

**Business Diversification and Banks' Performance: The Moderating Role of Credit and Liquidity Risk (Empirical Study)**

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## **Abstract**

The major objective of this study is to explore the moderating role of credit risk and liquidity risk on business diversification and banks' performance relationship, i.e., investigating the interaction relationship between banks' risks and business diversification on banks' performance. In light of this, the study also aims to examine the impact of credit risk and liquidity risk on banks' performance, especially in emerging countries like Egypt. Moreover, it seeks to test the effect of business diversification, through revenue diversification, asset diversification, and funding diversification, on banks' performance. This study depends on a sample consisting of 10 banks over the period from 2012 to 2021. The findings indicate that credit risk has a negative impact on banks' performance, whereas liquidity risk has a positive impact on banks' performance. Also, revenue diversification and asset diversification have a positive effect on credit risk, and only asset diversification has a positive effect on liquidity risk. Furthermore, all activities of diversification have an insignificant impact on banks' performance. The most important result is that credit risk and liquidity risk moderate business diversification and banks' performance relationship as credit risk changes the effect from an insignificant negative impact to a significant positive effect. Also, credit risk adjusts the impact of asset diversification from an insignificant positive impact on banks' performance to a significant positive impact. Furthermore, liquidity risk is able to convert the impact of revenue diversification on banks' performance from an insignificant negative impact to a significant negative impact.

## **Key words**

Credit risk, Liquidity risk, Revenue diversification, Asset diversification, Funding diversification, Banks' performance, Moderating role

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## **1. Introduction**

Banks are considered a key source of finance in most countries, particularly developing countries, because they are a part of financial institutions which considered a backbone of the economic growth of all countries. Recently, banks' activities have changed not only in Egypt but also in all countries as a result of skyrocketing competition and regulatory policies such as financial inclusion. As a consequence, it is momentous to understand factors that affect banks' performance to preserve banking system health and hence economic development (Alouane et al., 2022).

There are numerous factors that affect banks' performance, but one of the crucial factors is the risks surrounding their activities. The main activities of any bank are granting loans and collecting deposits, in other words, any bank gains mainly its profits through the payment of interests to depositors and collecting interests from borrowers (Gafrej and Boujelbéne, 2022). These activities contain many types of risks such as market risk, operational risk, exchange rate risk..., etc. Nonetheless, the basic two kinds of risks are credit risk and liquidity risk as shown in the majority of studies (e.g., Megeid, 2017); Hassan et al., 2019; Djebali and Zaghdoudi, 2020); Ovi et al., 2020; Gafrej and Boujelbéne, 2022; Harb et al., 2022; Twum et al., 2022; Zogning and Lenga, 2022). Furthermore, Hafez (2015) revealed that Islamic and conventional banks in Egypt facing often two types of risks which were credit risk and liquidity risk. Credit risk refers to an announcement of eroding the profitability of the bank and the beginning of a crisis inside the bank because of the increased amount of non-performing loans which is considered a red flag for critical problems, i.e., credit risk reflects an outstanding threat of stability of banks' performance (Naili and Lahrichi, 2022). While liquidity risk happens as a normal reaction resulting from the nature of banking activities since banks give funding to the borrowers for the medium and long-term compared to the duration of depositors which is commonly shorter than the lending duration (Gafrej and Boujelbéne, 2022).

The debate about the effect of credit risk and liquidity risk on banks' performance does not reach a consensus as the empirical results are different. Several studies demonstrated that credit risk has a negative impact on banks' performance (e.g., Ekinici and Poyraz, 2019); Hassan et al., 2019); Zogning and Lenga, 2021); Hunjra et al., 2022); Twum et al., 2022), whilst some studies showed that credit risk positively affects banks' performance such as the study of Yahaya et al. (2022)

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which found a positive impact of credit risk on banks' performance in the robustness model. In the same vein regarding liquidity risk, some studies revealed a positive impact on banks' performance (e.g., Mobarak, 2020; Azzam and Almaleeh, 2022; Hunjra et al., 2022), whereas other studies exhibited a negative effect on banks' performance (e.g., Chen et al., 2022; Yahaya et al., 2022). It is worth mentioning that inside the same study, there were different results. For instance, Yahaya et al. (2022) showed a negative impact of credit risk on banks' performance; but when doing robustness checks, the impact changed to become positive. Likewise, Hunjra et al. (2022) concluded that liquidity risk, using Loan to deposit ratio (LTD), had a negative impact on banks' performance, whilst liquidity risk, using current ratio (CR), had a positive effect on banks' performance. The results of aforementioned studies confirm that the literature related to the implications of credit risk and liquidity risk on banks' performance is inconclusive and requires more empirical studies.

Banks attempt to manage risks surrounding their activities by using various strategies. One of these strategies is business diversification. Business diversification is considered an outstanding sanctuary for banks to meet risks resulting from their traditional activity (Gafrej and Boujelbéne, 2022). Business diversification can be classified in many aspects such as geography diversification, functional diversification, lending diversification, revenues diversification, assets diversification, and funding diversification<sup>1</sup>. According to the portfolio theory, banks that depended on business diversification can improve their performance and diminish risks contemporaneously (Nisar et al., 2018). To illustrate, this theory means that banks with business diversification will avail from economies of scale which gradually declines banks' risks and raises their performance. Therefore, the aim of business diversification in banks is to reduce risks and enhance their profits.

Theoretically, depending on diversified activities can intuitively lead to a decline in risks faced by banks and an increase in banks' performance. Nevertheless, the empirical findings in the literature do not reach a consensus about the impact of business diversification on banks' risks or performance. For instance, some studies indicated that business diversification positively affects banks' risks and performance (e.g., Ferreira et al., 2019); Lee et al., 2020; Uddin et al., 2021; Addai et al., 2022; Alouane et al., 2022; Antao and Karnik, 2022). On the other hand,

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<sup>1</sup> It is worth mentioning that the current paper will address revenues diversification, assets diversification, and funding diversification.

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some studies proved that business diversification negatively affects banks' risks and performance (e.g., AlKhouri and Aroui, 2019; Ngoc Nguyen, 2019; Ovi et al., 2020). Moreover, some studies found that there is no significant impact of business diversification on banks' risks and performance (e.g., Raei et al., 2016); Abuzayed et al., 2018; Simoens and Vennet, 2022). The reason of inconsistent results may be related to the trade-off between the benefits of business diversification and its costs, in other words, the implications of business diversification rely on the benefits and costs of its activities. For example, revenue diversification by using non-interest activities is likely to improve banks' profits; however, these non-interest activities may increase banks' risks such as liquidity risk, market risk, and operational risk (Moudud-Ul-Huq et al., 2018). Furthermore, revenue diversification is likely to increase agency problems as managers may use this diversification to maximize their personal interests (Ochenge, 2022).

Accordingly, the aim of this study is to achieve two main objectives. The first is to examine the impact of risks and business diversification on banks' performance. The second is to find out the moderating role of banks' risks on business diversification and banks' performance relationship, i.e., the second objective is to explore the impact of interaction relationship between banks' risks and business diversification on banks' performance. Data for this study were collected using (10) banks in Egypt during the period from 2012 to 2021. The findings demonstrate that, firstly, credit risk negatively affects banks' performance, while liquidity risk positively affects banks' performance. Secondly, revenue diversification and asset diversification have a positive impact on credit risk, whilst funding diversification has no significant impact. Thirdly, only asset diversification has a positive effect on liquidity risk but revenue diversification and funding diversification have an insignificant impact. Fourthly, there is not a significant impact of all types of diversification on banks' performance. Finally, credit risk has a moderation effect as it converts the impact of revenue diversification on banks' performance from an insignificant negative impact to a significant positive impact. In the same vein, credit risk modifies the effect of asset diversification from an insignificant positive effect on banks' performance to a significant positive effect. Nonetheless, credit risk is not able to turn the insignificant impact into a significant one. Furthermore, liquidity risk is able to change the impact of revenue diversification on banks' performance from a non-significant negative impact to a significant negative impact. However, liquidity risk cannot moderate the effect of asset diversification and funding diversification on banks' performance.

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The existing study offers some important insights. Firstly, it expands the line of research on banks' risks, banks' performance, and business diversification in banks by providing empirical evidence from emerging economies, namely Egypt. Secondly, this study enriches the extant literature by examining the moderating role of banks' risks on business diversification and banks' performance. To the best of our knowledge, this is the first study that examined the interaction relationship between banks' risks and business diversification on banks' performance in Egypt. Finally, contrary to most of the empirical studies concerning business diversification, this study paid the same attention to asset diversification and funding diversification in contrast to most of the empirical studies which focused on revenue diversification.

The rest of this study is organized as follows. Section 2 reviews the literature of credit risk, liquidity risk, banks' performance, and business diversification. Furthermore, this section presents hypotheses development. Section 3 displays the research methodology including sample and data collection, definition and measurement of variables, and models specification. Section 4 demonstrates results accompanied by a discussion. Finally, section 5 includes conclusions, main recommendations, and further research.

### **2. Literature Review and Hypotheses Development**

This section includes a summarized review of the literature related to the effect of credit and liquidity risk on banks' performance and the impact of business diversification on credit and liquidity risk of banks. Also, it contains a brief review of how business diversification affects banks' performance. Furthermore, the moderating role of credit risk and liquidity risk on the impact of business diversification on banks' performance. Moreover, this section provides how to formulate hypotheses from the literature review discussion.

#### **2.1 The Impact of Credit Risk and Liquidity Risk on Banks' Performance**

Banks face various kinds of risks such as market risk, exchange rate risk, operational risk...., etc. The most severe types of risks are credit risk and liquidity risk. Several studies have investigated the implications of financial risks on banks' performance, particularly credit risk and liquidity risk. For instance, Ekinci and Poyraz (2019) examined the impact of credit risk on banks' performance based on (26) Turkish banks during the period from 2005 to 2017. The study measured

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banks' performance by using return on assets (ROA) and return on equity (ROE). For calculating credit risk, the study used a non-performing loans ratio (NPLs). The findings revealed that credit risk negatively affected banks' performance. Also, Hassan et al. (2019) explored the relationship between credit, liquidity risk, and banks' stability in Islamic banks compared to conventional banks for the period 2007 to 2015 using (52) banks including (26) conventional banks and (26) Islamic banks. The study exhibited a negative relationship between credit risk and banks' stability whether in Islamic banks or conventional banks. The relationship between liquidity risk and banks' stability was positive in conventional banks, whilst the relationship between liquidity risk and banks' stability was negative in Islamic banks.

In the same vein, Azzam and Almaleeh (2022) sought to detect the impact of liquidity risk on banks' performance by using (9) banks listed on the Egyptian Stock Exchange over the period from 2009 to 2019. Banks' performance was measured according to three proxies (ROE), (ROA), and earnings per share (EPS). Liquidity risk was calculated by using also three proxies liquid assets to deposits (LTD), liquid assets to assets (LTA), and cash to assets (CTA). One of the key results of the study was that liquidity risk had a positive impact on banks' performance in some cases. Likewise, Chen et al. (2022) investigated the impact of liquidity risk on banks' performance in financial crises using data from American banks during the period from 1996 to 2013. The findings of the study reported that liquidity risk decreased the probability of banks' survival, net interest margin, and ROA, while liquidity risk rose loan-loss-provision expenses. However, the study did not find any strong evidence that liquidity risk harmed banks' performance in crises. Furthermore, the study indicated that liquidity risk was not an indicator of banks' default problems, but liquidity risk had a separate impact on banks' performance during crises.

Similarly, Hunjra et al. (2022) tested the effect of credit, liquidity, and operational risks on banks' performance in South Asia during the period from 2009 to 2018 depending on (76) banks. Credit risk was measured by the non-performing loans ratio (NPLs). Liquidity risk was measured by using two proxies, firstly, the current assets to current liabilities ratio labeled current ratio (CR), and secondly, loans to deposits ratio labeled (LTD). The study concluded that credit risk had a negative impact on banks' performance. Liquidity risk, using (LTD) ratio, had a negative impact on banks' performance, whilst liquidity risk, using CR, had a positive effect

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on banks' performance. Also, Twum et al. (2022) examined the relationship between credit risk and banks' performance using (28) Chinese banks from 1990 to 2020. Return on equity (ROE) was used to measure banks' performance. Credit risk was measured by using the non-performing loans ratio, capital adequacy ratio, loan loss provision to total assets, and credit growth. The study indicated that there was a negative relationship between credit risk and banks' performance.

In the same way, Yahaya et al. (2022) mainly tested the impact of liquidity risk on banks' performance depending on (50) listed banks that operate in six Sub-Saharan African countries, including Nigeria, Ghana, South Africa, Zambia, Kenya, and Tanzania over the period from 2011 to 2019. Also, the study examined the effect of credit risk on banks' performance. Furthermore, the study investigated the interaction impact of liquidity risk and credit risk on banks' performance. Banks' performance was measured by (ROA) and (ROE). Liquidity risk was estimated by total loans to total deposit ratio, whereas credit risk was calculated by nonperforming loan to total loans ratio. The findings showed that there was a negative impact of liquidity risk and credit risk on banks' performance. Nevertheless, in the robustness model, there was a positive impact of credit risk on banks' performance. Moreover, the interaction impact of liquidity risk and credit risk on banks' performance demonstrated a negative impact. Likewise, Zogning and Lenga (2022) investigated the impact of banks' risks on profitability using (52) commercial banks in Central Africa for the period 2009 to 2016. Profitability was measured by three proxies ROA, ROE, and NIM. Credit risk was calculated by the ratio of non-performing loans to total loans and liquidity risk was estimated by the ratio of liquid assets to total assets. The study showed that credit risk and liquidity risk had a negative impact on banks' profitability.

To sum up, the majority of prior studies demonstrated that credit risk has a negative impact on banks' performance (e.g., Ekinci and Poyraz, 2019); Hunjra et al., 2022; Twum et al., 2022; Zogning and Lenga, 2022). With respect to liquidity risk, the literature revealed various impacts of liquidity risk on banks' performance as some studies found a positive effect (e.g., Hassan et al., 2019; Azzam and Almaleeh, 2022), while other studies showed a negative impact (e.g., Hunjra et al., 2022; Yahaya et al., 2022; Zogning and Lenga, 2022).

Therefore, the current study, in line with previous studies, expects a negative impact of credit risk on banks' performance. The reason for this is that the high ratio of non-performing loans can cause a decline in banks' performance. In other

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words, credit risk refers to the inability of borrowers to meet their commitments to banks. As a result, banks fail to retrieve the main source of their assets, namely loans. Moreover, they lose a key part of their revenues, i.e., interests. Regarding the liquidity risk, the existing paper foresees that liquidity risk positively affects banks' performance. The reason for this expectation is that the liquidity risk happens as a result of banking operations. To illustrate, liquidity risk occurs from normal banking activity which is related to granting medium and long-term funds and collecting short and medium-term deposits. Thus, the gap between the maturities dates among the two groups causes liquidity risk. Accordingly, liquidity risk positively reflects in banks' performance because the increase in liquidity risk arises from the increase in banking operations. Therefore, the first hypothesis and its sub-hypotheses can be formulated as follows:

***H1: There is a significant impact of credit risk and liquidity risk on banks' performance.***

***H1a: There is a significant negative impact of credit risk on banks' performance.***

***H1b: There is a significant positive impact of liquidity risk on banks' performance.***

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### **2.2 The Impact of Business Diversification on Credit Risk, Liquidity Risk, and Banks' Performance**

Presently, as a result of global crises, banks tend to deal with non-traditional activities in order to earn profits such as brokerage services, stock trading, and underwriting services (Meslier et al., 2014). This means that banks attempt to find out novel revenues, assets, or funding sources, i.e., banks try to use other kinds of activities besides their traditional activities. As a consequence, some studies have been conducted to examine the implications of business diversification on banks' risks and banks' performance. For instance, Edirisuriya et al. (2015) illustrated the response of stock markets to business diversification in banks during the period from 1999 to 2012 in South Asia because private sector banks in this area depend on a high portion of non-interest income sources. Income diversification was measured through the ratio of non-interest income to total income and asset diversification was measured by the ratio of non-interest-bearing assets to total assets. The results revealed that income diversification has an insignificant impact on the stock market volatility of banks. On the other hand, the increase in asset diversification can diminish the bank's idiosyncratic stock return volatility. Raei et al. (2016) tested credit portfolio diversification of Iranian banks on return on asset and return on equity during the period from 2009 and 2014. The study concluded that there was an insignificant impact of credit portfolio diversification on return on asset and return on equity.

Similarly, Sissy et al. (2017) examined the impact of revenue diversification and cross-border banking on risk and return using (320) banks across (29) African countries from 2002 to 2013. The study depended on the Herfindahl Hirschman Indices (HHI) to measure revenue diversification, while insolvency risk was measured by the Z-score. The results demonstrated that, firstly, cross-border banking raises revenue diversification. Secondly, cross-border banking did not have any significant impact on the risk and profitability of African banks. Thirdly, cross-border banking and revenue diversification rose risk-adjusted performance and diminished the risk of banks. Also, Abuzayed et al. (2018) sought to examine the impact of diversification on performance using a sample of banks in the Gulf Cooperation Council (GCC) countries from 2001 to 2014. The substantial result of the study was that diversification did not improve bank performance and hence bank stability.

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Likewise, Moudud-Ul-Huq et al. (2018) illustrated the effect of diversification strategies on banks' performance and risk for Southeast Asian emerging economies, particularly Indonesia, Malaysia, the Philippines, Thailand, and Vietnam during the period from 2011 to 2015 using (260) banks. The study measured banks' performance using ROA, ROE, and net interest margin (NIM). The risk was measured by using the standard deviation of ROA, ROE, and NIM, besides, using Z-Score. Income diversification was represented by a ratio between non-interest income and total operating income, whereas asset diversification was calculated by a ratio between non-interest-bearing assets and total assets. The findings of the study demonstrated that diversification strategies diversely affected banks' performance and risk. To illustrate, income and asset diversification had a positive impact on banks' performance and a negative impact on banks' risk in Indonesia and Thailand. On the other hand, asset diversification negatively affected both banks' performance and risk in Malaysia. Moreover, asset diversification did not have any significant impact on banks' performance. The important result of the study is that the implications of business diversification vary among countries because of many reasons, specifically the benefits related to this diversification.

In the same context, AlKhouri and Arouri (2019) examined the impact of income diversification and asset diversification on the performance and stability of six countries of the Gulf Cooperation Council (KSA, UAE, Kuwait, Qatar, Bahrain, and Oman) over the period from 2003 to 2015 with a comparison between conventional and Islamic banks. The findings exhibited that income diversification negatively affected banks' performance, while asset diversification has a positive impact on banks' performance. Ferreira et al. (2019) studied the effect of revenue diversification on banks' risk and banks' return using (1019) observations of Brazilian banks during the period from 2003 to 2014. Revenue diversification was estimated by the Herfindahl–Hirschman Index (HHI) and banks' risk was measured by Z-Score. The key result of the study was that revenue diversification positively affected return and risk-adjusted return, while it had an insignificant positive relationship with banks' risks. Additionally, Ngoc Nguyen (2019) investigated the effect of revenue diversification on banks' performance and risks depending on (26) Vietnamese banks over the period from 2010 to 2018. Banks' performance was measured using ROA and ROE, whereas banks' risk was measured by using Z-score. The findings showed that revenue diversification negatively affected banks' performance, but it positively affected banks' risk.

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Likewise, Lee et al. (2020) tested the effect of income diversification on banks' systemic risk if there were high asset correlations across banks using (1008) banks across (53) countries during the period from 2006 to 2013. Systemic risk was measured by Z-Score, whereas income diversification was calculated by the Herfindahl–Hirschman Index (HHI). The results denoted that income diversification increased systemic risk, however, when eliminating banks that had high asset correlations, the impact of income diversification on systemic risk became negative and insignificant. Ovi et al. (2020) explored the relationship between credit risk and revenue diversification using a sample of (247) banks from six countries (Indonesia, Malaysia, the Philippines, Singapore, Thailand, and Vietnam) for the period 1998 to 2018. Bank credit risk was measured by the non-performing loans to total loans ratio. Revenue diversification was estimated by the ratio of net non-interest income to total income ratio. The study showed that revenue diversification mitigated credit risk.

As well, Wu et al. (2020) sought to identify how business diversification affects banks' risk taking into account banks' efficiency. The study relied on a sample consisting of one thousand commercial banks from thirty-nine emerging economies over the period from 2000 to 2016. The study used the Z-score as an indicator of bank risk, the ratio of noninterest income to net operating revenue as a measure of revenue diversification, and the ratio of the difference between total liabilities and deposits to total liabilities as an indicator of funding diversification. The results of this study showed that business diversification has two competitive impacts. The first impact refers to the direct impact which enhances banks' stability, whereas the second impact points out the indirect impact that results in a decline in banks' efficiency. Therefore, the study concluded that the inclusive benefits of business diversification depend on the trade-off of the two competitive impacts.

In the same sense, Li et al. (2021) aimed to identify if the use of noninterest revenue sources affects the profitability and risks of banks during the COVID 19 pandemic, particularly in the year 2020 by using a sample of U.S. banks. Profitability was measured by using return on assets (ROA) or return on equity (ROE), and revenue diversification was calculated by the ratio of net non-interest income to net operating income. The findings of the study found that there was a positive relationship between performance and noninterest revenue, whilst there is an inverse relationship between risks and non-interest revenue sources. Uddin et al.

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(2021) examined the impacts of bank diversification, particularly income diversification and assets diversification, on profitability using (32) Bangladeshi banks over the period from 2007 to 2016. Profitability was measured by ROA, ROE, risk-adjusted return on assets, and risk-adjusted return on equity. Income diversification was calculated by a ratio of net interest income to total income, whereas asset diversification was estimated by a ratio of noninterest bearing assets to total assets. The results found that there was a significant positive relationship of income diversification and asset diversification on profitability.

Likewise, Antao and Karnik (2022) sought to study the relationship between revenue diversification and banks' performance using banks from (24) Asian countries during the period from 1996 to 2018. The study measured banks' performance through Z-Score, which is a measure of risk exposure, to determine the stability of banks. Revenue diversification was calculated by the ratio of non-interest income to operating income. The main finding of the study emphasized that revenue diversification increased banks' risks, in other words, it negatively affected banks' stability across all countries in the study's sample. This means that revenue diversification does not help banks to be more stable. Also, Kozak and Wierzbowska (2022) tested the impact of income diversification on banks' profitability, furthermore, they examined whether the severity of the COVID-19 pandemic affects the relationship between income diversification and profitability. The study relied on a sample consisting of forty European banks over the period from 2019 to 2020. The profitability was measured by using return on assets (ROA) and income diversification was measured by non-interest income to operating income. The findings indicated that the increase in non-interest income has a positive effect on profitability during the COVID-19 pandemic. Moreover, this impact was partially confirmed during the severity of the COVID-19 pandemic. In other words, income diversification protected the profitability of European banks in the case of the severity of the COVID 19 pandemic.

In the same vein, Ochengé (2022) investigated the impact of revenue diversification on the profitability and stability of Kenyan banks for the period 2010 to 2020. Revenue diversification was measured through a ratio between non-interest income and total operating income. Profitability, as an indicator of performance of banks, was calculated by using (ROA) and (ROE). By depending on a sample of (30) commercial banks, the study found that revenue diversification had a positive impact on profitability, but it had a negative impact on banks' risks.

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Moreover, the study proved that diversified banks could face a decline in profits as a result of external circumstances like COVID 19 pandemic more than less diversified banks. Also, the study recommended that Kenyan banks should depend on various sources of revenue in order to meet any economic crises. Additionally, Simoens and Vennet (2022) analyzed the effect of business diversification from different dimensions on banks' market valuations during the first wave of the COVID 19 pandemic using (56) European banks. The study included three dimensions of business diversification functional diversification, lending diversification, and geographic diversification. The study results exhibited that only functional diversification can act as a shock absorber because it alleviated banks' stock market decrease by roughly 10 percentage points, whilst lending diversification and geography diversification failed to protect banks from the impacts of the COVID 19 pandemic.

Overall, the literature demonstrated that business diversification differently affected banks' risks and performance. Some studies revealed that business diversification had a positive impact on banks' risks (e.g., Ngoc Nguyen, 2019; Lee et al., 2020; Antao and Karnik, 2022). On the other hand, some studies found that the effect of business diversification on banks' risks was negative (e.g., Sissy et al., 2017; Ovi et al., 2020; Li et al., 2021; Alouane et al., 2022; Ochenge, 2022). Regarding performance, some studies showed that business diversification positively affected banks' performance (e.g., Ferreira et al., 2019; Li et al., 2021; Uddin et al., 2021; Alouane et al., 2022; Kozak and Wierzbowska, 2022; Ochenge, 2022), while other studies implied that business diversification negatively affected banks' performance (e.g., Edirisuriya et al., 2015; Ngoc Nguyen, 2019). It is noteworthy that some studies demonstrated an insignificant impact on banks' performance (e.g., Edirisuriya et al., 2015); Raei et al., 2016; Abuzayed et al., 2018).

The basic limitation of studies mentioned in this section is that they concentrated on risks in general not specific types of risks such as credit and liquidity risks. Limited studies addressed these types of risks. Additionally, they explored the impact of business diversification on risks through stability measures like z-score. Moreover, the prior studies investigated extensively revenue diversification but they rarely examined asset diversification and funding diversification. Moreover, much of the extant literature concentrated foremost on Europe and the USA with some studies in Asian countries.

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The current study anticipates that business diversification, i.e., revenues diversification, assets diversification, and funding diversification, will positively affect credit risk and liquidity risk. This conjecture depends on the viewpoint that the increase in banks' activities can lead to an increase in banks' risks. Concerning banks' performance, business diversification can render banks many benefits if the activities are less risky and generate high returns. Thus, it is hard to expect the impact of business diversification on banks' performance because this impact depends on the comparison between the cost of business diversification and the benefits of this diversification. Simply put, in some cases, the cost of diversification outweighs its benefits as the activities related to business diversification may be riskier than the traditional activities of banks. Therefore, the second, third, and fourth hypotheses can be formulated as follows:

*H2: There is a significant positive impact of business diversification on credit risk.*

*H3: There is a significant positive impact of business diversification on liquidity risk.*

*H4: There is a significant impact of business diversification on banks' performance.*

### **2.3 The Moderating Role of Banks' Risks on Business Diversification and Banks' Performance Relationship**

The different findings on the impact of business diversification on banks' performance may be related to neglecting crucial factors that affect banks' environments. Literature has addressed some factors that moderate the impact of business diversification on banks' performance. As a case in point, Mulwa and Kosgei (2016) tested the effect of bank diversification on banks' performance, furthermore, the study examined the moderating role of solvency risk and credit risk on this effect. The study measured banks' performance according to (ROA) and (ROE), whereas credit risk was estimated by the ratio of non-performing loans (NPL) to total loans. Income diversification was calculated by the Herfindahl–Hirschman index (HHI) and asset diversification was measured by the sum squared shares of the individual components to total income or assets subtracted from unity to get a value that increases with the degree of diversification. Using (34) Kenyan banks over (9) firm years, the study concluded that income diversification and

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asset diversification had a negative impact on (ROA), while income diversification and asset diversification had no significant impact on (ROE). Regarding the moderating role of credit risk, the findings showed that credit risk had a significant and positive moderation impact on the relationship between income diversification and (ROA), whilst credit risk had an insignificant and positive moderation effect on the relationship between income diversification and (ROE). Furthermore, asset diversification significantly and negatively affected the relationship between asset diversification and (ROA) and (ROE).

Similarly, Luu et al. (2020) aimed to examine the effect of income diversification on banks' performance using data from (39) Vietnamese banks during the period from 2007 to 2017. In addition, the study investigated if the effect of income diversification on banks' performance could be affected by bank experience and ownership structure. Banks' performance was measured by (ROA) and (ROE), whereas income diversification was estimated by the Herfindahl–Hirschman index and the ratio of non-interest income to total operating income in the robustness check. The results revealed that income diversification positively affected banks' performance. Moreover, this positive impact increased for older banks that had more experience in the market. In the same vein, Adesina (2021) sought to test the impact of asset diversification and income diversification on banks' performance depending on (400) banks in (34) African countries for the period from 2005 to 2015. Furthermore, the study examined the moderating role of human capital efficiency on this effect. Banks' performance was calculated using (ROA) and (ROE). Income diversification was measured by the ratio of non-interest income to total income, whereas assets diversification was estimated by the Herfindahl–Hirschman index (AHHI) based on classifications of bank assets into four categories to determine asset diversification. The findings demonstrated that diversification negatively affected banks' performance. Moreover, the increase in human capital efficiency mitigated the negative effect of diversification on banks' performance.

In the same sense, Addai et al. (2022) investigated the effect of income diversification and corruption on banks' performance by using (715) African banks from (52) countries during the period from 2011 to 2018. Banks' performance was measured by four proxies return on assets (ROA), return on Equity (ROE), risk-adjusted return on assets (RAROA), and risk-adjusted return on Equity (RAROE). Income diversification was calculated by Herfindahl-Hirschman-index (HHI). The

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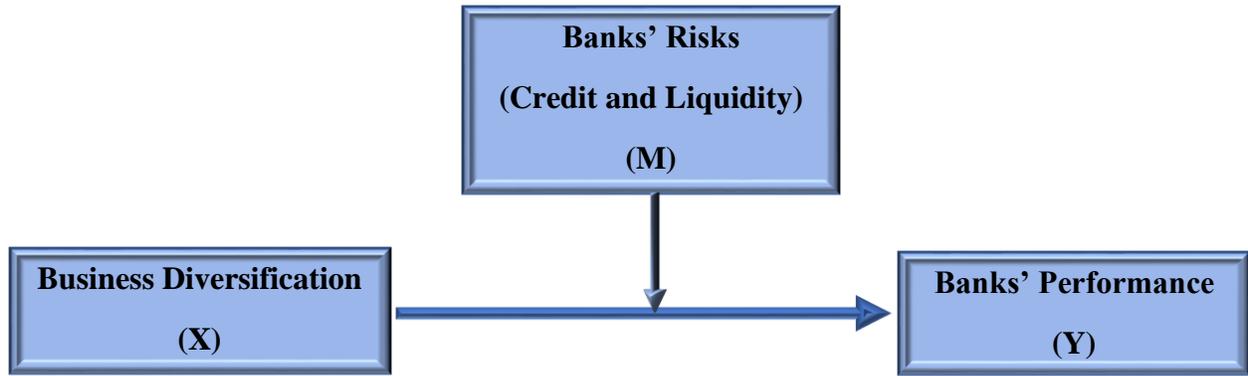
study found that income diversification positively affected banks' performance. Moreover, this positive effect diminished in countries that had a high level of corruption. In other words, the moderating role of corruption on income diversification and banks' performance relationship was negative. Also, Alouane et al. (2022) examined the moderating role of ownership structure on banks' performance and income diversification. The study depended on ten Tunisian banks listed on the Tunis Stock Exchange during the period from 2008 to 2017. The study revealed that the increase in revenue diversification enhanced banks' performance as it led to raising the level of profitability, in addition, the increase in revenue diversification improved banks' stability and hence lowered banks' risk. Concerning the moderation role of ownership structure on the relationship between banks' performance and income diversification, the study found that ownership structure moderated the relationship between banks' performance and income diversification since public and private ownership declined the effect of income diversification on banks' performance. But foreign ownership had no significant impact in this vein.

To sum up, the impact of business diversification on banks' performance can be moderated by some factors such as ownership structure, corruption, human capital efficiency, and risks surrounding banks. As can be seen from the above-mentioned studies, there are limited papers that addressed these factors. The existing study will enrich the literature by investigating the moderating role of credit risk and liquidity risk on the impact of business diversification on banks' performance among Egyptian banks. The current paper, in line with Mulwa and Kosgei (2016), predicts that credit risk and liquidity risk can moderate the impact of business diversification on banks' performance as shown in figure (1). Thus, the fifth and sixth hypotheses can be formulated as follows:

***H5: Credit risk moderates the impact of business diversification on banks' performance.***

***H6: Liquidity risk moderates the impact of business diversification on banks' performance.***

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**Fig. 1** The moderating role of banks' risks on business diversification and banks' performance relationship.

**3. Research Methodology**

**3.1 Sample and Data Collection**

The research population consists of all banks registered in Egypt which include (38) banks<sup>2</sup>. Table (1) shows the names of banks in the study sample.

**Table (1) Names of Banks in the Study Sample**

No.	Bank's Name
1	Commercial International Bank Egypt (CIB)
2	Egyptian Gulf Bank
3	Al Baraka Bank Egypt
4	Abu Dhabi Islamic Bank (ADIB) - Egypt
5	Alex Bank
6	Al Ahli Bank of Kuwait-Egypt (ABK)
7	Faisal Islamic Bank
8	Housing & Development Bank
9	Qatar National Bank Alahli – Egypt (QNB)
10	Suez Bank

Source: prepared by the researchers

The study sample contains (10) banks for 10 years from 2012 to 2021 according to the following criteria. Firstly, all financial statements must have been issued in the

<sup>2</sup> Central Bank of Egypt, annual report 2019/2020, p. 131.

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Egyptian pound. Secondly, banks that prepare their financial statements on 30 June have been excluded from the sample to achieve the consistency of the financial year. Thirdly, the availability of data that is required to test hypotheses. The required data was extracted directly from financial statements and notes to the financial statements which are available on firms' websites and the Mubasher website. Additionally, economic data were collected from the website of The World Bank.

### **3.2 Definition and Measurement of Variables**

#### **3.2.1 Banks' Performance**

Following the prevalent practice in previous studies, the current study use return on equity (ROE) to measure banks' performance. Return on equity (ROE) is calculated as a ratio of net income to shareholders' equity; it is a profitability metric that reflects the efficiency of banks to generate income from their shareholders' equity.

#### **3.2.2 Credit Risk**

Credit risk indicates that a borrower will not repay his debts or the payments of his debts will be delayed which may lead to cash flow problems (Van Greuning and Bratanovic, 2020). In other words, credit risk occurs when a borrower cannot meet his obligations whether interest or principal amounts. To measure the credit risk of banks, the current study uses the ratio of non-performing loans to total loans. This ratio measures credit risk; the higher this ratio, the higher the credit risk.

#### **3.2.3 Liquidity Risk**

Liquidity risk reflects the disability of banks to meet their maturing obligations, i.e., banks do not have enough cash to meet their depositor withdrawal request (Leo et al., 2019). Liquidity risk is measured by a ratio of liquid assets to total assets. The decrease in this ratio indicates a higher degree of liquidity risk.

#### **3.2.4 Revenue Diversification**

Revenue diversification means that banks depend on various revenue sources such as commissions, service charges, trading income, and other fees (Yan, 2012; Wu et al., 2020; Alouane et al., 2022). Revenue diversification in this study is measured

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by the ratio of non-interest income to total income. Non-interest income is the combination of revenues from commissions plus other non-interest income, while total income is the aggregation of net interest income and non-interest income.

$$\text{Revenue Diversification} = \frac{\text{Noninterest income}}{\text{Net interest income} + \text{Noninterest income}}$$

### **3.2.5 Asset Diversification**

Asset diversification refers to spreading a bank's portfolio across various asset classes such as domestic stocks, bonds, short-term investments, and international stocks (Meslier et al., 2014). Asset diversification is estimated by a ratio of noninterest-bearing assets to total assets. Noninterest-bearing assets are the difference between total assets and total loans and advances.

$$\text{Asset Diversification} = \frac{\text{Noninterest bearing assets}}{\text{Total assets}}$$

### **3.2.6 Funding Diversification**

Wu et al. (2020:6) define funding diversification as “..... *the non-deposit funding as a share of total liabilities that reflects the reliance of banks on wholesale funding sources, such as interbank borrowing, certificates of deposit, repo agreements, commercial papers, and other debt securities.*”. The existing study calculates funding diversification as follows:

$$\text{Funding Diversification} = \frac{\text{Total liabilities} - \text{Deposits}}{\text{Total liabilities}}$$

### **3.2.7 Control Variables**

This study contains five control variables to control for characteristics that can influence banks' performance, risks, and diversification. First, capital adequacy is considered an indicator of the sufficiency of a bank's equity to absorb losses from assets, in other words, the capital adequacy ratio denotes the level of capital banks should keep as a portion of their risky assets (Kozak and Wierzbowska, 2022; Naili and Lahrichi, 2022). Capital adequacy is measured by a ratio of total equity to total assets. Second, bank size is measured by the natural logarithm of total assets to control banks' size as banks of different sizes are likely to provide different results.

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Third, the deposit level is calculated by total deposits to total assets. Forth, bank age is estimated by the natural logarithm of banks' operational years. Finally, inflation is measured by the annual inflation rate to control macroeconomic variables. When the inflation rate is high, it causes a decline in the real value of debtors' revenues which may affect their ability to repay their obligations (Naili and Lahrichi, 2022). Table (2) describes the study variables.

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**Table (2) Description of the Study Variables**

Variables	Notation	Definition of Variable	References
Performance	ROE	Net income/Total shareholder's equity	Moudud-UI-Huq et al. (2018); Ekinci and Poyraz (2019); Ngoc Nguyen (2019); Mobarak (2020); Zogning and Lenga (2021); Naili and Lahrichi, (2022); Twum et al. (2022); Yahaya et al. (2022)
Credit Risk	CRISK	Non-performing loans /Total loans	Ekinci and Poyraz (2019); Uddin et al. (2021); Umar et al. (2021); Hunjra et al. (2022); Twum et al. (2022); Yahaya et al. (2022)
Liquidity Risk	LRISK	Liquid Assets/ Total Assets	Azzam and Almaleeh (2022); Zogning and Lenga (2022)
Revenues Diversification	RDIV	Net interest income / Total income	Edirisuriya et al. (2015);Moudud-UI-Huq et al. (2018); Uddin et al. (2021); Gafrej and Boujelbéne, (2022)
Assets Diversification	ADIV	Noninterest-bearing assets / Total assets	Edirisuriya et al. (2015); Moudud-UI-Huq et al. (2018); Uddin et al. (2021);
Funding Diversification	FDIV	(Total Liabilities - Deposits) / Total liabilities	Wu et al. (2020)
Capital Adequacy Ratio	CAR	Total equity / Total assets	Edirisuriya et al. (2015); Ferreira et al. (2019); Zogning and Lenga (2022)
Bank Size	BSIZE	Natural logarithm of total assets	Ovi et al. (2020); Paltrinieri et al. (2021); Markoulis et al. (2021); Uddin et al. (2021); Abdesslem et al. (2022)
Deposits Level	DL	Deposits / Total assets	Antao and Karnik (2021); Li et al. (2021); Ochenge (2022)
Bank Age	BAGE	Natural Logarithm of banks' operational years	Wu, et al. (2020)

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Inflation	INF	Annual inflation rate	Sissy et al. (2017); Căpraru et al. (2020); Gafrej and Boujelbéne (2022); Zogning and Lenga 2022
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Source: prepared by the researchers

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### 3.3 Models Specification

The current study depends on several models in order to achieve its objectives as follows:

#### 3.3.1 Model (1) Examining the Impact of Credit Risk and Liquidity Risk on Banks' Performance

The present study depends on model (1) to examine the impact of credit risk and liquidity risk on banks' performance. Model (1) can be formulated as follows:

$$ROE_{i,t} = \beta_0 + \beta_1 CRISK_{i,t} + \beta_2 LRISK_{i,t} + \beta_3 CAR_{i,t} + \beta_4 BSIZE_{i,t} + \beta_5 DL_{i,t} + \beta_6 BAGE_{i,t} + \beta_7 INF + \varepsilon_{i,t} \quad (1)$$

Where  $ROE_{i,t}$  refers to return on assets of bank (i) in the year (t),  $CRISK_{i,t}$  is the credit risk of bank (i) in the year (t),  $LRISK_{i,t}$  is the liquidity risk of bank (i) in the year (t),  $CAR_{i,t}$  is the capital adequacy of bank (i) in the year (t),  $BSIZE_{i,t}$  is the bank size of bank (i) in the year (t),  $DL_{i,t}$  is the deposit level of bank (i) in the year (t),  $BAGE_{i,t}$  is the bank age of bank (i) in the year (t),  $INF$  points out to the annual inflation rate, and  $\varepsilon_{i,t}$  is the standard error.

#### 3.3.2 Model (2) Testing the Effect of Business Diversification on Credit Risk

Model (2) shows the effect of business diversification on credit risk and it can be formulated as follows:

$$CRISK_{i,t} = \beta_0 + \beta_1 RDIV_{i,t} + \beta_2 ADIV_{i,t} + \beta_3 FDIV_{i,t} + \beta_4 BSIZE_{i,t} + \beta_5 DL_{i,t} + \beta_6 BAGE_{i,t} + \beta_7 INF + \varepsilon_{i,t} \quad (2)$$

Where  $RDIV_{i,t}$  refers to revenue diversification of bank (i) in the year (t),  $ADIV_{i,t}$  is asset diversification of bank (i) in the year (t),  $FDIV_{i,t}$  is funding diversification of bank (i) in the year (t), and the remainder variables is previously explained in model (1).

#### 3.3.3 Model (3) Examining the Impact of Business Diversification on Liquidity Risk

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To examine the impact of business diversification on liquidity risk, model (3) is formulated as follows:

$$LRISK_{i,t} = \beta_0 + \beta_1 RDIV_{i,t} + \beta_2 ADIV_{i,t} + \beta_3 FDIV_{i,t} + \beta_4 BSIZE_{i,t} + \beta_5 DL_{i,t} + \beta_6 BAGE_{i,t} + \beta_7 INF + \varepsilon_{i,t} \quad (3)$$

All variables are described formerly in model (1) and model (2).

### **3.3.4 Model (4) Testing the Effect of Business Diversification on Banks' Performance**

The effect of business diversification on banks' performance is tested by using model (4) as follows:

$$ROE_{i,t} = \beta_0 + \beta_1 RDIV_{i,t} + \beta_2 ADIV_{i,t} + \beta_3 FDIV_{i,t} + \beta_4 BSIZE_{i,t} + \beta_5 DL_{i,t} + \beta_6 BAGE_{i,t} + \beta_7 INF + \varepsilon_{i,t} \quad (4)$$

All variables are earlier described in model (1) and model (2).

### **3.3.5 Model (5) Examining the Moderating Role of Banks' Risks on Business Diversification and Banks' Performance Relationship**

The existing study relies on model (5) to examine moderating role of banks' Risks on business diversification and banks' performance relationship. Model (5) can be formulated as follows:

$$ROE_{i,t} = \beta_0 + \beta_1 RDIV_{i,t} + \beta_2 ADIV_{i,t} + \beta_3 FDIV_{i,t} + \beta_4 CRISK_{i,t} + \beta_5 LRISK_{i,t} + \beta_6 CRISK_{i,t} * RDIV_{i,t} + \beta_7 LRISK_{i,t} * RDIV_{i,t} + \beta_8 CRISK_{i,t} * ADIV_{i,t} + \beta_9 LRISK_{i,t} * ADIV_{i,t} + \beta_{10} CRISK_{i,t} * FDIV_{i,t} + \beta_{11} LRISK_{i,t} * FDIV_{i,t} + \beta_{12} BSIZE_{i,t} + \beta_{13} DL_{i,t} + \beta_{14} BAGE_{i,t} + \beta_{15} INF + \varepsilon_{i,t} \quad (5)$$

Where  $CRISK_{i,t} * RDIV_{i,t}$  points out the interaction variable of credit risk and revenues diversification.  $LRISK_{i,t} * RDIV_{i,t}$  is the interaction variable of liquidity risk and revenue diversification.  $CRISK_{i,t} * ADIV_{i,t}$  is the interaction variable of credit risk and assets diversification.  $LRISK_{i,t} * ADIV_{i,t}$  is the interaction variable of liquidity risk and assets diversification.  $CRISK_{i,t} * FDIV_{i,t}$  is the interaction

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variable of credit risk and funding diversification.  $LRISK_{i,t} * FDIV_{i,t}$  is the interaction variable of liquidity risk and funding diversification. All variables are described formerly in model (1) and model (2).

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### 4. Results and Discussion

#### 4.1 Descriptive Statistics

The present paper depends on some central tendency and dispersion measures to describe the study data briefly. Table (3) demonstrates some descriptive statistics of the study variables.

**Table (3) Descriptive Statistics**

Variable	N	Mean	Std. Dev.	Min.	Max.
ROE	100	0.17079	0.18872	-1.36838	0.66460
CRISK	100	0.10559	0.12877	0.01000	0.56850
LRISK	100	0.14471	0.11183	-0.00894	0.46228
RDIV	100	0.46397	0.72747	-3.81889	2.07244
ADIV	100	0.63437	0.15255	0.07949	0.99971
FDIV	100	-0.00853	0.81248	-7.97370	0.90314
CAR	100	0.10824	0.11497	0.04289	1.02267
BSIZE	100	24.69268	0.97258	22.74941	26.93115
DL	100	0.92942	0.71475	0.46767	7.93818
BAGE	100	3.73863	0.34203	2.77258	4.31748
INF	100	0.11344	0.06821	0.04500	0.29506

Source: statistical analysis results

It can be seen from the data in Table (3) that the mean value of (ROE), as a proxy of banks' performance, throughout the sample period is (0.17079), i.e., 17.07%. This is consistent with the study of Ochenge (2022) and Twum et al. (2022) as the mean value of (ROE) in these studies was 18.2% and 17.8% respectively. The maximum value of (ROE) is (0.66460) and the minimum value of (ROE) is (-1.36838). The negative value of (ROE) indicates that some banks suffered from negative returns in some years. This is in line with the study of Ngoc Nguyen (2019), Zogning and Lenga (2021), and Yahaya et al. (2022) as the lowest value of (ROE) in these studies was (-0.055), (-2.251), and (-67.008) respectively. According to the data of each bank, the highest value of (ROE) is presented in Al Ahli Bank of Kuwait-Egypt (ABK), while Abu Dhabi Islamic Bank (ADIB)-Egypt has the lowest value of (ROE). Also, the descriptive statistics exhibit that the standard deviation of (ROE) is (0.18872) which is similar to the study of Ekinici and Poyraz (2019), but this is different from the study of Zogning and Lenga (2021) as the standard deviation of (ROE) in these studies was (0.186) and (0.351) respectively.

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Regarding credit risk, Table (3) shows that the mean value during the overall sample is (0.10559), i.e., 11%. This result differs from the study of Umar et al. (2021) as the mean value of (CRISK) was (0.03). The maximum value of (CRISK) is (0.56850) and the minimum value of (CRISK) is (0.01000). These results match those observed in the study of Hunjra et al. (2022) as the highest value of (CRISK) was (0.516) and the lowest value of (CRISK) was (0.001). According to the data of each bank, the highest value of (CRISK) is seen in Suez Bank, whilst Al Ahli Bank of Kuwait-Egypt (ABK) has the lowest value of (CRISK). Also, the descriptive statistics display that the standard deviation of (CRISK) is (0.12877) which is different from the study of Uddin et al. (2021) as the standard deviation of (CRISK) was (0.062). Concerning liquidity risk, the mean value in the sample period is (0.14471), i.e., 14%. This result is inconsistent with the study of Azzam and Almaleeh (2022) as the mean value of (LRISK) was (0.463). The maximum value of (LRISK) is (0.46228) and the minimum value of (LRISK) is (-0.00894). According to the data of each bank, the highest value of (LRISK) is observed in Faisal Islamic Bank, whereas Abu Dhabi Islamic Bank (ADIB)-Egypt has the lowest value of (LRISK). Furthermore, the descriptive statistics show that the standard deviation of (LRISK) is (0.11183) which differs from the study of Zogning and Lenga (2022) as the standard deviation of (LRISK) was (0.194).

With respect to revenue diversification, the mean value of (RDIV) throughout the sample period is (0.46397), i.e., 46.3%. This is not consistent with the study of Moudud-Ul-Huq et al. (2018) as the mean value of (RDIV) was (27.149) in Indonesia and (80.675) in Malaysia. The maximum value of (RDIV) is (2.07244) and the minimum value of (RDIV) is (-3.81889). The negative value of (RDIV) means that some banks experienced losses related to net interest income in some years. According to the data of each bank, the highest value of (RDIV) is existing in Al Ahli Bank of Kuwait-Egypt (ABK), while Abu Dhabi Islamic Bank (ADIB)-Egypt has the lowest value of (RDIV). It is noteworthy that the previous result is consistent with the descriptive statistics related to (ROE) since Al Ahli Bank of Kuwait-Egypt (ABK) has the highest value of (ROE) and Abu Dhabi Islamic Bank (ADIB)-Egypt has the lowest value of (ROE). Also, the descriptive statistics exhibit that the standard deviation of (RDIV) is (0.72747) which is different from the study of Gafrej and Boujelbéne, (2022) since the standard deviation in this study was (0.1018). Relating to asset diversification, the mean value during the overall sample is (0.63437), i.e., 63%. This result is more than the study of Uddin et al. (2021) as the mean value of (ADIV) was (0.335). The maximum value of

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(ADIV) is (0.99971) and the minimum value of (ADIV) is (0.07949). According to the data of each bank, the highest value of (ADIV) is presented in Al Baraka Bank Egypt, while Faisal Islamic Bank has the lowest value of (ADIV). Moreover, the descriptive statistics show that the standard deviation of (ADIV) is (0.15255) which is less than the study of Moudud-Ul-Huq et al. (2018) as the standard deviation of (ADIV) in Thailand was (23.905). About funding diversification, the mean value in the sample period is (-0.00853). The maximum value of (FDIV) is (0.90314) and the minimum value of (FDIV) is (-7.97370). According to the data of each bank, the highest value of (FDIV) is observed in Qatar National Bank Alahli-Egypt (QNB), whereas Alex Bank has the lowest value of (FDIV). Furthermore, the descriptive statistics show that the standard deviation of (FDIV) is (0.81248) which is more than the study of Wu et al. (2020) as the standard deviation of (FDIV) was (0.179).

Concerning control variables, the mean value of (CAR) throughout the sample period is (0.10824), i.e., 11%. This is less than the study of Ferreira et al. (2019) as the mean value of (CAR) was (0.2022) in Brazil. The mean value of bank size (BSIZE) during the sample period is (24.69268), i.e., 25% which is more than the study of Ovi et al. (2019) as the mean value in this study was (16.783). Relating to deposits level, the mean value of (DL) during the overall sample is (0.92942), i.e., 93%. This value is more than the study of Li et al. (2021) since the mean value was (0.756) in China. The mean value of bank age (BAGE) is (3.73863) which is nearly equals to the study of Wu et al. (2020) as the mean value was (3.023). For inflation, the mean value of (INF) is (0.11344) which is more than the study of Sissy et al. (2017) since the mean value in 29 African countries was (0.087), in addition, the mean value of (INF) is more than the study of Yahaya et al. (2022) as the mean value of (INF) in this study was (9.2171) in Sub-Saharan Africa.

### **4.2 Testing Hypotheses**

#### **4.2.1 The Impact of Credit Risk and Liquidity Risk on Banks' Performance**

The first hypothesis aims to test how credit risk and liquidity risk affect banks' performance by using model (1). Table (4) provides the findings obtained from ordinary least squares (OLS) regression analysis. The following results in Table (4) denote that the model is statistically significant, where the p-value is (0.000). Besides, the adjusted value of the determination coefficient (Adjusted  $R^2$ ) is (0.269), which implies that the model explains nearly (27%) of the variation in

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banks' performance. This result is consistent with the study of Chen et al. (2022) and Mobarak (2020). With respect to the main coefficients of the model (1), coefficient  $\beta_1$  is negative and statistically significant at (-0.523), which implies that the increase in non-performing loans ratio leads to a decline in banks' performance. This result is in accordance with Ekinci and Poyraz (2019), Hassan et al. (2019), and Twum et al. (2022). In other words, credit risk negatively affects banks' performance, which supports *H1a* that indicates **"There is a significant negative impact of credit risk on banks' performance"**. As a consequence, banks should carefully manage credit risk in order to keep their performance stable. Banks can manage credit risk by selecting borrowers strictly. Moreover, banks should put appropriate credit limitations which are consistent with their possibilities.

**Table (4) The Regression Results of Credit and Liquidity Risk on Banks' Performance**

<b>Panel A: Summary statistics of model (1)</b>				
<b>P-value</b>	<b>F-value</b>	<b>R</b>	<b>R<sup>2</sup></b>	<b>Adj.R<sup>2</sup></b>
0.000	6.193	0.566	0.320	0.269
<b>Panel B: Results of the main coefficients of model (1) Independent variables (ROE<sub>i,t</sub>)</b>				
<b>Variable</b>	<b>Estimator</b>	<b>Coefficient</b>	<b>P-value</b>	
Constant	$\beta_0$	-0.830	0.076	
CRISK <sub>i,t</sub>	$\beta_1$	-0.523	0.000	
LRISK <sub>i,t</sub>	$\beta_2$	0.297	0.058	
CAR <sub>i,t</sub>	$\beta_3$	-0.191	0.191	
B <sub>SIZE</sub> <sub>i,t</sub>	$\beta_4$	0.027	0.168	
DL <sub>i,t</sub>	$\beta_5$	0.003	0.884	
BAGE <sub>i,t</sub>	$\beta_6$	0.084	0.115	
INF	$\beta_7$	0.337	0.175	

Source: statistical analysis results

Concerning the liquidity risk, coefficient  $\beta_2$  is positive and statistically significant at (0.297), which indicates that the decrease in liquid assets to total assets ratio causes a decrease in banks' performance. This result is in compliance with prior studies (e.g., Mobarak, 2020; Azzam and Almaleeh, 2022), but it contradicts the study of Zogning and Lenga (2022) which revealed that the liquidity risk negatively affected the performance of banks. That is to say, liquidity risk has a

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positive impact on banks' performance, which agrees with *H1b* that indicates that **"There is a significant positive impact of liquidity risk on banks' performance."** The positive effect of liquidity risk on banks' performance occurs because liquidity risk is often an inescapable result of operations in banks. In other words, banks usually gather short-term deposits and lend long-term loans. The gap between the maturity date of short-term deposits and the maturity date of long-term loans causes liquidity risk. Therefore, banks should have an adequate combination of assets and liabilities in order to achieve their liquidity needs.

In conclusion, the results of *H1a* and *H1b* support the first hypothesis which points out **"There is a significant impact of credit risk and liquidity risk on banks' performance."**

### 4.2.2 The Impact of Business Diversification on Credit Risk

The second hypothesis seeks to test the effect of business diversification on credit risk by using model (2). Table (5) provides the findings obtained from ordinary least squares (OLS) regression analysis.

**Table (5) The Regression Results of Business Diversification on Credit Risk**

<b>Panel A: Summary statistics of model (2)</b>				
<b>P-value</b>	<b>F-value</b>	<b>R</b>	<b>R<sup>2</sup></b>	<b>Adj.R<sup>2</sup></b>
0.000	4.032	0.512	0.262	0.197
<b>Panel B: Results of the main coefficients of model (2) Independent variables (CRISK<sub>i,t</sub>)</b>				
<b>Variable</b>	<b>Estimator</b>	<b>Coefficient</b>	<b>P-value</b>	
Constant	$\beta_0$	1.294	0.000	
<i>RDIV<sub>i,t</sub></i>	$\beta_1$	0.035	0.048	
<i>ADIV<sub>i,t</sub></i>	$\beta_2$	0.272	0.001	
<i>FDIV<sub>i,t</sub></i>	$\beta_3$	0.011	0.909	
<i>CAR<sub>i,t</sub></i>	$\beta_4$	-0.074	0.483	
<i>BFSIZE<sub>i,t</sub></i>	$\beta_5$	-0.053	0.000	
<i>DL<sub>i,t</sub></i>	$\beta_6$	-0.014	0.902	
<i>BAGE<sub>i,t</sub></i>	$\beta_7$	0.337	0.734	
<i>INF</i>	$\beta_8$	-0.075	0.661	

Source: statistical analysis results

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The above-mentioned results in Table (5) indicate that the model is statistically significant, where the p-value is (0.000). Also, the adjusted value of the determination coefficient (Adjusted  $R^2$ ) is (0.197), which implies that the model explains roughly (20%) of the variation in credit risk. This result is in line with the study of Zogning and Lenga (2022) as the adjusted value of the determination coefficient (Adjusted  $R^2$ ) was (25.49%). Concerning the main coefficients of the model (2), coefficient  $\beta_1$  is positive and statistically significant at (0.035), which infers that the increase in revenue diversification causes an increase in credit risk. This result is in agreement with Ferreira et al. (2019) and Antao and Karnik (2022) which found that revenue diversification affected positively banks' risk. However, this result contradicts the study of Ovi et al. (2020) and Li et al. (2021) which revealed that revenue diversification could mitigate credit risk. Also, this result does not support the findings of Raei et al. (2016) which showed that diversification in banks did not have a significant impact on credit risk. Thus, relating to the result of regression analysis, revenue diversification positively affects credit risk, which supports ***H2*** that indicates ***“There is a significant positive impact of business diversification on credit risk.”*** As a result, banks should be careful when using non-interest activities as these activities leads to an increase in credit risk.

With regard to asset diversification, coefficient  $\beta_2$  is positive and statistically significant at (0.272), which means that the increase in asset diversification motivates the increase in credit risk. Therefore, asset diversification has a positive effect on credit risk, which supports ***H2*** that indicates ***“There is a significant positive impact of business diversification on credit risk”***. This result is opposite to the study of Moudud-Ul-Huq et al. (2018) which concluded a negative impact of asset diversification on banks' risk in Indonesia, Thailand, and Malaysia. Consequently, banks should be cautious if they use various types of assets because this diversification can increase credit risk.

Concerning funding diversification, coefficient  $\beta_3$  is positive but statistically insignificant at (0.011). Therefore, funding diversification has a positive effect on credit risk but this effect is insignificant, which does not support ***H2*** that denotes ***“There is a significant positive impact of business diversification on credit risk”***. This finding corroborates the result of the study of Wu et al. (2020) which proved that funding diversification had no statistically impact on the Z-score. It is noteworthy that bank size has a positive significant impact on credit risk. This

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means that larger banks face a higher degree of credit risk. This result does not agree with the study of Ovi et al. (2020) and Uddin et al. (2021), but it matches with the study of Markoulis et al. (2021).

To summarize, the second hypothesis which indicates that “*There is a significant positive impact of business diversification on credit risk*” is accepted for revenue diversification and asset diversification. While this hypothesis is rejected for funding diversification.

### 4.2.3 The Impact of Business Diversification on Liquidity Risk

The third hypothesis pursues to test the implication of business diversification on liquidity risk by using model (3). Table (6) shows the findings obtained from ordinary least squares (OLS) regression analysis. The following results in Table (6) show that the model is statistically significant, where the p-value is (0.000). Also, the adjusted value of the determination coefficient (Adjusted  $R^2$ ) is (0.195), which implies that the model explains approximately (20%) of the variation in liquidity risk. This result is in line with the study of Ovi et al. (2020) as the adjusted value of the determination coefficient (Adjusted  $R^2$ ) was (0.368). Regarding the main coefficients of the model (3), coefficient  $\beta_1$  is negative but statistically insignificant at (-0.021), which means that the increase in revenue diversification causes a decrease in liquidity risk but this result is non-significant. This result supports the findings of Ngoc Nguyen (2019) which proved that revenue diversification had a negative impact of banks' risks. Therefore, according to the regression analysis, revenue diversification has an inverse insignificant effect on liquidity risk, which is not consistence with *H3* that indicates “*There is a significant positive impact of business diversification on liquidity risk*”.

**Table (6) The Regression Results of Business Diversification on Liquidity Risk**

<b>Panel A: Summary statistics of model (3)</b>				
<b>P-value</b>	<b>F-value</b>	<b>R</b>	<b>R<sup>2</sup></b>	<b>Adj.R<sup>2</sup></b>
0.000	4.002	0.510	0.260	0.195
<b>Panel B: Results of the main coefficients of model (3) Independent variables (LRISK<sub>t,t</sub>)</b>				
<b>Variable</b>	<b>Estimator</b>	<b>Coefficient</b>	<b>P-value</b>	
Constant	$\beta_0$	-0.804	0.005	

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$RDIV_{i,t}$	$\beta_1$	-0.021	0.158
$ADIV_{i,t}$	$\beta_2$	0.276	0.000
$FDIV_{i,t}$	$\beta_3$	0.057	0.503
$CAR_{i,t}$	$\beta_4$	-0.068	0.455
$BFSIZE_{i,t}$	$\beta_5$	0.020	0.080
$DL_{i,t}$	$\beta_6$	0.075	0.441
$BAGE_{i,t}$	$\beta_7$	0.048	0.182
$INF$	$\beta_8$	0.350	0.021

Source: statistical analysis results

With respect to asset diversification, coefficient  $\beta_2$  is positive and statistically significant at (0.276), which means that the increase in asset diversification leads to an increase in liquidity risk. Therefore, asset diversification has a positive impact on liquidity risk, which supports ***H3*** that indicates ***“There is a significant positive impact of business diversification on liquidity risk”***. Therefore, banks should take a great careful when using several types of assets as this diversification can increase liquidity risk. This result differs from the study of Moudud-Ul-Huq et al. (2018) which revealed that there was a negative effect of asset diversification on banks' risk in Indonesia, Thailand, and Malaysia.

Concerning funding diversification, coefficient  $\beta_3$  is positive but statistically insignificant at (0.057). Therefore, funding diversification has a positive effect on liquidity risk but this impact is insignificant, which does not support ***H3*** that denotes ***“There is a significant positive impact of business diversification on liquidity risk”***. This finding is consistent with the study of Wu et al. (2020) which demonstrated that funding diversification had an insignificant influence on the Z-score.

It should be noted that annual inflation has a positive significant impact on liquidity risk. This indicates that the increase in annual inflation leads to an increase in liquidity risk. This result is not consistent with the study of Paltrinieri et al. (2021) and Alouane et al. (2022) which found an insignificant impact of inflation on banks' risk. The potential reason for the positive effect of inflation on liquidity risk in Egypt may be related to eroding the actual value of money. To illustrate, the high levels of inflation cause a decline in the actual value of money earned by people which leads to a decrease in their abilities to reimburse their debts. As a consequence, this causes a reduction in liquidity levels and an increase in liquidity risk.

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To conclude, the third hypothesis which indicates that " *There is a significant positive impact of business diversification on liquidity risk*" is accepted for asset diversification. Whilst this hypothesis is not accepted for revenue diversification and funding diversification.

### 4.2.4 The Impact of Business Diversification on Banks' Performance

The fourth hypothesis pursues to test the implication of business diversification on banks' performance by using model (4). Table (7) demonstrates the findings obtained from ordinary least squares (OLS) regression analysis. The following results in Table (7) indicate that the model is statistically significant, where the p-value is (0.007). Also, the adjusted value of the determination coefficient (Adjusted  $R^2$ ) is (0.129), which shows that the model explains roughly (13%) of the variation in banks' performance. With respect to the main coefficients of the model (4), coefficient  $\beta_1$  is negative but statistically insignificant at (-0.011), which deduces that the increase in revenue diversification causes a decrease in banks' performance but this effect is statistically insignificant. This result is different with the study of Nisar et al. (2018), Githaiga and Yegon (2019), and Addai et al. (2022) which demonstrated a positive significant impact of revenue diversification on banks' performance. Nonetheless, this result is agreed with the study of Ngoc Nguyen (2019) and Antao and Karnik (2022) which revealed that revenue diversification negatively affected banks' performance. Thus, revenue diversification has an insignificant negative effect on banks' performance, which refutes  $H4$  that indicates "*There is a significant impact of business diversification on banks' performance*". Therefore, banks should pay great attention when using non-interest activities because these activities are likely to negatively affect banks' performance.

**Table (7) The Regression Results of Business Diversification on Banks' Performance**

<b>Panel A: Summary statistics of model (4)</b>				
P-value	F-value	R	$R^2$	Adj. $R^2$
0.007	2.835	0.447	0.200	0.129
<b>Panel B: Results of the main coefficients of model (4) Independent variables (<math>ROE_{i,t}</math>)</b>				
Variable	Estimator	Coefficient	P-value	
Constant	$\beta_0$	-1.674	0.001	
$RDIV_{i,t}$	$\beta_1$	-0.011	0.692	

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$ADIV_{i,t}$	$\beta_2$	-0.017	0.894
$FDIV_{i,t}$	$\beta_3$	-0.032	0.832
$CAR_{i,t}$	$\beta_4$	-0.174	0.278
$BSIZE_{i,t}$	$\beta_5$	0.060	0.004
$DL_{i,t}$	$\beta_6$	-0.028	0.868
$BAGE_{i,t}$	$\beta_7$	0.101	0.114
$INF$	$\beta_8$	0.477	0.071

Source: statistical analysis results

Concerning asset diversification, coefficient  $\beta_2$  is also negative and statistically insignificant at (-0.017), which shows that the increase in asset diversification leads to a decrease in banks' performance. This result is in line with the study of Berger et al. (2010) which concluded that asset diversification declined profits and increased costs. In the same vein, Edirisuriya et al. (2015) found that asset diversification itself did not enhance the market performance of banks. However, this finding contradicts the result of the study of AlKhouri and Arouri (2019) that showed that asset diversification had a positive effect on banks' performance. Consequently, asset diversification has an insignificant negative effect on banks' performance, which does not support **H4** that indicates "***There is a significant impact of business diversification on banks' performance***". As a result, using asset diversification should be used cautiously by banks since it may cause a negative impact on banks' performance.

Concerning funding diversification, coefficient  $\beta_3$  is negative but statistically insignificant at (-0.032). As a result, funding diversification has a negative effect on banks' performance but this effect is insignificant, which disproves **H4** that indicates "***There is a significant impact of business diversification on banks' performance***". This finding supports the previous research of Berger et al. (2010) which displayed that deposits diversification diminished profits and rose costs. As a consequence, banks should be careful when utilizing funding diversification as this diversification may lead to a decline in banks' performance. It is worth mentioning that bank size has a positive significant impact on banks' performance. This means that larger banks provide better performance related to return on equity (ROE). This finding confirms the result of the study of Luu et al. (2020) which demonstrated that banks' size positively affected banks' performance in Vietnam.

To sum up, the fourth hypothesis which indicates that "***There is a significant impact of business diversification on banks' performance***" is rejected for all

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activities of diversification, i.e., revenue diversification, asset diversification, and funding diversification.

### **4.2.5 The Moderating Role of Banks' Risks on Business Diversification and Banks' Performance Relationship**

The fifth hypothesis examines the interaction relationship between financial risks and business diversification on banks' performance by using model (5). Table (8) presents the results obtained from ordinary least squares (OLS) regression analysis. The following results in Table (8) indicate that the model is statistically significant, where the p-value is (0.000). Also, the adjusted value of the determination coefficient (Adjusted  $R^2$ ) is (0.385), which displays that the model explains roughly (39%) of the variation in banks' performance. In regard to the main coefficients of the model (5), coefficients  $\beta_1$ ,  $\beta_2$ , and  $\beta_3$  are statistically insignificant. This finding confirms the result of analyzing **H4** which demonstrated that all kinds of business diversification have an insignificant impact on banks' performance. Furthermore, the coefficient  $\beta_4$  is negative and statistically significant at (-3.411), which means that credit risk affects banks' performance negatively. This result is consistent with the findings of analyzing **H1a** that credit risk has a negative significant impact on banks' performance. Also, the coefficient  $\beta_5$  is positive and statistically significant at (1.979), which indicates that liquidity risk influences banks' performance positively. This result is in tune with the outcome of analyzing **H1b** that liquidity risk has a positive significant effect on banks' performance.

With regard to the moderating role of risks on the relationship between business diversification and banks' performance, regarding revenue diversification, the interaction coefficient  $\beta_6$  is positive and statistically significant at (0.616), which implies that an increase in revenue diversification leads to an increase in banks' performance in case of credit risk. In other words, the existence of credit risk changes the impact of revenue diversification from a negative insignificant impact on banks' performance, in **H4**, to a positive significant impact. This finding proves **H5** which indicates that "**Credit risk moderates the impact of business diversification on banks' performance**". As a consequence, banks can use non-traditional activities to enhance their performance when facing credit risk. This finding agrees with the result of the study of Mulwa and Kosgei (2016) which revealed that credit risk had a positive moderation effect on the relationship between income diversification and (ROE) but this effect was insignificant.

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Moreover, this result corroborates the ideas of Zogning and Lenga (2021) who proved that banks depended on revenue diversification to face the decline in revenues resulting from credit rationing. Similarly, the interaction coefficient  $\beta_7$  is negative and statistically significant at (-0.981), which denotes that an increase in revenue diversification causes a decrease in banks' performance in case of liquidity risk. To illustrate, the existence of liquidity risk alters the effect of revenue diversification from a negative insignificant effect on banks' performance, in **H4**, to a negative significant effect. This outcome supports **H6** which denotes that ***"Liquidity risk moderates the impact of business diversification on banks' performance"***. As a result, banks should be careful when using non-traditional activities as these activities diminish their performance if banks face liquidity risk. This result is in line with the study of Antao and Karnik (2022) which showed that revenue diversification had a positive impact on banks' risks and declined banks' stability.

Concerning asset diversification, the interaction coefficient  $\beta_8$  is positive and statistically significant at (3.223), which infers that an increase in asset diversification causes an increase in banks' performance in case of credit risk. Namely, the existence of credit risk alters the effect of asset diversification from a positive insignificant effect on banks' performance, in **H4**, to a positive significant effect. This result confirms **H5** which indicates that ***"Credit risk moderates the impact of business diversification on banks' performance"***. Therefore, banks should rely on numerous kinds of assets to improve their performance when facing credit risk. This finding contradicts the study of Mulwa and Kosgei (2016) which proved that credit risk had a significant negative moderation impact on the relationship between asset diversification and (ROE). On the contrary, the interaction coefficient  $\beta_9$  is negative but statistically insignificant at (-1.977), which indicates that an increase in asset diversification leads to a decline in banks' performance in case of liquidity risk but this impact is non-significant. That is to say, the presence of liquidity risk fails to adjust the impact of asset diversification from insignificant impact to significant ones. This result does not support **H6** which indicates that ***"Liquidity risk moderates the impact of business diversification on banks' performance"***.

About funding diversification, the interaction coefficient  $\beta_{10}$  is positive and statistically insignificant at (1.724), which indicates that an increase in funding diversification results in an increase in banks' performance in case of credit risk. However, this effect is insignificant. Put differently, the existence of credit risk

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cannot change the effect of funding diversification from an insignificant effect on banks' performance to a significant effect. This finding refutes *H5* which indicates that "*Credit risk moderates the impact of business diversification on banks' performance*". Likewise, the interaction coefficient  $\beta_{11}$  is negative but statistically insignificant at (-0.402), which shows that an increase in funding diversification leads to a decline in banks' performance in case of liquidity risk but this effect is non-significant. In other words, the existence of liquidity risk cannot change the impact of funding diversification from insignificant impact to significant ones. Accordingly, this result differs from *H6* which indicates that "*Liquidity risk moderates the impact of business diversification on banks' performance*". It is noteworthy that this result is consistent with the results of *H2* and *H3* of the current paper which proved that funding diversification had an insignificant impact on credit risk and liquidity risk. Moreover, this finding supports the outcome of *H4* of the present study as it revealed that funding diversification had no effect on banks' performance.

**Table (8) The Regression Results of Moderating Role of Banks' Risks on Business Diversification and Banks' Performance Relationship**

<b>Panel A: Summary statistics of model (5)</b>				
P-value	F-value	R	R <sup>2</sup>	Adj.R <sup>2</sup>
0.000	4.875	0.696	0.484	0.385
<b>Panel B: Results of the main coefficients of model (5) Independent variables (ROE<sub>i,t</sub>)</b>				
Variable	Estimator	Coefficient	P-value	
Constant	$\beta_0$	-0.299	0.601	
<i>RDIV<sub>i,t</sub></i>	$\beta_1$	0.032	0.489	
<i>ADIV<sub>i,t</sub></i>	$\beta_2$	0.042	0.851	
<i>FDIV<sub>i,t</sub></i>	$\beta_3$	-0.085	0.765	
<i>CRISK<sub>i,t</sub></i>	$\beta_4$	-3.411	0.000	
<i>LRISK<sub>i,t</sub></i>	$\beta_5$	1.979	0.016	
<i>CRISK<sub>i,t</sub> * RDIV<sub>i,t</sub></i>	$\beta_6$	0.616	0.004	
<i>LRISK<sub>i,t</sub> * RDIV<sub>i,t</sub></i>	$\beta_7$	-0.981	0.020	
<i>CRISK<sub>i,t</sub> * ADIV<sub>i,t</sub></i>	$\beta_8$	3.223	0.007	
<i>LRISK<sub>i,t</sub> * ADIV<sub>i,t</sub></i>	$\beta_9$	-1.977	0.068	
<i>CRISK<sub>i,t</sub> * FDIV<sub>i,t</sub></i>	$\beta_{10}$	1.724	0.611	
<i>LRISK<sub>i,t</sub> * FDIV<sub>i,t</sub></i>	$\beta_{11}$	-0.402	0.801	
<i>CAR<sub>i,t</sub></i>	$\beta_{12}$	-0.242	0.080	
<i>BSIZE<sub>i,t</sub></i>	$\beta_{13}$	0.011	0.601	

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$DL_{i,t}$	$\beta_{14}$	-0.078	0.688
$BAGE_{i,t}$	$\beta_{15}$	0.072	0.193
$INF$	$\beta_{16}$	0.305	0.189

Source: statistical analysis results

To summarize, the fifth hypothesis which indicates that “*Credit risk moderates the impact of business diversification on banks' performance*” is accepted for revenue diversification and asset diversification, but it is rejected for funding diversification. On the other hand, the sixth hypothesis which indicates that “*Liquidity risk moderates the impact of business diversification on banks' performance*” is accepted for revenue diversification, but it is rejected for asset diversification and funding diversification.

### 5. Conclusion

Financial institutions, particularly banks, play a pivotal role in economic growth in developing countries since the sector of banks is considered a line of life in these countries. One of the most important determinants that affect banks' performance is the risks related to their activities. As a consequence, the present study aims to examine, first, the impact of credit risk and liquidity risk on banks' performance. Second, this study tests if business diversification motivates or mitigates credit risk and liquidity risk. Third, it examines the effect of business diversification on banks' performance. Fourth, the study attempts to find out the moderating role of credit risk and liquidity risk on business diversification and banks' performance relationship. This paper relied on 10 banks in Egypt during the period from 2012 to 2021.

To achieve the aforementioned objectives, the current study examined six hypotheses. Firstly, the study tested the impact of credit risk and liquidity risk on banks' performance. The results revealed that credit risk negatively affected banks' performance, while liquidity risk had a positive impact on banks' performance. Secondly, the study examined the impact of business diversification on credit risk. The findings showed that revenue diversification and asset diversification had a positive impact on credit risk, whilst funding diversification had a positive impact but this impact is insignificant. In other words, revenue diversification and asset diversification caused an increase in credit risk. Thirdly, the paper studied the effect of business diversification on liquidity risk. The results of this hypothesis proved that only asset diversification caused an increase in liquidity risk, whereas

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revenue diversification and funding diversification had an insignificant impact. Fourthly, the impact of business diversification on banks' performance was examined. Surprisingly, revenue diversification, asset diversification, and funding diversification had no impact on banks' performance. Fifthly, the paper investigated the moderating role of credit risk on business diversification and banks' performance relationship. The findings demonstrated that credit risk changed the impact of revenue diversification on banks' performance from an insignificant negative impact to a significant positive impact. Furthermore, credit risk modified the effect of asset diversification on banks' performance from an insignificant positive effect to a significant positive effect. However, credit risk did not have a moderating role in the impact of funding diversification on banks' performance. Sixth, the study tested the moderating role of liquidity risk on business diversification and banks' performance relationship. The results indicated that liquidity risk converted the effect of revenue diversification on banks' performance from an insignificant negative impact to a significant negative impact. Nonetheless, liquidity risk had no moderating role in the impact of asset diversification and funding diversification on banks' performance.

In the light of the findings mentioned above, some recommendations can be stated. First, for managing credit risk, managers should select the borrowers accurately; furthermore, they should determine convenient credit limitations which are suitable for their possibilities. In other words, managers in banks should pay great attention to the policies of granting loans and the time related to reimbursement of the loan to avoid credit risk which negatively affects banks' performance. Second, banking management should be cautious towards the liquidity position by keeping the needful levels of deposits and loans. It is worth mentioning that when managers do not succeed in controlling long-term loans, the credit risk is likely to transform into a liquidity crisis. Third, when banks depend on non-interest activities and several types of assets to diversify their businesses, they should take into account that these activities may cause an increase in credit risk and liquidity risk. Forth, banking management should place great importance on the moderating role of credit risk and liquidity risk concerning business diversification and banks' performance relationship. The present study is limited by using one proxy for banks' performance. Therefore, this study can be replicated by using other proxies of banks' performance such as ROA. Furthermore, this study can be repeated by using a comparison between Islamic banks and conventional banks. Moreover, this study can be re-examined under the COVID-19 crisis.

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