezare (2013); Boyle et al. (2015), and Ozkan-Tektas and Basgoze (2017). Most importantly, it sufficiently meets the requirements of the statistical analysis that was applied to achieve the stated objectives of the study. Figure 1 provides a graphical representation of the sample population.

Figure 1. Map of the Gauteng province and its municipal borders.

Source: Municipalities of South Africa (2018)



3.3. Hypothesis

Null hypothesis (H_{01}): There is no relationship between bank perception and depositors' behaviour to withdraw.

Alternative hypothesis (H_{a1}): There is a relationship between bank perception and depositors' behaviour to withdraw.

Null hypothesis (H_{02}): There is no relationship between depositors' behaviour to withdraw and behavioural finance bias.

Alternative hypothesis (H_{a2}): There is a relationship between depositors' behaviour to withdraw and behavioural finance bias.

Null hypothesis (H_{03}): Depositors level of risk tolerance does not influence depositors' behaviour to withdraw.

Alternative hypothesis (H_{a3}): Depositors level of risk tolerance does influence depositors' behaviour to withdraw.

3.4. Survey design and procedure method

Quantitative data were gathered from participants who completed a self-administered questionnaire consisting of five sections. The questionnaire was introduced to participants by means of a cover page, explaining the significance of the study as well as the role of the participants. The questionnaire consisted of the following sections: (A) demographic information, (B) operational risk scenarios (C) bank perception (D) behavioural finance and (E) risk tolerance. Section B consists of a 24-item scale, which includes eight operational risk events where depositors are required to indicate the likelihood that they will withdraw their current deposits. The following statements represent the operational risk scenarios used to elucidate participants responses regarding the source of information:

1. Hackers have stolen valuable client information leading to financial losses to customers, how likely are you to withdraw?
2. Your bank is under investigation for the unfair employee benefits and unfair termination of some of the employees, how likely are you to withdraw?
3. Your bank is under investigation for credit card fraud committed by someone within the bank, how likely are you to withdraw?

4. Your bank is under investigation for evading laws due to mismarking of their position (i.e. the bank is not as financially strong as reported), how likely are you to withdraw?
5. Your bank has been accused of reckless lending by extending high volumes of loans exposing the bank to liquidity problems, how likely are you to withdraw?
6. An external party from outside the bank has managed to forge a cheque and withdraw large amounts of money from your account, how likely are you to withdraw?
7. Bank employees are under investigation for stealing depositors money, how likely are you to withdraw?
8. Your bank is under investigation for having health and safety issue regarding employee workplace safety, how likely are you to withdraw?
9. Your bank is under investigation for the market manipulation of interest rates and the South African currency, how likely are you to withdraw?
10. Your bank has been accused of discrimination in terms of gender, how likely are you to withdraw?
11. External parties have managed to steal millions by means of credit card and debit card fraud, how likely are you to withdraw?
12. External auditors have accused your bank of failing to deliver accurate annual reports (losses were hidden from customers), how likely are you to withdraw?
13. Your bank has sustained damage to physical assets due to vandalism, how likely are you to withdraw?
14. Your bank has frequent disruptions in business due to system failures as a result of outdated software, how likely are you to withdraw?
15. Your bank has frequent disruption in the normal course of business due to power outage, how likely are you to withdraw?
16. The bank has been providing misleading information resulting in financial losses, how likely are you to withdraw?
17. Your bank has sustained damage to physical assets by means of a natural disaster (loss resulting in the destruction of an institution or affecting it), how likely are you to withdraw?
18. Your bank has been accused of financial losses in client funds and assets, how likely are you to withdraw?
19. Your bank has been accused of extending loans to people who cannot afford it, exposing the bank to possible bankruptcy, how likely are you to withdraw?
20. Your bank has sustained damage to physical assets due to a terrorist attack, how likely are you to withdraw?
21. Your bank has frequent disruptions in banking applications (such as the unavailability of mobile and internet banking), how likely are you to withdraw?

The depositors' likelihood to withdraw was measured on a six-point Likert scale (1 = very unlikely, 6 = very likely). Section C included a question regarding the reputation of the samples' respective banks. These questions were formed from theory to determine how depositors form their perception of a bank i.e. the reputation of a bank. A four-item scale was used to measure reputation using a six-point Likert scale (1 = strongly disagree, 6 = strongly agree).

1. My perception of a bank is based on the level of confidence that I have in the bank.
2. My perception of a bank is based on how its performance meets my expectations.
3. My perception of a bank is based on the level of trust I have in the bank.
4. My perception of a bank is based on the level of satisfaction regarding the service from the bank.

The fourth section (Section D) included a nine-item behavioural finance scale, which included statements aimed to elucidate the biases on which depositors base their financial decisions. Depositors had to relate their decisions to withdraw on the behavioural finance biases using the six-point Likert scale (1 = strongly disagree, 6 = strongly agree). Section D incorporated the first scale of risk tolerance, the survey of consumer finance (SCF). The SCF does not fully incorporate all of the variables of financial risk tolerance (four-item scale) but is a comprehensive measure for investment choice attitudes and experience (Grable & Lytton, 2001, p. 43).

3.5. Reliability of scales

To validate the internal reliability consistency of this scale, Cronbach alpha values for all eight factors were calculated. According to Cronbach (1951), the reliability of a scale is dependent on the number of items in a scale, hence value around 0.7 is acceptable in terms of internal reliability consistency. All eight operational risk events had Cronbach alpha values higher than 0.7. Since the factors grouped well together and had high Cronbach alpha values greater than 0.7, it can be assumed that all eight of the initial factors are reliable. Internal consistency reliability was also tested for the variable bank perception where a Cronbach alpha value of 0.93 was obtained to make this scale highly reliable. Behavioural finance biases are aimed at explaining the relationship between depositors' financial decision-making behaviour. Moss, Prosser, and Costello (1998) and Hilton, Brownlow, McMurray, and Cozons (2004) argues that the reliability of Cronbach alpha values may differ according to the field of study. However, when using human responses, a benchmark value of 0.6 may be used where values below 0.6 indicate low internal reliability (Malhotra, Birks, & Wills, 2012). Since this was a self-constructed scale based on literature, the internal consistency reliability had to be performed. The behavioural bias scale obtained a Cronbach alpha value of 0.61. The subjective risk tolerance scale SCF was a validated single question scale that was used.

3.6. Ethical considerations

High values and norms were kept throughout the research process. The study was conducted according to the ethical guidelines and principles as prescribed by North-West University (NWU, 2016). The research study obtained ethical clearance from the Research Committee of the Faculty of Economic Sciences and Management Sciences with the relevant ethics clearance number ECONIT-2018-02. Prior to the participation in the study, the research purpose was fully explained to participants by the respective fieldworkers. After consent was given, participants were assured that responses would be recorded confidentially whilst all collected data would be reported on anonymously. Participants were informed that participation was strictly voluntary and that they could withdraw at any stage without any repercussions. No incentives were provided that could possibly encourage participation

3.7. Data analysis

After the quantitative data were collected, it was coded and captured through the use of the Statistical Packages of Social Sciences (IBM SPSS) version 25. Data analysis involved the use of descriptive statistics including frequency distributions in order to report the demographics of the sample. Relationships were tested by means of non-parametric correlation analysis.

4. Results of the study

This section reports the results of the collected and analysed data. Firstly, the demographic composition of the sample is reported. Secondly, the section presents the correlation and reliability analysis.

4.1. Demographic background of the sample

The majority (32%) of depositors were between the ages of 30 to 39 years of age. Age group 18 to 29 represented 26.1 per cent of the sample, whereas the age group 40 to 49 represented 22.3 per cent of the sample. The minority of the sample was represented by depositors older than 60 years. A total of 54.9 per cent of depositors were female while 45.1 per cent were male depositors. Just over 20 per cent of the sample had a high school education. Almost 50 per cent (49%) had university education which included an undergraduate degree, honours degree, masters degree or doctoral degree. The majority of depositors (30.3%) earned an annual income of between R200 001-R400 000 (EUR12 364–24 729EUR) per annum.

4.2. Correlation analysis

The correlation between internal fraud and bank reputation indicated significant results ($r = 0.312$) and a positive strong linear association ($r = 0.30-0.49$). The results for internal fraud were significant at the 1 per cent significance level ($p < 0.01$). The Spearman correlation between external fraud and bank perception showed similar results to internal fraud as a positive linear association ($r = 0.411$) was observed significant at 1 per cent significance level ($p < 0.01$). Employment practice and workplace safety had a small positive association ($r = 0.230$) with bank perception which was also significant. Clients, products and business practices had a medium effect ($r = 0.406$) which was indicative of a significant positive linear association at the 1 per cent significance level ($p < 0.01$). From all the operational events, damage to physical assets had the smallest effect ($r = 0.134$) but still indicated a significance at 1 per cent ($p < 0.01$). Business disruptions and system failures indicated a small positive linear association ($r = 0.241$) between this event and how depositors form the perception of a bank. A pure reputational event had also obtained a positive linear association ($r = 0.382$) between bank perception and depositors likelihood to withdraw which was followed by a significance at 1 per cent ($p < 0.01$) which further supports the relationship.

The strongest positive association was found between execution and delivery where a medium effect ($r = 0.448$) was observed which was indicative of a medium linear relationship. It is also noteworthy to indicate that all the correlation coefficients were significant at 1 per cent ($p < 0.01$). This indicates that there is a relationship between how depositors regard the reputation of a bank based on their own perception and how likely they will be to withdraw their money during operational events. In other words, how likely depositors are to withdraw money from their accounts after these operational events is positively associated with how they form their perception of a bank.

5. Behavioural finance

The correlation coefficients amongst depositors willingness to withdraw during internal fraud and external fraud events and behavioural bias indicated small positive linear associations ($r = 0.156$, $r = 0.173$) respectively. The results for internal and external fraud ($p < 0.01$) were found at the 1 per cent significance level. The Spearman correlation further indicated that a positive association ($r = 0.261$) exists between depositors' behaviour during employment practice and workplace safety which was also significant ($p < 0.01$). Clients, products and business practices also had a positive association ($r = 0.247$) which was indicative of a small effect significant at the 1 per cent significance level ($p < 0.01$). Damage

to physical assets resembled a medium effect by indicating a positive linear relationship ($r = 0.364$) significant at 1 percent ($p < 0.01$). Business disruptions and system failures yet again indicated a positive linear association ($r = 0.191$) between how depositors behave during this event and behavioural finance bias which was significant ($p < 0.01$). Execution and delivery obtained a positive linear association ($r = 0.237$) which was followed by a significance at 1 per cent ($p < 0.01$) which further supports the relationship. A pure reputational event (characterised by rumours, true or false, which could impact the reputation of a bank) (Honey, 2012, p. 13) also achieved a linear association ($r = 0.232$) between depositors' behaviour to withdraw during a reputational event and behavioural biases. The result was significant at 1 per cent ($p < 0.01$). Therefore, the null hypothesis (H_{02}) stating that there is no relationship between depositors' behaviour to withdraw and behavioural finance biases can be rejected. The alternative hypothesis (H_{a2}) stating that there is a relationship between depositors' behaviour to withdraw and behavioural finance biases, therefore, can be concluded.

Since this was a self-constructed scale based on the literature, the internal consistency reliability had to be performed. The behavioural bias scale obtained a Cronbach alpha value of 0.61.

6. Risk tolerance

The correlation amongst depositors' willingness to withdraw during internal fraud and risk tolerance indicated significant results ($r = -0.174$) and a negative small linear association. The results for internal fraud were significant at the 1 per cent significance level ($p < 0.01$). Therefore, depositors risk tolerance level will influence the way depositors withdraw during an internal fraud event. The more severe the internal fraud event, the higher were depositors willingness to withdraw and the more risk-averse they became. Similar results were found for depositors' willingness to withdraw during external fraud since an ($r = -0.129$) negative small linear association significant at the 1 per cent significance level ($p < 0.01$) was found. For employment practice and workplace safety, no relationship was found between depositors' willingness to withdraw and their risk tolerance level. Damage to physical assets also indicated ($r = -0.111$) a small negative association between the level of subjective risk tolerance and depositors' likelihood to withdraw which was significant at the 5 per cent significance level ($p < 0.05$). Clients, products and business practice also indicated ($r = -0.131$) a small negative association between the level of risk tolerance and depositors' likelihood to withdraw which was significant at the 1 per cent significance level ($p < 0.01$). For these four events, the correlation coefficients suggest that the higher the level of risk tolerance, the less likely depositors will be to withdraw and hence the null hypothesis could be rejected. For business disruptions and a pure reputational event, no relationship was found between depositors' willingness to withdraw and their subjective risk tolerance level. No significant association was found which was combined with very small effect sizes. Therefore, the level of risk tolerance did not have a significant relationship with depositors' likelihood to withdraw after these events. Null hypothesis (H_{03}) stating that there is no relationship between depositors' behaviour to withdraw and their risk tolerance could not be rejected for the last events.

Boyle et al. (2015) researched the levels of risk perception of depositors regarding a set of hypothetical banking failures and the role that deposit insurance plays towards risk mitigation during a banking failure. The study also considered the risk tolerance levels of 349 student depositors based in the United States, Europe and New Zealand, which indicated how much risk student depositors are willing to take concerning their country's deposit insurance schemes. Those countries who did not implement an explicit deposit insurance scheme indicated a higher withdrawal risk and lower levels of risk tolerance. Hence, the results of this study are similar to those of Boyle et al. (2015) since South Africa makes use of an implicit deposit insurance scheme. Depositors without deposit insurance are found to be more sensitive to risk.

6.1. Conceptual model of all factors influencing operational events

Table 2 below indicates a summary of all the variables that may have influenced depositor behaviour in terms of their likelihood to withdraw during seven operational risk events.

Table 1. Relationship between operational events, bank perception, behavioural finance and risk tolerance

Factors	Internal fraud	External fraud	Employment practice and workplace safety	Clients, products and business practice	Damage to physical assets	Business disruptions and system failure	Execution delivery and process management	Bank perception	Behavioural biases	Risk tolerance
Internal fraud	1									
External fraud	0.690**	1								
Employment practice and workplace safety	0.586**	0.416**	1							
Clients, products and business practice	0.728**	0.639**	0.472**	1						
Damage to physical assets	0.369**	0.271**	0.577**	0.394**	1					
Business disruptions and system failures	0.359**	0.383**	0.265**	0.489**	0.309**	1				
Execution, delivery and process management	0.615**	0.628**	0.414**	0.719**	0.329**	0.508**	1			
Bank Perception	0.312**	0.411**	0.230**	0.406**	0.134**	0.241**	0.448**	1		
Behavioural biases	0.156**	0.173**	0.261**	0.247**	0.364**	0.191**	0.237**	.297**	1	
Risk tolerance	-0.174**	-0.129**	-0.043	-0.008**	-0.111*	-0.081	-0.045	-0.051	0.054	1

Notes: Table 1 illustrates the relationship between how depositors define a banks' reputation (form their perception of a bank) and how likely they will be to withdraw in the event of an operational risk event. A two-tailed significance level can be assumed at a 1 per cent significance level. The correlations amongst the variables ranged from small ($r = 0.10-0.29$) to medium ($r = 0.30-0.49$). All of the relationships between the observed variables had positive correlation coefficients, which is indicative of a positive linear relationship. **Significant at 1 per cent

Table 2. Model summary of significance between operational events and constructs

Depositor behaviour	Construct	Variable	Positive/Negative influence
Internal fraud	Bank perception	Reputation	Positive
	Behavioural finance	Representativeness Availability	Positive
	Risk tolerance	SCF	Negative
External fraud	Bank perception	Reputation	Positive
	Behavioural finance	Representativeness Availability Self-control	Positive
	Risk tolerance	SCF	Negative
Employment practice	Bank perception	Reputation	Positive
	Behavioural finance	Representativeness Self-control	Positive
Clients, products and business practice	Bank perception	Reputation	Positive
	Behavioural finance	Representativeness Availability Self-control	Positive
	Risk tolerance	SCF	Negative
Damage to physical assets	Bank perception	Reputation	Positive
	Behavioural finance	Representativeness Availability Self-control	Positive
	Risk tolerance	SCF Grable	Negative
Business disruptions	Bank perception	Reputation	Positive
	Behavioural finance	Availability Self-control	Positive
Execution and delivery	Bank perception	Reputation	Positive
	Behavioural finance	Representativeness Availability Self-control	Positive

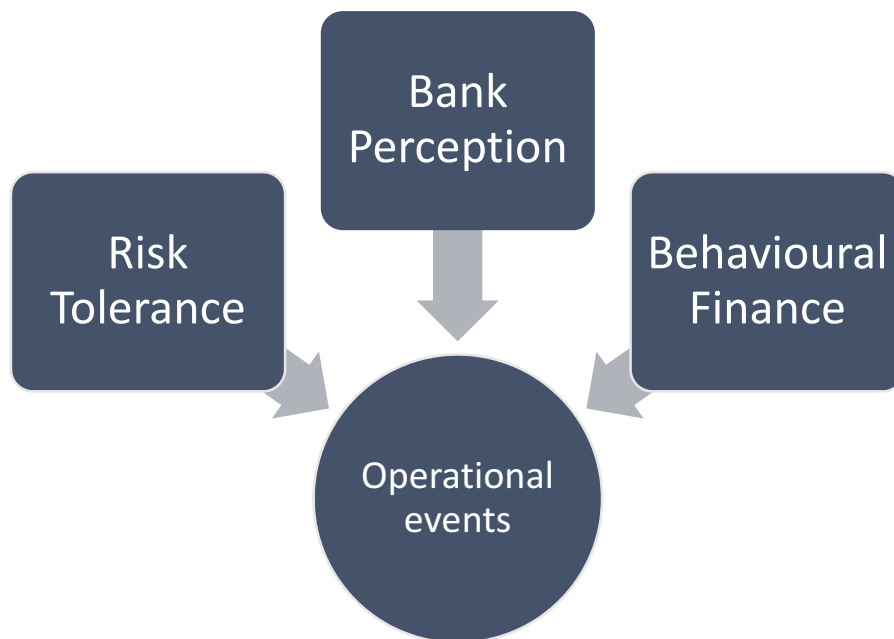
Notes: Table 2: Conceptual model of operational risk events and the factors influencing it. Considering the results for operational risk events, all of the events were significantly influenced by bank perception. Hence, depositors likelihood to withdraw during any operational risk event will be influenced by the perception of their bank (reputation, performance, expectations etc).

All operational risk events were influenced by one or more behavioural biases. The representativeness bias was significant for all operational risk events except for business disruptions and system failure. Therefore, depositors who are subject towards this bias will be more likely to withdraw than those who are not subject to this bias. The availability bias was significant for all operational risk events except for employment practice and workplace safety. Therefore, depositors who are subject towards this bias will be more likely to withdraw than those who are not subject to this bias. The self-control bias was significant for all operational risk events except for internal fraud. Therefore, depositors who are subject towards this bias will be more likely to withdraw than those who are not subject to this bias. Hence, behavioural finance biases influence depositors' likelihood to withdraw during operational risk events.

Risk tolerance was found to have a negative influence on depositors likelihood to withdraw during operational risk events. An inverse relationship exists between depositors' risk tolerance and their willingness to withdraw. Negative correlation coefficients were found for all operational risk events and their risk tolerance level. Hence, depositors will be less likely to withdraw the higher their risk tolerance level and more likely to withdraw the lower their risk tolerance level. Significant relationships were found for internal and external fraud. Therefore, depositors risk tolerance level

Figure 2. Factors influencing operational risk events.

Notes: Figure 2 indicates the factors found to significantly influence depositors likelihood to withdraw after operational risk events.



will influence the way depositors withdraw during an internal fraud and external fraud event. The more severe the fraud event, the higher were depositors willingness to withdraw and the more risk-averse they became.

7. Conclusion and recommendations

South African banks operate in a very volatile and competitive industry facing numerous financial risks every day. This is not to mention the continuously evolving stakeholder needs and preference. Depositors can be regarded as the main stakeholders of banks and hence their behaviour can influence a banks' risk exposure.

A bank's reputation is based on depositors' perception regarding a banks' performance (whether it meets expectations or not), the level of confidence and trust in a bank as well as the level of satisfaction experienced. Hence, this definition of a bank reputation in the mind of depositors was put to the test to see whether there is an association between bank reputation and depositors' withdrawal behaviour (how likely they are to withdraw). A non-parametric Spearman correlation was used since both the variables were measured using an ordinal scale. All the correlation coefficients were significant. This indicates that there is a relationship between how depositors regard the reputation of a bank based on their own perception and how likely they will be to withdraw their money during operational events. In other words, how likely depositors are to withdraw money from their accounts after these operational events is positively associated with how they form their perception of a bank.

A non-parametric correlation was performed where a small significant positive correlation was found between behavioural finance and depositors' likelihood to withdraw. The top three behavioural biases as selected by depositors were selected and independent t-tests were performed based on whether depositors chose this bias or not. The representativeness bias was significant for all operational risk events except for business disruptions and system failure. Therefore, depositors who are subject towards this bias will be more likely to withdraw than those who are not subject to this bias. The availability bias was significant for all operational risk events except for employment practice and workplace safety. Therefore, depositors who are subject towards this bias will be more likely to withdraw than those who are not subject to this bias. The self-control bias was significant for all operational risk events except for internal fraud. Therefore, depositors who are subject towards this

bias will be more likely to withdraw than those who are not subject to this bias. Hence, behavioural finance biases influence depositors' likelihood to withdraw during operational risk events.

Risk tolerance was found to have a negative influence on depositors likelihood to withdraw during operational risk events. An inverse relationship exists between depositors' risk tolerance and their willingness to withdraw. Negative correlation coefficients were found for all operational risk events and their risk tolerance level. Hence, depositors will be less likely to withdraw the higher their risk tolerance level and more likely to withdraw the lower their risk tolerance level. In addition, the empirical findings of this paper will help banks to profile depositor behaviour during operational risk events in order to mitigate against large losses and possible bank runs. This will, in turn, enable banks to come up with better mitigation and management strategies for operational risk by incorporating stakeholder behaviour.

Considering the theoretical and empirical findings of this paper, a few managerial implications and recommendations can be offered. The empirical analysis revealed that although all seven operational risk events were significant, depositors were less likely to withdraw during damage to physical assets and employment practice and workplace safety. Building on the foundation of this research paper, future researchers are recommended to use a bigger sample size and extend the region of the sample (to not only use Gauteng but also the other provinces). It is also recommended that the level of financial knowledge of depositors should be investigated. It may also be worthwhile to apply the model to other related internal and external stakeholders to see whether the factors that significantly contribute to operational risk differed between these various stakeholders.

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