



The Impact of Corruption on Bank Profitability: A Comparative Study Between Islamic and Conventional Banks

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Abstract

The purpose of this study is to investigate the impact of corruption on bank profitability in dual banking systems for 14 Islamic countries during the post-global financial crisis period from 2011 to 2019. The study sample included 331 banks (134 IBs and 197 CBs), using a novel method of quantile regression by Powell (2016). Unlike regular linear regression used in previous studies, which used the OLS method to calculate the conditional mean, quantile regression estimates the conditional median. Therefore, it helps comprehend outcomes that are not normally distributed and have nonlinear associations with predictor factors. Also, the study applied the fixed and random effect methods to confirm the reliability of our findings. The findings indicate that corruption is insignificant to the profitability of IBs at all profitability levels. In contrast, it has mixed effects significantly on CBs. Corruption and big bank size negatively affect those CBs with high profits, while it positively affects those CBs with low and medium profits. This may be because governments implicitly or explicitly protect big banks if their failure threatens to weaken the economy. Therefore, these banks will be encouraged to finance bad customers and misuse authority for personal benefit due to the moral hazard produced by the "too big to fail" protection (wheels of sand theory). This study encourages policymakers to design new regulations similar to Islamic banks to minimize the corruption effect on conventional bank profitability more efficiently and ensure economic development.

Keywords

Corruption; Islamic banks;
Conventional Banks;
Profitability; Quantile
Regression.



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تأثير الفساد على ربحية المصارف: دراسة مقارنة بين المصارف الإسلامية والمصارف التقليدية

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الفساد؛ المصارف الإسلامية؛ المصارف التقليدية؛ الربحية؛ الانحدار الكمي.

تهدف هذه الدراسة إلى فحص تأثير الفساد على ربحية المصارف في الأنظمة المصرفية المزدوجة في 14 دولة إسلامية، خلال فترة ما بعد الأزمة المالية العالمية من عام 2011 إلى 2019. وقد شملت عينة الدراسة 331 مصرفاً (134 مصرفاً إسلامياً و197 مصرفاً تقليدياً)، وذلك باستخدام طريقة الانحدار الكمي الحديثة التي طورها باول (Powell, 2016). وعلى عكس الانحدار الخطي العادي المستخدم في الدراسات السابقة، والتي اعتمدت على طريقة المربعات الصغرى العادية (OLS) لحساب المتوسط الشرطي، فإن الانحدار الكمي يقدر الوسيط الشرطي. لذلك، فهو يساعد على فهم النتائج التي لا تتبع التوزيع الطبيعي، ولها علاقات غير خطية مع المتغيرات التنبؤية. كما طبقت الدراسة طريقتي التأثيرات الثابتة والعشوائية للتأكد من مدى صحة النتائج التي توصلنا إليها. تظهر النتائج أن الفساد ليس له تأثير ذو دلالة إحصائية على ربحية المصارف الإسلامية في كل المستويات. وفي المقابل، يظهر للفساد تأثيرات مختلفة وذات دلالة إحصائية على المصارف التقليدية. حيث يؤثر الفساد وحجم المصرف سلباً على المصارف التقليدية ذات الأرباح العالية. بينما يؤثر إيجاباً على المصارف ذات الأرباح المنخفضة والمتوسطة. ويعود السبب في ذلك إلى أن الحكومات تحمي المصارف الكبيرة بشكل صريح أو خفي إذا كان فشلها يهدد بضعف الاقتصاد. وبسبب هذه الحماية، تواجه المصارف مشكلة المخاطر الأخلاقية الناتجة عن مبدأ أكبر من أن تغش ونظرية الرمل في العجلات. وهذا بدوره يشجعها على تمويل عملاء غير موثوقين، وإساءة استخدام السلطة لتحقيق مصالح شخصية. بناءً على ذلك، تحت هذه الدراسة صناع القرار على وضع لوائح تنظيمية جديدة تشبه تلك المطبقة في المصارف الإسلامية. ويساعد هذا في تقليل أثر الفساد على ربحية المصارف التقليدية بشكل أكثر كفاءة، وبما يضمن تحقيق التنمية الاقتصادية.

1. Introduction

Many emerging countries experience a high corruption level that may slow their development generally, such as the ineffective distribution of resources, the existence of a shadow economy, low foreign Investment and trade, and the provision of inadequate healthcare and education. Thus, corruption worsens the situation in these societies and decreases the level of life for the majority of their people (E.g., Hoinaru et al., 2020; Castro et al., 2013; Choi & Thum, 2005; Sanjeev et al., 2000). Corruption, understood as ‘sale of government property for private gain’, is an enduring aspect of human cultures (Aidt, 2009). Corruption is defined as a unique form of rent-seeking, which is a way for companies to get special treatment from the government (Rose-Ackerman, 1999). Also, corruption is defined by Transparency International as the misuse of authority for personal benefit.

In recent times, the banking sector in many Islamic countries has reformed from a conventional banking system to a dual banking system that includes both Islamic and conventional banks, e.g., Qatar, UAE, and Saudi Arabia (Gheeraert & Weill, 2015) or a pure Islamic banking sector, e.g., Iran and Sudan (Abedifar et al., 2016). However, it may be debated that conventional and Islamic banks are similar; both organizations are for-profit and differ in their obligation to moral values and socio-economic justice (Wan Ibrahim & Ismail, 2015). Moreover, the dominant aim of Islamic banks is to provide financial services in compliance with Sharia (Islamic law). Thus, in theory, Islamic banking is distinguished from conventional banking in its mission, objectives, and responsibilities toward society (Ramlan & Adnan, 2016). By performing this, Islamic banks will protect the Islamic populations from prohibited business activities in Islam law and not be allowed to commit immoral or corrupt business problems (Bektas et al., 2022; Hoepner et al., 2011).

The Islamic religion is based on Islamic law, which prohibits interest, and emphasizes profit-loss sharing (risk-sharing). Therefore, these characteristics have protected Islamic banks against the global financial crisis (GFC) outcomes (Elbadri & Bektas, 2017). Also, Bitar et al. (2017) found that Islamic culture, identity, beliefs, and loyalty, and applying Islamic principles may help improve Islamic banks' reputation, trust, and public confidence, hence their financial soundness. Furthermore, Baele et al. (2014) found that Islamic loans have a lower default rate due to the client's religious convictions. Therefore, Sharia laws govern the actions of Islamic bank management and clients, particularly the prohibition of interest and risk-sharing; this is reflected in banking behavior, such as loan growth, borrowing costs, and loan defaults. On the contrary, the conventional banking systems transfer the impact of corruption to the economy and generally slow its development through low foreign Investment and trade, a lower economic growth level, weakening political legitimacy, stability, economic development, and social welfare (Kordbacheh & Sadati, 2022; Bunyaminu et al., 2021; Goel et al., 2011).

Profitability is commonly established as the most critical factor for judging the banking sector's performance. Therefore, when comparing Islamic and conventional banks, it is crucial to consider the interpretation of bank profitability, which can be in two aspects. First, profit is used to measure the performance of the banking sector. Second, banks depend on profit to fund their operations as one of the low-cost sources of funds. Thus, bank profitability is essential for the soundness of banks. Further, profits are the first line of protection against credit-related losses, and retained earnings are a critical source of capital for banks, allowing them to establish large buffers to withstand subsequent losses (see, e.g., Tarek Al-Kayed et al., 2014; Berger et al., 1999). Therefore, the importance of bank profitability has motivated investigators, scholars, and stakeholders to pay

more attention to the factors affecting bank profitability (Athanasoglou et al., 2006). One of the main factors that affect bank profitability is corruption, according to studies conducted by (Murharsito et al., 2017; Chen & Liao, 2011; Naceur & Omran, 2011; Liao, 2009; Aburime, 2008). This begs the question of how much corruption might affect financial institutions' profitability post-GFC. Does the impact of corruption on Islamic bank profitability differ from its conventional counterpart? Policymakers, bank management, investors, and bank customers are all interested in corruption's impact on the banking industry's performance. The general population, who stand to lose a great deal when the banking industry struggles and must be saved, is also interested in this topic.

In the last few years, there has been a growing interest in corruption and a substantial discussion on its effects on commercial banks' profitability (Bougatef, 2017; Murharsito et al., 2017; Chen & Liao, 2011; Mongid & Tahir, 2011; Naceur & Omran, 2011; Liao, 2009; Aburime, 2008), and the profitability of domestic versus foreign banks (Chen & Liao, 2011; Demirgüç-Kunt & Huizinga, 1999); and the cost-efficiency and profitability (Naceur & Omran, 2011); bank lending (Atkins et al., 2015); and information asymmetry (Brown et al., 2021; Dass et al., 2016); and the credit quality of the local bank (Murharsito et al., 2017). However, to the author's knowledge, few publications in the literature discuss corruption issues affecting bank profitability, particularly in Islamic banks. Thus, this study differs from the few existing literature in many ways: 1) only a few studies use post-global financial crisis periods; if it exists, they examined a single country (e.g., Shah et al., 2022; Zaman et al., 2021; Uddin et al., 2017). 2) The significant inflow of Islamic finance into the world economy has grown an exciting idea regarding its conduct towards corruption. Corruption may be found in almost every part of the globe. Thus Islamic banks are likely to have been subjected to some unethical practices. This raises a vital discussion as corruption is often inevitable, something Islam forbids. Therefore, the study findings will help regulators and Sharia advisors who have full authority to enact and develop required laws and policies in dual banking systems. 3) Heretofore, the conclusions drawn from earlier research on the financial effects of corruption are still unclear. For instance, Shah et al. (2022), Kordbacheh and Sadati (2022), Bunyaminu et al. (2021), Hassan et al. (2021), Uddin et al. (2017), Park (2012), Goel and Hasan (2011), and Aburime (2008) found that corruption has a negative impact on the bank. In contrast, Zaman et al. (2021), Hassan et al. (2021), Bougatef (2017), Arshad and Rizvi (2013), Mongid and Tahir (2011), Chen and Liao (2011), Aburime (2010), Demirgüç-Kunt and Huizinga (1999) found that corruption has a positive impact on banks. 4) No study applied the method of Quantile Regression (QR) of Powell (2016). This novel methodology can explain the independent variables at any point of the distribution of the profitability where the quantile technique is not limited to clarifying the mean of the profitability, which explains why the findings of empirical studies were mixed.

Quantile approach found corruption to be positively related to profitability for those CBs with low and mean profit. This might suggest that these banks opt to bribe government officials when when doing so improves their performance, since the expected advantages outweigh bribing costs (rent-seeking theory). In contrast, corruption is found to be negatively related for those CBs with high profit. This might suggest that corruption harms the operations of these banks, and makes it difficult to borrow money from them due to lengthy approval processes, and abuse power for personal gain (wheels of sand theory). This may explain the mixed findings of previous studies. Moreover, our findings confirm that no significant corruption effect on the profitability of IBs across regression quantiles. We argue that the corruption effect of CBs appears to be caused by

the religiosity factor of management and clients, where the Sharia board of IBs plays a vital role in framing and exerting policy for strict adherence to Sharia principles in the Banks. Hence, CBs seem to suffer more from legal loopholes in dealing with illegal profits. Therefore, there is a need for new regulations designed to stop these banks from taking ill-gotten gains, which regulators appropriately enforce, and increase the accountability of senior bankers.

The remainder of the paper is structured as follows: Section 2 presents the literature review. Section 3 show theoretical framework, which provides a theoretical base for the impact of corruption on the profitability of banks. Section 4 exhibits the data used in the investigation and develops hypotheses. Section 5 states the results. The final section suggests the conclusion.

2. Literature Review

2.1 Corruption theories

The examination of corruption is based on two different hypotheses. Firstly, the "rent-seeking" idea was proposed by Tullock (1967). According to this theory, corruption is a special kind of rent-seeking that allows businesses to obtain preferential treatment from the government (Rose-Ackerman, 1999). In theory, bureaucratic corruption is not necessarily bad for the economy (Boukou, 2017; Gao, 2010; Aidt, 2009; Méon & Sekkat, 2005). In particular, corruption can loosen the rigorous lending procedure, simplify time-consuming loan processes, and shorten loan approval periods. The "grease the wheels" hypothesis backs up the "rent-seeking" hypothesis. According to the "Grease the Wheels" idea, corruption can accelerate economic growth when governance systems are shaky and policy is inefficient, according to the "Grease the Wheels" idea (Aidt, 2009; Méon & Sekkat, 2005). Companies choose to bribe public servants when doing so improves their performance (Boukou, 2017). According to Gao (2010), corporations are more willing to accept bribes since the expected advantages outweigh bribing costs.

Secondly, the "sand the wheels" idea is an alternate hypothesis. It discusses the impact of corruption on finance and economic progress (Tanzi, 1998). According to the "Sand the Wheels Theory," corruption may hurt banks' operations (Bougatef, 2016; Park, 2012; Goel & Hasan, 2011) and make it harder to borrow money from them owing to lengthy approval processes. In addition, bribery hurts company performance, resulting in a misallocation of resources in the economy. This was confirmed by Transparency International that corruption is the abuse of entrusted power for private gain. Hence, corruption in the banking system refers to dishonest acts by bank directors, bank officials, and bank supervisors. Therefore, corruption is officials' unethical activity in pursuit of illicit private benefit. For example, bribes or improper gifts are given or accepted and laundering money, and so on. which made the Islamic teachings and beliefs forbid corruption.

2.2 The Effect of Corruption on Profitability

Recognizing the main variables that affect bank profitability is valuable to developing bank performance and achieving banking strategies. Nevertheless, former researchers pay much less attention to the beneficial role of Corruption on bank profits, mainly concentrating on IBs. In the banking sector, many researchers proved that corruption adversely affects bank profitability. For instance, La Porta et al. (2002) stated that as levels of corruption rise, the functioning of the financial system decline, that corruption drives substantial information asymmetries and, consequently, a negative correlation between corruption and bank performance. In contrast, Liao (2009) examined how corruption affected the profitability of foreign banks in 16 Asian countries between 1992 and 2006. The author used the Generalized Least Squares technique with random

effects to estimate the profitability equation. The results indicated that corruption affects profitability of banks significantly and positively.

For IBs, Arshad and Rizvi (2013) examined how corruption affected the profitability of Islamic banks in countries with high levels of corruption. This paper used 300 observations of 30 Islamic banks for 10 countries during the period of 2001–2010. The author runs a fixed-effect and random-effect regression on the sample data, considering microeconomic and macroeconomic elements that affect the profitability of banks. The empirical findings revealed that corruption significantly positively impacts profitability of banks. The findings presented some confidence to indicate that banks are flourishing from national corruption. Also, Uddin et al. (2017) collected annual data on 7 IBs and 18 CBs from 2005 to 2014. They used the GMM model to analyze the impact of socioeconomic variables on the performance of banks in Bangladesh. The empirical results demonstrated that corruption has a statistically significant positive impact on bank profitability. Also, the study found that cost efficiency, credit risk, and GDP growth rate adversely affect bank profitability.

In the ASEAN region, Mongid and Tahir (2011) examined data collected in 6 countries (Malaysia, Indonesia, Singapore, Philippines, Thailand and Vietnam) from 2003–2008 to observe the determinants of banking profitability. The authors used a simple linear regression model. Results revealed a positive relationship between the equity to total assets, personnel expenses ratio to total cost and bank profitability emphasizes the ability of the banking sector to have advantages in a corrupt environment. In addition, using a sample of developed and developing countries, Demirgüç-Kunt and Huizinga (1999) discovered that better contract enforcement, an efficient legal system, and the absence of corruption are linked with low profitability. Recently, Shah et al. (2022) examined how corruption and money laundering affected the asset quality of CBs and IBs in Pakistan from 2012–to 2018 using the random effect model. Authors found that corruption positively affects Non-performing loans (NPLs) of CBs. In contrast, corruption has a negative impact on the loan portfolio quality of IBs. Hassan et al. (2021) used the GMM technique to examine the effect of corruption on the efficiency of 77 banks in the Gulf Cooperation Council (GCC) countries between 2005 and 2014. Their findings support the sand the wheel theory for IBs, where authors found that corruption has a negative impact on the stability of IBs, while it has a positive impact on the stability of CBs. This finding backs the view that under the current weak governance structures and complex policy framework, corruption serves as an escape hatch for CBs. Zaman et al. (2021) used OLS and GMM regressions to investigate the impact of corruption on the stability of IBs and CBs in Pakistan and Malaysia from 2012–to 2018. Authors found that IBs profit from corruption. In a less corrupt setting, like Malaysia, corruption has a good effect on bank stability; in a more corrupt setting, like Pakistan, it has a negative effect.

In Eurozone countries, Asteriou et al. (2021) studied the influence of corruption, economic freedom, transparency, and bank regulation on the profitability and stability of banks, applying a sample of 326 banks from the 19 Eurozone economies covering between 2005 and 2018. They used the GMM technique. The outcomes revealed that corruption has an adverse effect on the profitability of banks. Also, Kordbacheh and Sadati (2022) examine the impact of corruption on banking soundness in 98 rich and poor natural resource countries from 2012 to 2015 using the OLS method. Authors found that a higher level of corruption has poorer banking soundness and is more substantial in rich countries in natural resources (resources curse theory).

Bougatef (2017) investigate how corruption affects the profitability of bank in the African region by applying the generalized method of moments (GMM) method. The examination used a panel of ten Tunisian CBs from 2003 to 2014. The empirical results revealed that the corruption level impacts positively and significantly on bank profitability, suggesting that CBs in Tunisia benefit from the corrupt environment. Aburime (2010) studied the relationship between corruption and the profitability of 48 Nigerian commercial banks from 1996-2006. The outcomes confirmed that corruption impacts significantly positively on bank profitability. Also, Chen and Liao (2011) investigated determinants of bank profitability in domestic versus foreign banks concerning bank-specific variables, macroeconomic variables, institution quality, country risk, banking regulation, and supervision across 70 countries from 1992 to 2006. This paper used the Generalized Least Squares method with random effects to estimate the model. The results established that bank profitability is positively associated with corruption. In contrast, Aburime (2008) attempted to distinguish the profitability determinants of Nigerian banks. The author used panel data from 138 banks from 1980-2007 and applied the ordinary least squares approach.

The empirical outcomes established that a rise in corruption correlated with reductions in bank profitability in Nigeria. Also, Yakubu & McMillan (2019) examined the influence of corruption on bank profitability in Ghana by employing the Generalized Method of Moments (GMM) from 2008 to 2017. The finding suggests a negative significant association between bank profitability and corruption, reflecting the wheels and sand theory on corruption. Recently, Bunyaminu et al. (2021) investigated the impact of corruption on bank risk-taking behaviour in Ghana from 2008 to 2017 using GMM. Authors found that corruption encourages banks to take risks supports the "sand the wheels" theory of the relationship between corruption and development. Finally, Bougatef (2017) used the GMM method and examines the profitability determinants of ten commercial banks in Tunisia from 2003 to 2014. They found a positive relationship between bank profitability and corruption level.

Souissi-Kachouri (2020) studied Corruption's impact on the profitability of banks and economic growth in MENA countries from 2000-2016. The author found that the effect of corruption on bank performance is not linear. If corruption reaches a critical level and becomes everywhere in an economy, it badly affects bank performance. However, the pervasiveness of corruption in an economy increases the magnitude of NPLs, leading to a misallocation of financial resources and declining economic growth.

In emerging and developed economies, Bolarinwa and Soetan (2019) investigated the effect of corruption on bank profitability. They used two samples. The first sample consists of 111 CBs from 33 economies for the High corrupt environment model. The model in the least corrupt environment used 56 CBs selected from the five least corrupt and developed economies. The paper applied panel cointegration, difference GMM, and system GMM. The results showed that corruption is vital in explaining the profitability of CBs in both developed and emerging economies. Furthermore, the findings show that corruption has different effects in emerging economies and positively affects developed economies. Lastly, for local banks, Murharsito et al. (2017) examined how corruption affected the local bank's credit quality and profitability. The authors used data from 26 local development banks between 2012 and 2013. Empirical results presented that corruption significantly has a positive impact on bank profits. That refers to; the higher profit gained for local development banks.

Aish et al. (2022) examine the influence of money laundering and corruption on the profitability and stability of IBs. This paper used data from 19 IBs and 53 CBs in Malaysia and Pakistan, using fixed effect, random effect regressions, and GMM methods. The results showed that money laundering and corruption positively impact bank stability and profitability in small corrupt nations, i.e., Malaysia; nevertheless, corruption damages profitability of IBs, and money laundering favors stability and profitability of IBs in more corrupt countries, i.e., Pakistan. Also, Kanapiyanova et al. (2022) showed that corruption control is the most important factor influencing profitability of banks, regardless of the type of banks in QISMUT+3 countries from 2011 to 2018.

The roles of corruption on profitability of banks developed from the above discussions of the existing literature have reported mixed evidence and still need clarification. Some empirical studies reveal that banks benefit from the corrupt environment to increase profit. However, Corruption's ability to streamline laborious procedures is still required, especially to shorten bureaucratic process delays. Furthermore, banks use corruption as a quick way to escape the unfavorable environment in which their company operates (e.g., Murharsito et al., 2017; Bougatef, 2017; Mongid & Tahir, 2011; Aburime, 2010). On the other hand, other studies show that corruption can hinder growth in loans by raising the cost of borrowing, exposing banks to high risks of non-payment of loans, and stifling credit growth where organisations well connected to the corridors of political power can access banks loans but are more likely to default on payments. In other words, Loan risk is increased by unscrupulous activities that provide loans to companies that pay bribes. Therefore, corruption skews bank funding allocation from good projects to bad ventures, which lowers the calibre of private investments, encourages poor management, and dramatically increases operating expenses. (e.g., Asteriou et al., 2021; Yakubu & McMillan., 2019; Bougatef, 2016; Park, 2012; Goel & Hasan, 2011). Thus, the study will identify and explain why the findings of empirical studies were mixed, where QR methodology can explain the independent variables at any point of the profitability distribution.

Hence, based on empirical evidence on the relationship between corruption and profitability of Islamic and conventional banks, we argue the main hypotheses hypothesize that:

H1a: Corruption negatively impacts the profitability of conventional banks more significantly than Islamic banks.

H1b: Corruption positively impacts the profitability of conventional banks more significantly than Islamic banks.

To test the previous two main hypotheses, we investigate the impact of corruption on the profitability of both IBs and CBs.

3 Theoretical Framework

Theoretically, the relationship between corruption and bank profitability can be attributed to different channels. For example, the effect of corruption on economic growth is explained in the literature by referring to Park (2012), financial markets explained by Ng (2006), bank lending by Weill (2011) and Atkins et al. (2015), on Banking Stability by Toader et al. (2018), on credit risk by Hasan et al. (2021), on bank performance by Murharsito et al. (2017), on banking profitability by Arshad and Rizvi (2013) and Mongid and Tahir (2011). Therefore, following the literature findings, corruption can affect bank profitability through different channels. Thus, the banking sector, in general, and bank profitability, in particular, are expected to be altered by the changing corruption levels. Henceforward, there is a sensible foundation to investigate the effect of corruption on the profitability of banks.

Following the earlier discussions, we build the bank profitability function and model specification as follows:

$$ROAE_t = F(COR_t, CTI_t, SIZE_t, ETOA_t, GDP_t, \text{and } INF_t) \quad (1)$$

Where bank profitability ratio (ROAE) is the dependent variable, corruption (COR) is the main Independent variable, while cost-inefficiency (CTI), bank size (SIZE), Equity to total assets (ETOA), the growth rate of gross domestic product (GDP) and Inflation (INF) are other Independent variables and serve as Control Variables.

$$y_{it} = \beta_p X'_{it} + \alpha_i + \varepsilon_{it} \quad (2)$$

Where y_{it} denotes the dependent variable expressed as return on average equity (ROAE); X_{it} is a vector of independent variables including COR, CTI, SIZE, ETOA, GDP and INF; β_p represents the coefficient at quintile p ; while α_i and ε_{it} is the error term. Several researchers have used the bank profitability ratio (ROAE) as a proxy for profitability in banking, such as (Athanasoglou et al., 2008; and De Young and Rice, 2004). Abel and Le Roux (2016) also verified that return on equity is a good indicator of profitability. Therefore, banks with a high ROAE ratio indicate improved bank profitability.

The bank profitability determinants were divided into three main categories, namely corruption (COR), the macroeconomic indicators (GDP and INF), and the Bank-Specific determinants (CTI, SIZE, and ETOA). For corruption (COR), In this study, we gauge the degree of corruption in the nation using the Corruption Perception Index (CPI), which is frequently employed in prior works such as Toader et al. (2018), Bougatef (2016), Bougatef (2015), Park (2012), Weill (2011), and Transparency International launched (CPI) index first time in 1995. In 2013 The CPI index included 177 nations, and it assigns a score to nations based on how corrupt their public sectors are thought to be. The CPI ranged from 0 (very corrupt) to 10 (very clean) between 1995 and 2011. currently, Transparency International assigns scores ranging from zero, indicating high levels of corruption to hundred low levels. Therefore, we follow Park (2012) and define the (COR) as follows:

COR= 10 - CPI for year 2011.

COR= 10 - CPI/10 for years 2012 to 2019.

This study used the Transparency International launched (CPI) index to control corruption. In general, in the existing literature, it is argued that the impact of corruption (COR) on bank profitability is ambiguous. For example, Uddin et al. (2017) and Arshad and Rizvi (2013) presented strong evidence that corruption has a positive and statistically significant effect on bank profitability, suggesting that banks thrive from corruption in the country. This is consistent with the "rent-seeking" theory; banks pay bribes to officials of the government when the payment improves their performance, since the expected advantages outweigh bribing costs. In contrast, Aburime (2008) and La Porta et al. (2002) confirmed a negative correlation between corruption and bank performance, which is consistent with the "wheels of sand" hypothesis. Corruption harms the operations of banks and makes it difficult to borrow money from them due to lengthy approval processes. In addition, the abuse of power for personal gain and the misallocation of economic resources.

Regarding Bank-Specific factors. First, bank size(SIZE): We define the size of each bank by the logarithm of total assets. Although bank size can lead to bank profitability improvements, according to economies of scale and scope theories, Bank size can increase profitability by taking advantage of scale and scope efficiencies (Berger, 1995). Furthermore, a positive finding relationship between profitability and bank size is confirmed by many studies such as Aladawan (2015), Kosmidou (2008), and Bikker & Hu (2001). Therefore, a bank's size is an important factor because bigger banks can reduce expenses and increase their profit margin. Additionally, banks can benefit from diversification and scale efficiencies. In contrast, according to the 'Too Big to Fail' theory, bank size encourages banks to take on greater risk hence harming profitability (e.g., Kosmidou et al. (2005), Naceur (2003), Mishkin, 1999, and Berger et al. (1987). While Athanasoglou et al. (2006) said that the Islamic bank's size is unimportant since it had an insignificant effect on its profitability. As such, the relationship between bank size and bank profitability is ambiguous. Hence, based on empirical evidence on the relationship between bank size and banks profitability, we argue to hypothesize that:

H2: Bank profitability is strongly correlated with bank size.

Second, the role of solvency as measured by the equity of the asset (ETOA) is essential as protection against risks and unexpected losses. Among others, Chowdhury et al. (2017) found that an increase in ETOA statistically and significantly leads to an increase in bank profitability. If banks have adequate capital, they can face reduced bankruptcy costs and hence reduce their funding costs. Well-capitalized banks depend more on internal and minor on external financing, resulting in higher profitability. This positive association is in line with several previous studies (Kosmidou, 2008; Pasiouras and Kosmidou (2007). On the contrary, according to (Goddard et al., 2004), higher ETOA may be connected with lower risk-taking and, thereby, lower anticipated returns. Hence, based on empirical evidence on the relationship between equity to the asset and bank profitability, we argue to hypothesize that:

H3: equity to the asset is positively related to bank profitability.

Further, among other variables impacting bank profitability is cost-inefficiency (CTI), defined as the ratio of operating expenses to operating income. The economic theory suggests a reverse association between bank profitability and CTI. In line with the theory and findings of several researchers (Riaz & Mehar, 2013; Pasiouras & Kosmidou, 2007), the CTI negatively correlates with profitability as a profitable bank has a low operating cost. Therefore, we anticipate an inverse relation between a CTI and the profitability of banks. Hence, based on empirical findings on the connection between bank profitability and cost inefficiencies, we argue to hypothesize that:

H4: cost-inefficiency is negatively related to bank profitability.

Finally, NPLs (Non-performing loans) are measured by the percentage of non-performing loans to total loans. When the non-performing loans exceed the permissible limit, the banks will lose a large amount of capital, increase the risk, and lower profits, leading to much financial damage and ultimately threatening bank profitability. Therefore, many studies confirm a negative relationship between NPLs and bank profitability (e.g., Athanasoglou et al., 2008; Demirgüç-Kunt & Huizinga, 1999; Berger & DeYoung, 1997). Hence, based on empirical evidence on the relationship between non-performing loans and bank profitability, we argue to hypothesize that:

H5: Non-performing loans is negatively related to bank profitability.

According to the literature, the macroeconomic environment is a significant determinant of bank behavior. For example, variables like GDP growth rate and inflation are well-stated determinants of bank profitability (Chaibi & Ftiti, 2015; Abid et al., 2014; Messai & Jouini, 2013; Park, 2012). First, the economic theory proposes that banks become more profitable when economic growth (GDP) increases. This is because higher-growth-rate countries necessitate more funding, which is also typically thought to be more efficient, better capitalised, have low credit risk, and be more profitable (e.g., Calza et al., 2006; Athanasoglou et al., 2006). In contrast, growing GDP would increase consumer buying power. Consequently, people would be wont to get more loans and invest for higher returns on their money (e.g., Beckmann, 2007 and Goddard et al., 2004).

Also, Sufian and Parman (2009) revealed an insignificant negative impact of GDP on conventional bank profitability. Hence, we expect GDP growth to positively impact bank profitability. Therefore, based on empirical evidence on the relationship between GDP growth and bank profitability, we argue to hypothesize that:

H6: Bank profitability is positively correlated with GDP growth.

Second, inflation (INF) pushes banks to limit loans, resulting in a drop-in banking sector activity. In general, the financing capacity of the banks decreases to promote economic growth. For instance, Umar et al. (2014) found that inflation has a negative impact on bank performance. On the other hand, they argued that inflation leads to a boost in bank performance as long as the banks can expect future inflation and modify the interest rate to yield higher revenue than cost, which leads to higher profit due to adjusting the interest rate. However, several studies have revealed a positive association between inflation and bank performance (Sufian & Habibullah, 2009; Athanasoglou et al., 2008). The other studies found that the relationship between inflation and bank profitability is insignificant (Naceur and Kandil, 2009 & Naceur, 2003). In sum, the inflation effect is contingent upon banks' ability to predict inflation and if it aligns with overall economic instability, as stated by Uhde and Heimeshoff (2009). Hence, based on empirical evidence on the relationship between inflation and bank profitability, we argue to hypothesize that:

H7: inflation is negatively related to bank profitability.

4. Data and methodology

4.1. Data

The sample consists of unbalanced panel data from 331 banks, of which 134 are full-fledged Islamic banks working in 14 Islamic countries from 2011 to 2019 (see Table 1). They are selected from Islamic countries to ensure that IBs and CBs operate in the same economic environment. As a result, these countries seem to share comparable political environments, bureaucratic structures, and cultural values, which create opportunities for corruption in various sectors, including banking. This research analyses the Perception of country-wide corruption and bank-specific and macroeconomic data. The bank-specific data was obtained from the Bank Focus database, the macroeconomic data from World Development Indicators, and the corruption scores from Transparency International Annual reports. Among the limitations of this research are the availability of new data, as well as the fact that the data after 2019 were affected by the outbreak of the COVID-19 pandemic and its challenges to banking habits. Table 2 shows variables definition, Abbreviations, and data sources.

Table 1: Samples of Islamic and conventional banks

NO,	Country	CBs	IBs	CPI Score Average, 2011-2019
1	The UAE	15	10	3.04
2	Bangladesh	25	12	7.38
3	Bahrain	5	21	5.48
4	Egypt	9	3	6.65
5	Indonesia	47	11	6.49
6	Iraq	13	12	8.26
7	Jordan	13	5	5.19
8	Kuwait	5	12	5.70
9	Malaysia	9	19	5.12
10	Pakistan	20	9	7.03
11	Qatar	5	5	3.38
12	Saudi	6	5	5.20
13	Syria	11	3	8.23
14	Turkey	14	7	5.68
Total		197	134	

Source: Transparency International CPI annual reports, 2011–2019. The index is between 0 to 10, with zero denoting the cleanest county and ten the most corrupted counties. A score higher than 5 denotes a serious corruption issue in the country.

Table 2. The variables Definition.

variable Names	Definitions & Source	Expected sign
<u>Dependent variable:</u>		
Bank Profitability (ROAE)	Net Income to average Shareholders' Equity. Source: OBF.	
<u>Main independent variables:</u>		
Corruption (COR)	The perceived level of corruption for each country, and measured by follow Park (2012) method. Source: TI.	+/-
<u>Control variables:</u>		
1) Bank specific variables:		
credit risk (NPLs)	Ratio of Non-performing loans to total loans. Source: OBF	+
Capital adequacy (ETOA)	Ratio of shareholder equity to bank's total assets. Source: OBF	+
Bank size (SIZE)	Natural log of the value of the bank's total assets. Source: OBF	+/-
Cost to income (CTI)	Cost to income ratio, operating expenses to operating income. Source: OBF	-
2) Macroeconomic variables:		
GDP Growth (GDP)	Annual GDP growth rate. Source: WDI.	+
Inflation rate (INF)	Annual percentage change in real inflation rate. Source: WDI.	+/-

Notes: World Development Indicators (WDI), Orbis Bank Focus (OBF), and Transparency International (TI).

To distinguish between IBs and CBs, we employ ROAE to proxy the profitability of banks. Table 3 shows statistical summary of data providers for the factors used in the model. By comparing the ROAE for both IBs and CBs, we observe that CBs are more profitable than IBs. IBs have a lower average return on equity (0.07) than CBs (0.09). Considering equity to total assets (ETOA), IBs have a higher average (0.25) than CBs (0.17), which means IBs depend more on internal than external funding. Internal funding is commonly considered less expensive for the bank than external funding since it does not have to incur transaction costs to get it, nor does it have to pay the taxes associated with giving dividends. Regarding CTI, IBs have a higher ratio (0.69) than CBs

(0.54). Finally, data shows that IBs have, on average, a lower size (14.31) than the average size of CBs (15.14). Further, to guarantee that multicollinearity won't impact our findings. When the explanatory variables in a regression equation are correlated, Multicollinearity occurs. Therefore, we first look at the correlation between our variables. As Table 4 displays, the correlation between all variables is weak or moderate. Therefore, the correlation matrix in Table 3 demonstrates that multicollinearity does not exist in our model.

Table 3: Summary statistics for Islamic and commercial banks

Variables	Banks	Mean	Obs	P50	Min	Max	S.D	Skewness	Kurtosis
ROAE	CBs	0.09	1694	0.10	-3.49	1.16	0.19	-8.37	129.10
	IBs	0.07	1072	0.08	-1.37	3.39	0.18	4.18	129.17
NPLs	CBs	0.09	1551	0.05	0.00	2.28	0.17	5.35	43.63
	IBs	0.10	800	0.04	0.00	1.34	0.17	3.49	16.53
ETOA	CBs	0.17	1693	0.12	-0.01	0.99	0.15	2.96	12.46
	IBs	0.25	1072	0.13	-1.52	1.00	0.29	0.32	7.49
CTI	CBs	0.54	1685	0.48	-16.33	8.19	0.59	-11.70	433.33
	IBs	0.69	1053	0.57	-20.40	13.21	1.20	5.43	163.73
SIZE	CBs	15.14	1693	15.04	8.83	19.37	1.88	-0.05	2.51
	IBs	14.31	1072	14.61	6.61	18.45	2.02	0.62	3.34
COR	CBs	6.24	1764	6.40	2.50	8.70	1.42	-0.73	3.20
	IBs	5.86	1192	5.70	2.50	8.70	1.44	0.15	2.67
GDP	CBs	0.04	1764	0.05	-0.26	0.14	0.05	3.84	25.16
	IBs	0.04	1196	0.05	-0.26	0.14	.04	2.71	24.45
INF	CBs	0.06	1764	0.05	-0.021	0.52	0.08	3.78	19.32
	IBs	0.04	1196	0.03	-0.021	0.52	0.06	4.96	35.48

Note: * ROAE: Return on Average Equity; NPLs: Non Performing Loans; ETOA: Equity to Total Assets; CTI: Cost to Income; SIZE: Size of the Bank; COR: Corruption; GDP: Growth in Gross Domestic Product; INF: Inflation.

Table 4: The Correlation Matrix

	ROAE	NPLS	ETOA	CTI	SIZE	COR	GDP	INF
ROAE	1							
NPLS	-0.175	1						
ETOA	-0.142	0.109	1					
CTI	-0.084	-0.014	0.308	1				
SIZE	0.187	-0.467	-0.285	-0.085	1			
COR	0.043	0.148	-0.134	-0.045	-0.421	1		
GDP	-0.04	-0.164	-0.134	-0.027	0.05	-0.097	1	
INF	0.194	0.112	-0.137	-0.055	-0.166	0.454	-0.512	1

Note: * ROAE: Return on average equity; NPLs: Non-performing loans; ETOA: Equity to total assets; CTI: Cost to income; SIZE: Size of the bank; COR: Corruption; GDP: Gross domestic product growth rate; INF: Inflation.

4.2. Methodology

The Quantile Regression (QR) methodology has lately achieved publicity and attention in various sectors, including sociology, finance, economics, and medical science (Wang et al., 2018; Koenker, 2017; Qin, 2012). The fundamental skill of this technique is having a complete framework and a very thorough investigation of the interaction among variables over an extensive range. Unlike the mean regression approach, it does not require data to follow a specific distribution when estimating different impacts at various quantiles of the reaction variable. The QR is thought to be better resistant to outliers because of the low sensitivity of the estimation results to outliers and multimodality (Liu et al., 2013). In addition, the QR can handle heterogeneity in data acquired from diverse sources, places, and periods without making many assumptions (Qin, 2012; Qin & Reyes, 2011; Qin et al., 2010).

Since Koenker and Xiao's (2004) publication provided a general method for estimating quantile regression for longitudinal data, quantile regression has been used in panel data. This study can be used as a foundation for future research in other fields. Kniesner et al. (2010) conducted the first study, which used panel data QR with heterogeneity of intercept to investigate changes in the statistical life value through prospective pay levels. The data suggest that statistical life value differs significantly among the labour force. Furthermore, Canay (2011) published research that developed a two-step estimation for estimating the panel QR. Monte Carlo simulations performed quite similarly to Koenker and Xiao's (2004) estimator. Galvao et al. (2013), like previous excellent research, dealt with estimating censored QR with fixed effects; simulations using Monte Carlo to examine the performance of sample, which might be highlighted. Finally, Powell (2016) provided Quantile regression for panel data with non-additive fixed effects in recent years, preserving the non-separable disturbance term linked to QR and providing the base for the study.

Although there have been several research on panel quantile regression models from both theory and practice, this is the first attempt in the literature to apply this technique to bank profitability modeling. As a result, this study used a panel QR model to investigate the association between bank profitability and many factors, namely corruption, while considering the heterogeneity within banks. The technique used, advantages, and the justification for applying this approach to achieve the study's purpose are described below.

Cut points known as quantiles separate a probability distribution's range into adjacent intervals with equal probabilities. For example, let p be a value from zero to one, then the $100p$ percentile of the distribution for a random variable (y) that is continuous, represented by $Q(p)$, can be written as follows:

$$p = P(y \leq Q(p)) = F(Q(p)) = \int_{-\infty}^{Q(p)} f(y)dy \quad (3)$$

where the density distribution function is indicated by $f(y)$. Equation 1 defines $Q(p)$ as follows:

$$Q(p) = F^{-1}(p) = \text{Inf}\{y: F(y) \geq p\}. 0 \leq p \leq 1 \quad (4)$$

where Inf represents the greatest lower bound and F^{-1} represents the cumulative distribution function's inverse function.

Similar to how the mean estimation of a random sample produces the smallest of the sum of squared errors, the median of a random sample for a random variable y produces the least of the

sum of absolute variances. The generic $Q(p)$ is thought to be the best way to minimize the weighted average of samples with values greater than or equal to $Q(p)$. Samples with values less than or equal to $Q(p)$ can be defined as follows:

$$\text{Min}[\sum_{i \in \{i: y_i \leq Q(p)\}} p|y_i - Q(p)| + \sum_{i \in \{i: y_i > Q(p)\}} (1-p)|y_i - Q(p)|] \quad (5)$$

If y is the linear variable function as follows:

$$y = \beta X' + \varepsilon \quad (6)$$

Where y is the dependent variable, β is the vector of unknown parameters of the variables X , and ε is error term. As a result, the challenges of optimization will be transformed into the β s estimation solution:

$$\hat{\beta}(p) = \underset{\beta \in R^K}{\text{argmin}} [\sum_{i \in \{i: y_i \leq \beta X'_i\}} p|y_i - \beta X'_i| + \sum_{i \in \{i: y_i > \beta X'_i\}} (1-p)|y_i - \beta X'_i|] \quad (7)$$

Thus, for each quantile level (p) between 0 and 1, $\hat{\beta}(p)$ can be considered the p th regression quantile, which minimises the sum of weighted absolute residuals (Qin et al. 2010; Koenker and Bassett 1978).

5. Empirical results

We start our empirical analysis by estimating the whole model as described by equation (2), once for IBs and another for CBs. Then, tables 5 and 6 report the full results of both types of banking. In this study, the Quantile Regression method proposed by Powell (2016) is utilized due to normal asymptotic distribution and consistency of parameters. The initial step of the method involves estimating the unobserved fixed effect ($\hat{\alpha}_{it} = E_T[y_{it} - \hat{\beta}_p X'_{it}]$, $\hat{\beta}_p = \sqrt{nT} - \text{consistent estimator of } \beta_p$) and performing the standard quantile regression via $\hat{y}_{it} = y_{it} - \hat{\alpha}_{it}$ on the independent variable vector and the estimate at the quantile is obtained as in Equation (5). Further, we also focus on a different regression method for robustness purposes, namely random and fixed effect methodologies, to confirm the reliability of our findings.

This study justifies using the 25th, 50th, 75th, and 95th quantiles for These points reveal unequal effects. Testing these specific levels reveals whether corruption affects struggling banks (The 25th percentile) and high-performing banks (The 75th percentile) differently. The use of the 95th percentile is crucial, as it directly tests the "too big to fail" theory by isolating the most profitable banks.

5.1 Estimation results of the Islamic banks model

Empirical research has mainly concentrated on recognizing variables that most affect profitability. However, reviewing the literature, the effect of many variables on profitability is not straightforward. Previous studies investigating the association between profitability and its determinants, such as corruption, the cost-to-income ratio, bank size, equity to total assets, GDP growth rate, and inflation, have originated mixed results regarding the magnitude of coefficients, significance, and direction variation.

Table 5: The estimated parameters of the determinants of Islamic bank profitability.

Dependent variable: ROAE	Quantile Coefficient			
	25%	50%	75%	95%
COR	0.002 (-0.005)	-0.006 (-0.005)	0.002 (-0.002)	0.001 (-0.006)
NPLs	-0.443*** (-0.087)	-0.154*** (-0.027)	-0.024*** (-0.008)	0.093 (-0.075)
ETOA	0.173** (-0.075)	0.122** (-0.051)	-0.026*** (-0.009)	-0.055* (-0.030)
CTI	-0.005 (-0.028)	-0.064*** (-0.007)	-0.032*** (-0.004)	-0.017*** (-0.003)
SIZE	0.047*** (-0.012)	0.028*** (-0.006)	0.018*** (-0.002)	0.011*** (-0.003)
GDP	0.388** (-0.154)	0.170*** (-0.043)	0.134*** (-0.05)	0.268 (-0.213)
INF	-0.077 (-0.218)	0.399*** (-0.07)	0.775*** (-0.036)	0.867*** (-0.066)

Note: Standard errors in parentheses. * $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$.

Table 5 shows the estimation findings of the QR method for the impact of the independent factors on Islamic bank profitability. This study illustrates that corruption has an insignificant impact on Islamic bank profitability across all quantiles when considering the 5% significance level as a criterion. The main interest of our results is that the coefficients of the corruption variable estimated by the QR technique exhibit inconsiderable magnitude across all quantiles (0.002, -0.006, 0.002, and 0.001). This result contradicts Shah et al. (2022) and Hassan et al. (2021), who pointed out corruption negatively impacts Islamic banks. Further, the "Sand the Wheels Theory" states that corruption may damage banking operations (Bougatef, 2016; Park, 2012; Goel & Hasan, 2011) and make it more challenging to borrow money from them owing to lengthy approval processes. Also, the insignificant impact of corruption on the profitability of Islamic banks is attributed to the structural specificity of the Shari'ah governance system, such as internal legislative oversight represented by the 'Shari'ah Supervisory Board', and self-regulation of morality stemming from religious commitment.

On the other hand, the behaviour of some variables' regression coefficients varies over the conditional distribution of Islamic bank profitability (quantiles). As a result, high-profitability banks (higher quantiles) seem to be affected by bank-specific factors differently than low-profitability banks (lower quantiles). The empirical findings suggest that NPLs negatively related to Islamic bank profitability and are statistically significant at the 1% level; however, the upper quantile presents a positively and insignificant effect. The significant coefficient of NPLs increases gradually over quantiles (Q0.25, Q0.50, and Q0.75) 0.443, 0.154, and 0.024, respectively. Our findings align with some literature (e.g., Athanasoglou et al., 2008; Demirgüç-Kunt & Huizinga, 1999; Berger & DeYoung, 1997). When the NPLs exceed the permissible limit, the banks' profits will decline, they lose a large amount of capital, raise the risk, lead to much financial damage, and ultimately threaten bank profitability.

Further, the most intriguing of our findings is that the association between ETOA and bank profitability is not linear. The outcomes revealed that ETOA has a positive relation with profitability of IBs and is statistically significant at Q0.25 and Q0.50. This positive finding also aligns with the empirical result of (Chowdhury et al., 2017; Kosmidou, 2008; Pasiouras & Kosmidou, 2007) and supports the argument that banks with high equity to total ratio have reduced funding costs, resulting in higher profitability. However, at higher quantiles, this relationship becomes negative. This result is consistent with the wisdom in banking; a higher ETOA ratio is associated with lower ROAE. A higher ratio reduces the equity risk and accordingly reduces the equilibrium expected ROAE required by investors. This means that higher ETOA may be connected with lower risk-taking and, thereby, lower anticipated returns (Goddard et al., 2004).

Regarding cost-inefficiency (CTI), Our findings show that CTI negatively impacts bank profitability, which is highly significant for all quantiles except for Q0.25. Also, we found that the level of CTI increases across quantiles ($Q0.50=0.064$, $Q0.75=0.032$, and $Q0.95=0.017$) which implies that high-profit banks are less affected by CTI compared to low-profit banks. This result aligns with Riaz and Mehar (2013) and Pasiouras and Kosmidou, 2007, that highly profitable banks have low operating costs. On the other hand, our findings show that bank size (SIZE) positively and significantly impacts all Islamic bank profitability distribution quantiles. This finding aligns with the result of Aladawan (2015) and Bikker and Hu (2001). The size of Banks can exploit scale and scope efficiencies and improve the profitability of banks (Berger, 1995). Further, we found that low-profitability Islamic banks can take advantage of both scale economies and diversification to increase their profitability more than high-profitability banks. However, high-profitability banks may generate low profitability by motivating big banks to take on greater risk via 'too big to fail' impetus (Mishkin, 1999). For example, at the lower quantile (Q0.25), each unit of bank size adds by the bank leads to an increase of about 0.047 units of profitability. In contrast, at the high quantile (Q0.95), each unit of bank size adds only 0.011 units of profitability.

Table 5 also shows the effect of macroeconomic variables; First, the results found GDP growth rate varies at different quantiles; our results reveal considerable variation in size and significance. In particular, results show that the GDP growth coefficient is positive and statistically significant over the entire quantiles except for the upper quantile (Q0.95), which has a positive and insignificant correlation with bank profitability. According to economic theory, more GDP (gross domestic product) results in better bank profitability. This is because economies with greater growth rates require more financing, which is often anticipated to be more efficient, better capitalized, less susceptible to credit risk, and more profitable (e.g., Athanasoglou et al., 2006; Calza et al., 2006). Second, our findings exhibit that inflation positively and significantly impacts the profitability of IBs over entire quantiles except for the lower quantile. Our empirical result is consistent with several studies conducted by (Sufian & Habibullah, 2009; Athanasoglou et al., 2008), which indicated that higher inflation means higher bank profitability. On the other hand, this finding is inconsistent with the fact that inflation drives systemic problems and negatively impacts both the banking industry and overall economic activities (Horvath & Vaško, 2016; Demirgüç-Kunt & Huizing, 1999). However, the effect depends on whether banks expect inflation and whether it aligns with a generalized state of economic fragility (Uhde and Heimeshoff, 2009).

5.2 Estimation results of conventional Banks Model

The QR coefficients at 0.25th, 0.50th, 0.75th, and 0.95th quantiles of the dependent variable (ROAE) are shown in Table 6. The QR model findings demonstrated that corruption significantly

and favorably affects conventional banks' profitability, and this effect decreased gradually (.019,.016, .010) over quantiles (0.25th, 0.50th, 0.75th). However, this effect becomes significantly negative at the high-bank profitability level (95th quantile). So, focusing on the entire dependent distribution allows the effect of corruption on bank profitability to differ for the upper/lower distribution of the profitability of conventional banks. The positive finding is supported by the "Grease the Wheels" hypothesis, where banks benefit from the corrupt environment to increase their profit, and it is consistent with previous studies (Murharsito et al., 2017; Bougatef, 2017; Aburime, 2010; Mongid & Tahir, 2011). On the other hand, the negative finding is supported by the "Sand the Wheels" hypothesis and is consistent with previous studies (e.g., Asteriou et al., 2021; Yakubu & McMillan, 2019). Thus, bank operations are damaged by corruption, and borrowing money from them is more difficult due to long approval processes, the abuse of entrusted power for private gain, and misallocating economic resources (e.g., Bougatef, 2016; Park, 2012; Goel & Hasan, 2011).

Table 6: The estimated parameters of the determinants of conventional bank profitability.

Dependent variable: ROAE	Quantile Coefficient			
	25%	50%	75%	95%
COR	0.019*** (0.003)	0.016** (0.007)	0.010*** (0.002)	-0.019*** (0.006)
NPLs	-0.122*** (0.017)	-0.042 (0.054)	-0.029*** (0.010)	0.059*** (0.019)
ETOA	-0.068** (0.028)	-0.046 (0.044)	-0.080*** (0.013)	-0.089* (0.050)
CTI	-0.112*** (0.011)	-0.111*** (0.016)	-0.124*** (0.006)	-0.122*** (0.003)
SIZE	0.011*** (0.001)	0.020*** (0.006)	0.010*** (0.004)	-0.002 (0.003)
GDP	0.423*** (0.087)	0.543*** (0.088)	0.344*** (0.068)	0.706*** (0.168)
INF	0.232*** (0.086)	0.399*** (0.099)	0.696*** (0.024)	1.190*** (0.057)

***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Regarding bank-specific factors, our findings show that the association between NPLs and profitability is not linear across quantiles. For example, in Table 6, the empirical findings suggest that NPLs negatively correlate with conventional bank profitability and are statistically significant at the 1% level in the Q0.25 and Q0.75 models. At the same time, the 50th percentile (middle quantile) has a negative and insignificant impact. NPLs increase when the borrower no longer pays in accordance with the terms of the loan. This adversely influences the bank profitability, can cause impaired loans, and, at most harmful, default. Our results are in-line with earlier empirical findings (e.g., Athanasoglou et al., 2008; Demirgüç-Kunt & Huizinga, 1999; Berger & DeYoung, 1997) when NPLs rise over the acceptable level, banks will suffer capital losses increased risk, and decreased earnings, which will result in many financial damages and eventually threaten bank profitability. In contrast, the results present a highly significant and positive relationship at the upper quantile, implying that the higher the non-performing loans, the higher the conventional bank profitability. Our results are in-line with earlier empirical findings Ahmad (2015) and Rajan

(1994), where the credit policy of bank management has been developed to build a good reputation to generate a profit; utilize current earnings to cover future loan defaults.

Interestingly, we found that equity to total assets (ETOA) negatively impacts conventional bank profitability across all quantiles but is only significant at 0.25 and 0.75 quantiles. Hence, the inverse relationship between the profitability of CBs and ETOA is also in-line with expectations. Moreover, this relationship conforms with the argument that a higher ETOA ratio inspires CBs to invest in safer assets, which may impact bank profitability (Mehta, 2012; Goddard et al., 2004). Furthermore, our findings discovered that the cost efficiency (CTI) coefficient across all regressions has a negative sign and is statistically significant at the 1% significance level. Moreover, at the upper quantiles, the high cost-inefficient lead to lower bank profitability. Our results are in-line with earlier empirical findings and support the bad management theory, which states that degradation in cost efficiency precedes rises in non-performing loans and decreases in profitability (Riaz & Mehar, 2013; Pasiouras & Kosmidou, 2007). Further, Bank size coefficients are positive and significant in 25%, 50%, and 75% quantiles of conventional bank profitability. Our findings are in-line with earlier empirical findings (Bikker & Hu, 2001; Berger, 1995) and suggest the significant impact of possible scale and scope economies on the profitability of banks, and banks can exploit an economy of scope and economy of scale and improve profitability. On the other hand, Bank size at the highest quantity (95% quantiles) has a negative and insignificant impact on conventional bank profitability. Thus, Bank size may cause deteriorating bank profitability by facilitating financial institutions to accept greater risk via 'too big to fail' theory (Mishkin, 1999).

Regarding the macroeconomic environment, our findings suggest that GDP growth has a positive and high significance to the CBs' profitability. This is in line with previous studies and typically supports that high GDP Growth is enough to contribute to increasing bank profitability, and bank efficiency is often high when GDP is high and the national economy is growing well (Beckmann 2007; Calza et al., 2006; Goddard et al., 2004). Further, our results confirm that inflation (INF) positively affects conventional bank profitability, where the estimated coefficient of inflation appears to increase across quantiles $Q0.25 = 0.232$, $Q0.50 = 0.399$, $Q0.75 = 0.696$, and $Q0.95 = 1.190$. In general, high inflation motivates banks to restrict credit, lowering the actual return on equity and, ultimately, causing a reduction in the banking sector activity. Nevertheless, the positive coefficient on the INF is in-line with (Sufian & Habibullah, 2009; Uhde & Heimeshoff, 2009; Athanasoglou et al., 2008), where the inflation effect is dependent on whether bank management anticipates inflation and if it corresponds with general economic fragility.

5.3 Robustness Tests

To ensure the reliability of our findings, we do a robustness check using a different regression approach. According to the Housman test, the fixed-effect model (FE) is the most appropriate model to explain the result of CBs. On the other hand, the random effect model (RE) is the best model for explaining the outcome of IBs. Therefore, this study uses the FE method to examine the link between corruption and conventional bank profitability. Table 7 shows the results of the FE and RE approaches for comparison.

In general, the study note that the results of FE method do not substantially deviate from the previous three quantiles' values in either sign or substance (Q0.25; Q0.50; Q0.75). In contrast, the QR results found that corruption hampers CBs from allocating their resources optimally so that the estimated coefficient of corruption at the upper quantile is significantly harmful. Moreover, the

QR approach shows that the calculated coefficient's size decreases with increasing quantile. Additionally, the estimates for NPLs, ETOA, CTI, SIZE, INF, and GDP variables are comparable across the FE and QR techniques. However, the QR method finds COR, NPLs, and SIZE variables have different signs related to high-profitability banks (Q0.95). This is because the FE estimator solely focuses on the distributions' mean and prevents the corruption's impact on banks' credit risk from varying between quantile. When checking the quantile regression, the estimation findings of these variables differ across the quantiles, indicating that the effect of these variables changes according to bank profitability; however, The FE approach prevents the influence of these variables on bank profitability from varying across quantiles.

Concerning IBs, overall, we found that the findings of the RE approach are not considerably different from those of the QR methodology. According to the QR and RE estimation results, corruption has a negligible influence on Islamic bank profitability. The main interest of our results is that the coefficient of the corruption variable estimates by both methods reveals inconsiderable in the magnitude of the coefficient, which means corruption does not affect Islamic bank profitability. Furthermore, NPLs, ETOA, CTI, SIZE, INF, and GDP variables are estimated similarly by the RE and QR methods. NPLs and GDP factors, on the other hand, were not shown to be substantially connected to high-profitability banks using the RE technique (Q0.95). Furthermore, the QR results reveal that the impact of ETOA on conventional bank profitability varies in sign across quantiles. For example, while there is a positive relationship between Q0.25 and Q0.50, there is a negative relationship between Q0.75 and Q0.95.

Table 7: The Results of the Fixed and Random Effect Technique

Dependent variable: ROAE	Fixed Effect (CBs) Coefficient	Random Effect (IBs) Coefficient
COR	0.027** (-0.013)	0.002 (-0.006)
NPLS	-0.198*** (-0.045)	-0.125*** (-0.042)
ETOA	0.485*** (-0.104)	-0.018 (-0.033)
CTI	-0.015** (-0.007)	-0.008 (-0.006)
SIZE	0.081*** (-0.014)	0.018*** (-0.005)
GDP	1.064*** (-0.134)	0.288 (-0.203)
INF	0.974*** (-0.084)	0.707*** (-0.128)
Constant	-1.463*** (-0.263)	-0.233** (-0.095)

***, **, and * indicate significance at 1%, 5%, and 10%, respectively.

Conclusion:

The main purpose of this study is to assess the impact of corruption on Islamic and conventional bank profitability. The analysis is carried out on panel data of 331 banks in (14) Islamic countries (134 IBs and 197 CBs) from 2011 to 2019. This paper presents a novel method of Quantile Regression developed by Powell (2016), which will also help understand the effect of corruption on profitability of banks through allows the corruption impact to vary across all quantiles of profitability, which may explain why the results of previous empirical studies have been mixed. To our knowledge, this analysis has not been undertaken in the previous literature. Also, to ensure the reliability of our findings, the study applied the fixed and random effect methods as a further analysis to confirm the finding's robustness.

The QR findings show that corruption is positively and significantly related to the profitability of CBs. Although low-profitable CBs may benefit from corrupt activities, high-profit CBs are less likely to participate in severely corrupt practices, which lowers their profitability. Therefore, concentrating on the dependent variable's whole distribution permits the impact of corruption on profitability to vary between quantiles, which accounts for the inconsistent results of empirical research. Some showed a positive correlation, while others showed a negative one. Therefore, our results support the previous studies findings that companies decide to provide bank officials bribes when doing so increases their profits. (Boukou, 2017). Furthermore, because perceived profitability raises the cost of corruption, companies are more inclined to accept bribes. (Gao, 2010). Therefore, the positive result backs up the "Grease the Wheels" hypothesis, consistent with previous studies (Murharsito et al., 2017; Aburime, 2010; Mongid & Tahir, 2011; Bougatef, 2017) that banks benefit from the corrupt environment to increase their profit. On the other hand, the negative result supports the "Sand the Wheels" hypothesis and is consistent with previous studies (e.g., Asteriou et al., 2021; Yakubu & McMillan., 2019) that corruption decreases bank profitability. Considering IBs, the results clarify that corruption has an insignificant effect on IBs. Moreover, the findings show that CBs are more affected by corruption than IBs since the coefficient of corruption in IBs less than their counterpart CBs.

The empirical outcomes of this study propose that bank-specific variables, particularly the NPLs and CTI ratios, negatively impact the profitability of both types of banks. Thus, IBs and CBs should control their NPLs and costs efficiently concerning profitability to improve their profitability. Also, ETOA is negatively correlated with the profitability of CBs, while this effect on IBs differs in sign over quantiles. Although ETOA positively affects Islamic bank profitability at lower and medium quantiles, this effect is negative at upper quantiles. In this case, the lower and medium IBs profitability should increase the equity financing rather than the portfolio of debt financing to increase their profitability. Conversely, High IBs' profitability should increase debt financing rather than the portfolio of equity financing. In contrast, bank size is positively and significantly related to profitability in IBs and CBs. However, considering the bank size coefficient, Islamic banking is more affected by bank size than commercial banking. Furthermore, the macroeconomic variables GDP growth (GDP) and inflation (INF) positively impact bank profitability.

This study generates two main contributions to the existing literature. First, using the novel method (Quantile Regression developed by Powell, 2016) highlights the corruption impact has different levels of profitability of banks. Second, only a few studies use post-global financial crisis periods; if so, they examined a single country. Third, comparing the IBs and CBs gained a better

knowledge of the effect of corruption on bank profitability in Islamic countries. As corruption is often inevitable, the study findings will help regulators and policymakers develop realistic banking standards for CBs resembling IBs to tackle corruption and improve their profitability. Hence, our results raise doubts about the efficiency of Shariah's governance to preventing corrupt activities in the industry of IBs, how bank management of CBs will be more efficient in handling corruption, and a warning sign to their Policymakers should focus more on combating corruption.

Given the varying impact of corruption between small and large banks, banking supervisory units in these countries should tighten scrutiny of loans and facilities granted by large, highly profitable commercial banks, and link them to a strict solvency system that prevents financing defaulting clients or the abuse of influence for personal gain. However, this study has limitations, especially in the financial data availability in IBs. However, this study has limitations, especially in financial data availability in IBs. Hence, further research is recommended in different regions with various profitability levels and country-wide corruption. In addition, our results indicate that corruption does not impact IBs. Therefore, researching the reasons behind that will help control the behavior of conventional banks.

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