The effect of the COVID-19 pandemic on the performance of Turkish banks: a comparative panel data analysis

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Abstract: This study investigates the impact of the COVID-19 pandemic on the performance of conventional and participation banks in Turkey. Panel data with random effects was the main analysis methodology adopted by the study. The data of ten banks was analysed within the range of 2015–2021. The results of the combined analyses could not establish any impact of the pandemic on the profitability of both groups of banks. The same result is also observed when the analysis is conducted on both groups separately. In contrast, a negative impact on the operational efficiency of banks was observed when the analysis was conducted on the two sets of the banks combined. Interestingly, the results suggest that the pandemic had a negative impact on the operational efficiency of participation banks but not on conventional banks when the analysis was conducted on the two sets of the banks separately.

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1   Introduction

On March 11, 2020, the World Health Organisation (WHO) declared COVID-19 a global pandemic (Mohammad et al., 2021). As a measure to counter the spread of the disease, many countries resorted to lockdowns, in which many economic activities were either minimised or totally closed. Economies became stagnant for a period exceeding six months, and hardly any formal business was functional at full capacity. According to Congressional Research Service, in 2020 global economic growth was reduced to an annualised rate of around –3.2%, global trade is estimated to have fallen by 5.3% in 2020 (Congressional Research Service, 2021). In the same year, unemployment in the US jumped to 4.9%, an unpresented level since 1930. In October 2021, there were around 4.2 million fewer jobs compared to February 2020 (Centre on Budget and Policy Priorities, 2022). Consequently, businesses encountered an unprecedented and unexpected decline in profits, in particular in sectors with no flexibility to work from home (Dunbar, 2022). Demand for liquidity pushed many firms to draw huge amounts of credit from pre-existing credit lines with their banks (Li et al., 2020). Mosser (2020) reported that the huge increase in the demand for liquidity resulted in non-financial customers of US banks to draw heavily on their existing lines of credit, as depicted in Figure 1, in a scenario very similar to the situation in the aftermath of the financial crises of 2008-09.

Figure 1   Loans and leases in bank credit during the COVID-19 and the global financial crisis (see online version for colours)
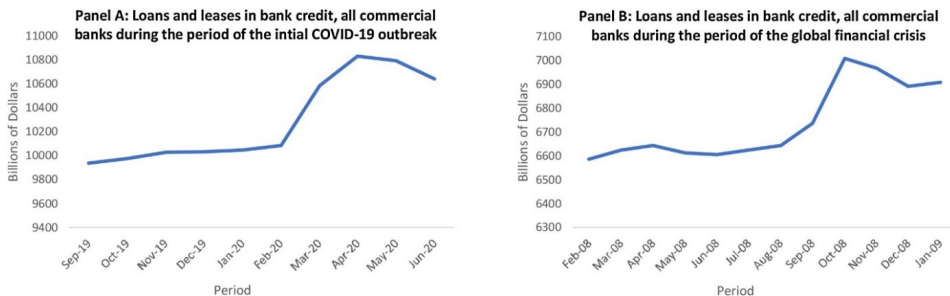
Source: Dunbar (2022)

What exacerbated the situation was the dramatic increase in the rate of default on most banks loans, including mortgages, automobiles loans, and personal loans (El-Chaarani et al., 2022). As a result, banks were under great financial strain for being unable to raise new capital to replace the leaving capital (Dunbar, 2022).

Banks' performance, operations, and profitability were all impacted indirectly as a result of their exposure to affected households and businesses with declining income and revenues (Le et al., 2022). The index STOXX Europe 600 Banks declined by 46% in the period between February 13 and April 21, 2020, a decline almost twice the decline of the MSCI Europe (ECB, 2020). Likely sources for these low valuations are the expectation of a pandemic-induced wave of non-performing loans, low-for-longer interest rates and lower anticipated bank profitability (Simoens and Vander, 2021).

Despite the existence of a reasonable volume of research on the adverse effects of the COVID-19 on the financial system (e.g., Elnahass et al., 2021; Ramelli and Wagner, 2020; International Monetary Fund, 2021; McKibbin and Fernando, 2020; Le et al., 2022; Agnese and Vento, 2020), studies on the COVID-19 impact on the banking system are still limited (Demirgüç-Kunt et al., 2021). This research gap applies to studies on both conventional as well as Islamic banking systems (Le et al., 2022).

This study aims at bridging this gap by capturing the effect of this pandemic on the Turkish banks (both conventional and participation). More specifically, it seeks to empirically assess the impact of the COVID-19 pandemic on the profitability and operational efficiency of conventional and participation banks in Turkey. By doing so, the study primarily endeavours to contribute to the existing literature in two ways: First, it investigates the impact of COVID-19 and the consequent lockdown on the banking system in Turkey. Second, it draws an analytical comparison between Islamic banks and conventional banks in terms of profitability and operational efficiency during the pandemic. It may be noted here that participation banking is synonymous with the term of Islamic banking or interest-free banking that operated according to the principles of Islamic law as it is specifically used in Turkey and Morocco (Kaplan, 2020).

The remainder of this study is structured as follows: Section 2 provides the conceptual and theoretical framework, while Section 3 contains a review of the literature. Section 4 highlights the research methodology Section 5 presents the results followed by the discussion in Section 6. Conclusion and research limitations are discussed in the final section.

2 The conceptual and theoretical framework

The conceptual framework of this paper is presented in Figure 2, which explains the relationship between the pandemic-driven economic crisis and banks' performance. Banks, as financial intermediaries, are positioned at the frontline of any economic downturn and are impacted directly by economic slowdowns or recessions. It is hard to overemphasise that there is a reciprocal relationship between economic growth and the financial and banking systems, in the sense that a strong economic performance should theoretically translate into a significant financial performance of firms and financial institutions including banks. Likewise, a robust financial system and banking system is essential to achieve economic growth. This latter notion has been articulated in the literature as early as 1873 and 1912 by Walter Bagehot and Joseph Schumpeter respectively.
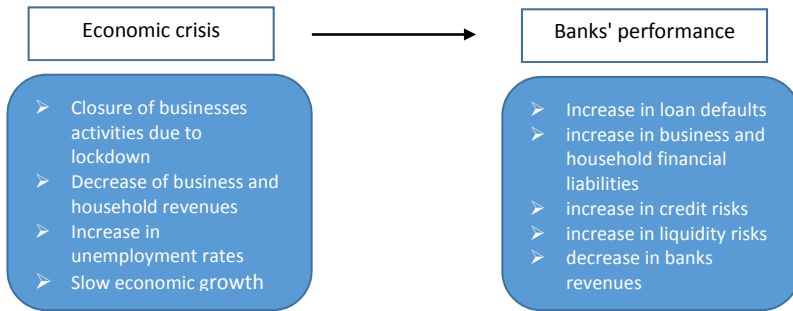
The period of pandemic witnessed the impact of economic crises on the performance of financial institutions and banks. In the literature review section, the impact of the pandemic on Islamic and conventional banks is discussed in detail. However, a clear picture of the economic effects of the pandemic cannot be extracted without taking all

relevant factors into account. To begin, Itani et al. (2020) argue that three key factors have potentially contributed to the COVID19-driven economic crises, namely

1   trust deficit

2   inherited characteristics of the economy

3   fiscal and monetary policies.

These factors are depicted in Figure 3.

Figure 2   Conceptual framework of the pandemic-driven economic crisis and its impact on banks' performance (see online version for colours)

Economic crisis		Banks' performance

➤ Closure of businesses activities due to lockdown
➤ Decrease of business and household revenues
➤ Increase in unemployment rates
➤ Slow economic growth

➤ Increase in loan defaults
➤ increase in business and household financial liabilities
➤ increase in credit risks
➤ increase in liquidity risks
➤ decrease in banks revenues

Source: Developed by the author

Figure 3   Factors contributing to the COVID19-driven economic crisis

Trust Deficit	Inherited Economy

COVID-19 Pandemic

Fiscal & Monetary Policies

Pandemic Driven Economic Crises
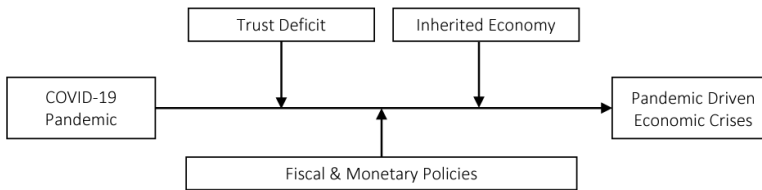
Source: Itani et al. (2020)

Theoretically, banks, as financial intermediaries, are affected by the economic conditions both positively and negatively from the demand side and the supply side of funds. As illustrated in Figure 4, from the supply side, banks are affected by lesser amounts of savings and deposits due to lesser revenues generated by households and firms. Simultaneously, on this side an increase in demand in withdrawals and liquidity is observed. On the other hand, banks are affected on the demand side by being able to attract fewer borrowers, less income generated, and eventually, less profit made by banks and less operational efficiency. Concurrently on this side of the process, lesser loan repayment and higher credit risk is observed.

In line with the theoretical background of this study, the following null hypotheses have been formulated:

$H\theta_1$: COVID-19 pandemic has no impact on the profitability of the Turkish banks.

$H\theta_2$: COVID-19 pandemic has no impact on the operational efficiency of the Turkish banks.

Figure 4   Impact of economic conditions on banks' demand and supply of funds (see online version for colours)
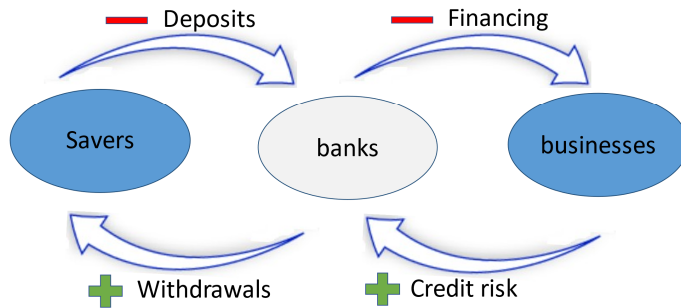
Source: Developed by the author

3   Review of literature

3.1   *Islamic banking in Turkey*

Islamic banking is a type of banking that is interest-free and strictly adheres to the instructions sourced from core Islamic doctrines and jurisprudence (Shariah) when conducting any financial or commercial transactions. This system has been gaining much acceptance, especially within Muslim-dominated countries such as Malaysia, Indonesia, Saudi Arabia, Jordan, Kuwait, Turkey, and Qatar. It is growing very rapidly not only in Muslim countries but even in many non-Muslim countries. As illustrated in Figure 5 below, the total assets of the Islamic finance industry are estimated to be USD 2.2 trillion with a growth rate of 10%-12% over the next two years (S&P Global Ratings, 2022).

Figure 5   Growth outlook of Islamic finance (see online version for colours)
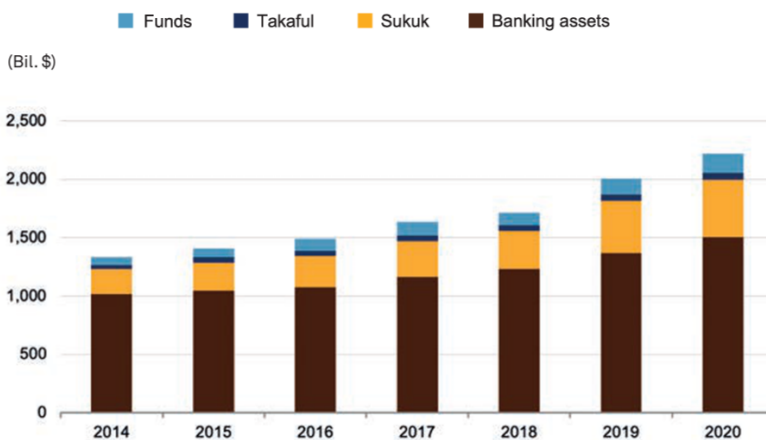
Source: S&P Global Ratings (2020)

In Turkey, Islamic banking is known as participation banking. Al Baraka Türk is the first participation bank in Turkey. It was established in 1984 following decree number 83/7506 of the Council of Ministers in 1983 on setting up 'Special Finance Houses'

(Varsak, 2017). In 1985 Faisal Finance Special Finance House was established followed by the establishment of Anadolu Special Finance House in 1991 and İhlas Special Finance House in 1995. A major development took place in 2005 when these 'Special Finance Houses' gained the title of banks after the enactment of the Banking Law No. 5411 (TKBB report, 2014). Table 1 provides a historical overview of the development of participation banking in Turkey.

Table 1   Development of participation banking in Turkey

Date	Progress	Description
1983	Issuance of the Decree Nos. 83/7506 of the Council of Ministers for the establishment of special finance houses	Status of Special Finance Houses was transferred into status of Participation Banks in 2006
1985	Establishment of Albaraka Türk Special Finance House	It continues to operate as Albaraka Türk Participation Bank
1985	Establishment of Faisal Finans Special Finance House	The name of the bank was changed as Family Finans Special Finance House in 2001. It merged with Anadolu Finans Special Finance House in 2005 and the name of the bank was changed to Türkiye Finans Participation Bank. It continues to operate under the same name
1989	Establishment of Kuveyt Türk Special Finance House	It continues to operate as Kuveyt Türk Participation Bank
1991	Establishment of Anadolu Special Finance House	It merged with Family Finans Special Finance house in 2005.
1995	Establishment of İhlas Special Finance House	It was liquidated in 2001
1996	Establishment of Asya Finans Participation Bank	It was transferred into Saving Deposits Insurance Fund on May 29, 2005 and liquidated on July 22, 2016
2005	Establishment of Türkiye Finans Participation Bank	It was established in 2005 with the merger of Family Finans Special Finance House and Anadolu Special Finance House
2005	"Special Finance Houses" gained the title and status of being banks with the enactment of the Banking Law No. 5411	Up till today
2015	Establishment of Ziraat Participation Bank	Operating till today
2016	Establishment of Vakıf Participation Bank	Operating till today
2019	Turkiye Real Estate Bank (Türkiye Emlak Katılım Bankası). It re-entered the market as a participation bank	Historically, the bank was established in 1926 as Real Estate and Orphans Bank and changed its name many times as Real Estate and Credit Bank of Turkiye and later as Tek Bank (see the official website https://www.emlakkatilim.com.tr/en/about-us/history)

Table 1   Development of participation banking in Turkey (continued)

| Date	Progress	Description
2021	"Participation Finance Department" was establishment within the President's Finance Office.	The new department is to focus on
		1. Raising awareness of participation finance and
		2. Developing strategies in the field,
		3. Boosting cooperation among public institutions, the private sector, universities and nongovernmental organisations (NGOs) so Islamic finance can be improved

Source: Developed by the author, see also Varsak (2017)

Today there are six participation banks out of total 54 banks operating in Turkey (TKBB, 2021). Total assets of participation banks are estimated to constitute about 7% of total banking assets in the country and expected to reach 15% by 2025 (Moody's report 2021). Assets of participation banks grew 54% in 2020 compared to 28% in development and investment banks in the same year. Participation banks employing 17 thousand employees out of 203 in total, i.e., approximately 8.5% of all employees in the sector. The number of branches reached around 1255 out of 11,194 branches throughout the country (Banks Association of Turkiye, 2020).

3.2   Effects of COVID-19 pandemic on the banking industry

The recent COVID-19 pandemic has caused the global economy to go into an economic recession rivalled only by the Great Depression (Chakraborty and Maity, 2020; Gopinath, 2020). In fact, the effect is much worse that the 2009 financial crisis as illustrated by Figure 6 (IMF report, 2020).

Figure 6   Real GDP growth, a comparison between 2009 and the ongoing pandemic (see online version for colours)
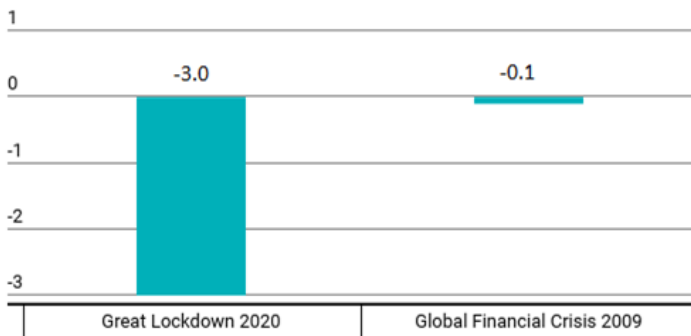
Source: World Economic Outlook (IMF, 2020)

The IMF projected that the decline in world GDP would be around 3% in 2020 with an accumulated loss of US$9 trillion during the 2020–2021 period. Likewise, according to an estimate by the Asian Development Bank, the ongoing pandemic will cost the global economic between $5.8 to $8.8 trillion (ADB, 2020). In 2020, these amounts were 6.4%

and 9.7% of world GDP respectively. The financial sector is not immune to the impact of economic shocks induced by the COVID-19 pandemic. The pandemic was seriously felt in the banking industry. In US, the Federal Reserve's July survey of senior loan officers reported many banks tightening credit standards for loans. The survey also reported weaker demand for a variety of loan types (commercial and industrial), as well as for commercial real estate and consumer loans; with the exception of a modest increase in demand for residential mortgages.[1]

Several empirical studies have been conducted to uncover the real impact of this pandemic on different aspects of financial markets and institutions around the world, including its impact on stock exchanges (Sansa, 2020) and banking industry (Marcu, 2021; Anwar et al., 2021; Siregar, 2021; Barua and Barua, 2021; Baret et al., 2020; Bokhtiar et al., 2021). It is believed that banking industry will take many years to fully recover from the pandemic's impact. Perwej (2020) has reviewed the impact of COVID-19 on the Indian banking system, the study concluded that the coronavirus outbreak threatened a years-long clean-up of India's financial system. Likewise, Barua and Barua (2021) explored the implications of COVID-19 for Bangladesh's banking sector. Their results suggest that all banks are likely to be victims of this pandemic as there is a clear fall in risk-weighted asset values, diminished capital adequacy ratio and decreased net income. The study shows that larger banks are likely to be the most affected by the pandemic and the impact will be on the day-to-day business operations. On the other hand, Siregar et al. (2021) scrutinised the impact of the COVID-19 shock on banking and corporate sector vulnerabilities in Indonesia. The study found a sharp decline in corporate balance sheets during the pandemic. The study also emphasised the need for governmental intervention to save these corporates in order to accommodate their liquidity problems and prevent these problems from developing into solvency problems. In the midst of highlighting the adverse consequences of the pandemic, Marcu (2021) argued that one of the few advantages of the pandemic is the role it played in accelerating the digitalisation of the banking system. His study shows that the COVID-19 pandemic has been critical in accelerating the digitalisation of the banking system. Many banks had been slow to fully digitalise their services before the pandemic; however, the measures enforced to control the spread of the pandemic had forced banks to rapidly shift to digitalising their services to their clients in order to continue offering services during lockdowns. Consequently, many banks were digitalised to a great extent, and this has been a positive development in the financial sector.

Like other financial institutions, Islamic banks are not immune to financial effects wrought by the pandemic. Some papers have attempted to explore the impact of the pandemic on Islamic banks, e.g., Anwar et al. (2021) who probed the effect of the COVID-19 outbreak on Islamic banking in Malaysia. The study was based on a qualitative review of past studies and surveys. Their findings show that the COVID-19 pandemic affected banks' day-to-day business operations. This development limited the interactions between the banking staff and their clients. This means very few business transactions were conducted during that period.

Rehman et al. (2021) investigated the impact of COVID-19 on Islamic bank indices of the Gulf Cooperation Council (GCC) countries. They used the data related to the banking sector from stock exchanges and the Dow Jones Islamic Market Index in GCC countries, prior to and during the pandemic for their analysis. The study found that Islamic banks have the capacity to absorb and respond to the financial and economic crisis induced by the pandemic. Furthermore, the study found that Islamic banks were

able to provide valuable banking services continuously during the crisis with minimal interruptions. However, the study indicates that Islamic bank indices in GCC countries performed better in 2019 prior to the outbreak of COVID-19.

More specifically, Almonifi et al. (2021) investigated the COVID-19 pandemic effect on the performance of Al Rajhi Bank in the Kingdom of Saudi Arabia. The study explores the progress of Al Rajhi Bank using two sets of data samples: One set from before and the other from during the COVID-19 lockdown. The findings indicate that the pandemic had a minimal impact on the Islamic banking system of Saudi Arabia, especially on Al Rajhi Bank. A good body of the literature has been conducted to compare between the conventional banks and Islamic banks. For instance, Miah et al. (2021) studied the impact of COVID-19 on Islamic banks in Bangladesh from the Marxist perspective of "circuit of merchant's capital". The study notes that more than two-thirds of Islamic banks' investments and income are concentrated on working capital and trade finance, which are among the elements most vulnerable to economic shock induced by the pandemic. This means that Islamic banks are affected by the pandemic mostly because of their investment patterns. At the same matter, Akkas and Al Samman (2021) explored the resilience of IFIs compared to their conventional counterpart against the COVID-19 pandemic in the GCC countries. The data was sourced from 191 financial companies, including Islamic, conventional and Islamic-window financial institutions. The results of the study indicate that full-fledged Islamic participation institutions were found to be less affected by the COVID-19 outbreak than their counterpart conventional and Islamic-window institutions in the countries of Bahrain, Oman, Qatar, Saudi Arabia and UAE.,, and. In particular, in Saudi Arabia and Oman, participation institutions have demonstrated marked resilience to the effects of the pandemic. In the same context, El-Chaarani et al. (2022) investigated the impact of COVID-19 on the financial structure and performance of Islamic banks and conventional banks in the GCC countries. The study concluded with key points: 1) Conventional banks have presented a higher level of financial performance and financial liquidity than their Islamic counterparts, 2) conventional banks have shown a higher capacity to manage their financial risk during the crisis period, and 3) a high level of non-performing loans, high inflation rate and high percentage of non-important costs have a negative impact on the financial performance of Islamic banks mainly during the pandemic period. Such negative impact on both types of banking is also confirmed by Arafat et al. (2021), though the study did not articulate any difference between conventional and Islamic banking in terms of the level of impact.

Approaching the central point of this study, needless to assert, the pandemic has apparently huge impact on the banks, with the massive withdrawal of money from banks accompanied by increasing default-payment cases (Goodell, 2020).

The existing literature has produced mixed results on the impact of the pandemic on banks' profitability and operational efficiency. Li et al. (2021) explored the effect of revenue diversification on bank profitability and risk during the COVID-19 pandemic. Their results suggest a positive correlation between performance (as measured by return on assets and return on equity), and noninterest income (NII). Additionally, they found evidence that the use of NII is associated with lower levels of risk. NII refers to revenues received by the bank from resources outside interest payments (Xie et al., 2022). In this light, Fajri et al. (2022) examined the impact of the COVID-19 pandemic on Islamic banks in Indonesia. The study concluded that a negative impact of the pandemic can be observed on Islamic banks' profitability in the long run, most notably in terms of financing to wholesale and retail trade sectors. Finally, Sohibien at al. (2022), asserts that

the pandemic has a significant and negative impact on the return on asset (ROA) of Islamic banks.

Despite the flourishing literature probing the effect of COVID-19 on different financial institutions in different countries, as summarised in Table 2, the impact of this pandemic on Turkish participation banks has not been examined to the knowledge of the author. This study aims at filling this literature gap by rigorously looking into the effect of COVID-19 on participation banks in Turkey. In addition, it probes the effect of the pandemic on Turkish conventional banks and compares its effects on both.

Table 2   Summary of the literature

Author(s)	Study population	Main findings
Agnese and Vento (2020)	Banks in Euro area	The study found that deposits from household and non-financial corporation during the early stages of the pandemic were stable but also recorded increasing trends especially the deposits coming from the corporates.
Mohammad et al. (2021)	Islamic banks in Bangladesh	Islamic banks are affected by the pandemic mostly because of their investment patterns.
Sohibien et al. (2022)	Article V Islamic Commercial Banks in Indonesia	ROA and financing have a positive reciprocal relationship, meaning that when ROA increases, financing would increase, and vice versa. In addition, the pandemic has significant impact on the decline of the ROA.
El-Chaarani et al. (2022)	The impact of COVID-19 on financial structure and performance of Islamic banks: a comparative study with conventional banks in the GCC countries	(1) There is a significant difference between Islamic banks and conventional banks during the crisis of COVID-19, whereby conventional banks have presented a higher level of financial performance and financial liquidity than their Islamic counterparts (2) Conventional banks have revealed higher capacity to manage their financial risk during the crisis period, and (3) A high level of non-performing loan, high inflation rate and high percentage of non-important cost have a negative impact on the financial performance of Islamic banks mainly during the pandemic period of COVID-19
Arafat et al. (2021)	Impact of COVID-19 on the Performance and Stability of Conventional and Islamic Banks in the GCC Region, Malaysia, and Pakistan	A significant and negative impact of COVID-19 on the financial performance of both types of banks did not find any significant evidence of the impact of COVID-19 on the stability of these banks
Akkas and Al Samman (2021)	GCC countries	Fully fledged Islamic participation institutions are found to be less affected by the pandemic
Bokhtiar et al. (2021)	Stock Markets Globally	The pandemic was responsible for identical volatility clustering in both stock markets. Moreover, the results show that both stock markets are strongly correlated and co-move significantly within the sample period

Table 2 Summary of the literature (continued)

Author(s)	Study population	Main findings
Yasser et al. (2021)	Banking in Saudi Arabia	The results indicate that the pandemic had minimal impact on the Islamic banking system of Saudi Arabia, especially Al Rajhi Bank
Rehman et al. (2021)	Gulf Cooperation Council (GCC)	Islamic banks have the capacity to absorb and respond to the financial and economic crisis induced by the pandemic. However, the study indicates that Islamic bank indices in GCC countries performed better in 2019 before COVID-19 than in 2020 during the pandemic
Anwar et al. (2021)	Banking industry in Malaysia	The COVID-19 pandemic affected the banks' day-to-day business operations
Siregar et al. (2021)	Indonesia	The study found a sharp decline in corporate balance sheets during the pandemic
Barua and Barua (2021)	Bangladesh's banking sector	Their results indicate that banks are more likely to be victims of this pandemic, as there is a clear fall in risk-weighted asset values, accompanied by diminishing capital adequacy ratio and decreased net income. The study shows that larger banks are found to be the most affected by the pandemic
Marcu (2021)	Global Banking Sector	The pandemic has been critical in accelerating the digitalisation of the banking system. Many banks had been slow to fully digitalise their services before the pandemic
Li et al. (2021)	Global Banking Sector	The noninterest revenue sources are positively related to performance but inversely related to risk
Banna et al. (2021)	65 Islamic banks from six countries over the period 2011–2020. These countries are Qatar, Malaysia, Sudan, Indonesia, Bangladesh and Pakistan	The study found that adopting digital financial inclusion strengthened the stability of Islamic banks and reduced the default risk of the banks in the studied region
Rahmi and Sumirat (2021)	Indonesia	The performance of commercial banks during COVID-19 pandemic is considered strong performance, on average ROA is 1.4%. However, banking profitability was yet maintained differently in each BUKU (Commercial Bank based on Business Activities). Bank BUKU 1 (with core capital less than one trillion rupiah) is considered weak performance with negative ROA during COVID-19 pandemic. The Return on Asset in Bank BUKU 1 felldramatically from May 2020 to June 2020 into negative ROA

Table 2   Summary of the literature (continued)

Author(s)	Study population	Main findings
Nguyen et al. (2021)	238 and 218 customers of 20 Vietnamese commercial banks via email in 2018 Q4 and 2020 Q2	Customer experience with digital banking had a significant and positive impact on financial performance via customer satisfaction before COVID-19, during the lockdown, only WoM had a positive impact on financial performance
Katusiime (2021)	Uganda	The study found that the impact of the pandemic on bank profitability was only observed in the long run. Furthermore, the Treasury Bill interest rate and lending rate have a significant positive effect on bank profitability
Wahyudi(2020).	Indonesia	Statistical test results show simultaneously CAR, FDR, NPF, BOPO and inflation have an impact on ROA even during the COVID-19 pandemic

Source: Developed by the author

4   Methodology

4.1   Data definitions and source

The scope of this study makes use of secondary data sourced from consolidated and audited financial reports from specific banks (Islamic and conventional). Moreover, other data sources for macroeconomic variables used in this research were obtained from www.tuik.gov.tr. The data is made up of macroeconomic and financial ratios from conventional banks and Islamic banks in Turkey. Turkey has been selected for several reasons:

1   Turkey is one of the emerging markets for Islamic banking

2   the researchers are based in Turkey and can have an easier access to data

3   Turkey has a dual banking system that accommodate both Islamic banks and conventional banks.

The study is based on a data sample for the seven-year period between 2015 and 2021, five of which consist of the pre-pandemic period and the remaining two consist the pandemic period. The performance of the banks under the study will be evaluated based on the difference between the pre-pandemic and pandemic period.

As illustrated in Table 3, conventional banks under this study are Vakif Bankasi, Ziraat Bankasi, Yapi ve Kredi Bankasi, Iş Bankasi and Akbank. The Islamic banks are Albaraka Türk, Küveyt Türk Bankasi, Türkiye Finans, Ziraat Katilim and Vakif Katilim. The banks were selected based on ease of access to their data. Additionally, these banks are included in the sample control of over 75% of the Turkish banking sector, thereby giving a reliable reflection of the Turkish banking community.

Table 3   Details of the population of study

Type of banks	Name of the bank	Date of establishment	Capital size	Ownership (Major Shareholders)
Participation (Islamic) banks	Kuwait Turk Bankasi	1989	3.2 billion Turkish lira	Kuwait Finance House
	Albaraka	1984	1.35 billion Turkish lira	Albaraka Banking Group.
	Turkiye Finans	2005	2.6 billion Turkish lira	Saudi National Bank (SNB)
	Ziraat Katilim	12 May 2015	1.75 billion Turkish lira	Turkish Republic Treasury
	Vakif Katilim	February 17, 2016	1.02 billion lira	Prime Ministry Directorate General of Foundations 99%
				General Directorate of Foundations 1%
Conventional banks	Vakif Bank	April 13, 1954	47 billion Turkish lira	Turkish Republic Treasury
	Iş Bankasi	1923	58 billion Turkish lira	İş bank Pension Fund (37.08%), Free Float (34.83%), Atatürk Shares (28.09%)
	Ziraat Bankasi	1863	NA	Turkish Republic Treasury
	Yapi Kredi	1944	8.5 billion Turkish lira	Koç Financial Services
	Akbank	1948	54.4 billion (2019)	Sabanci Holdings 49%
				Free Float 51%

Source: Developed by the author

The key objective of this study is to examine the effect of COVID-19 on the banks' profitability and operational efficiency. Different financial ratios and macroeconomic variables have been adopted in order to actualise these objectives.

4.2   *Data analysis*

As detailed in Table 4, this study seeks to compare the effect of COVID-19 on the profitability and operational efficiency of Turkish participation and conventional banks from the period within 2015–2021. Panel data analysis is employed in this study. It is a more suitable data analysis methodology to use, since the data consist of cross-sectional as well as time-series data.

According to (Baltagi, 2001), panel data methodology is more reliable, efficient, and comprehensive as it combines two datasets: A horizontal cross-section sample unit (N) and a corresponding cross-sectional vertical time dimension (T). It involves the pooling of observations on a cross-section such as firms, countries, and schools over several time series. One of the advantages of panel data over time series and cross sectional data

analyses is that it controls individual heterogeneity, which the other two methods do not take into consideration.

Table 4   Details of data

Variable(s)/Financial ratios	Abbreviation	Frequency	Source	Time interval
Return on Asset Ratio	ROA	Yearly	Financial Statements	2015–2021
Return on Earnings	ROE	Yearly	Financial Statements	2015–2021
Growth Rate of Assets	GRA	Yearly	Financial Statements	2015–2021
Gross Domestic Product per capita	GDPPC	Yearly	TurkStat	2015–2021
Gross Domestic product	GDPGR	Yearly	TurkStat	2015–2021
Efficiency	EFFI	Yearly	Financial Statements	2015–2021
Loan to Assets Ratio	TL/TA	Yearly	Financial Statements	2015–2021
Size (Total Assets)	TA	Yearly	Financial Statements	2015–2021
Inflation Rate	INFLA	Yearly	TurkStat	2015–2021
Capital Adequacy ratio	CAR	Yearly	Financial Statements	2015–2021
Non-Performing Loans	NPL	Yearly	Financial Statements	2015–2021
Total Deposits	TD	Yearly	Financial Statements	2015–2021
COVID–19 pandemic	COVID	Yearly	WHO	2015–2021
Population	Pop	Yearly	TurkStat	2015–2021

Source: Developed by the author

4.2.1   *Cross-Sectional dependence analysis*

The first step is to conduct a cross sectional dependence analysis in order to ascertain which type of panel unit root is more appropriate to employ, whether it is first- or second-generation unit root test. Cross-Sectional Dependence Analysis measures the level at which the countries involved in this study are interdependent. This shows the cross-correlations or relationships across individuals over time. An economic shock in one country may spill over to other countries with which they have strong economic or political ties. For instance, GDP per capita growth rate in England can have an impact on the GDP growth rate in France and Germany. This shows how they interact and influence each other over time. When there exists a cross-sectional dependency, second generation unit root tests are the most suitable. In cases where there is no cross-sectional dependency, the first-generation tests are preferred over the others (Baltagi, 2001).

4.2.2 Panel unit root test

The panel unit root test is carried out to determine the level of stationarity of the variables in the model. This section comes after conducting the cross-sectional dependence analysis. The outcome from the cross-sectional dependency analysis determines which type of panel unit root test is to be conducted. First-generation unit root tests are applied if there is no cross-sectional dependency among the variables whereas the second-generation unit root is applied if variables are cross-sectionally dependent on each other.

4.2.3 Hausman test

The next step is the selection of which panel data regression model that is more reliable to use, and which is the best model fit. Baltagi (2005) stated that the Hausman test determines which model estimator best fits. This involves choosing between a Random Effects model and Fixed Effects model. Fixed Effect Model relaxes the effect of time-invariant individual characteristics on the predictor variables so that the predictors' net effect can be determined whereas Random Effect Model regression model assumes that the individual time invariant heterogeneity among individual units is random.

This study seeks to compare the effect of COVID-19 on the profitability and operational efficiency of Turkish participation and conventional banks. In this study, Return on Earnings (ROE) and operational efficiency are used as dependent variables acting as proxies for profitability and operational efficiency respectively. A COVID dummy variable indicating the period of the COVID-19 pandemic was also used in order to capture and detect the impact of the pandemic on both profitability and efficiency on the banks under this study.

As the main aim of the study is to ascertain the impact of the COVID-19 pandemic on two different aspects (profitability and operational efficiency), the study adopts different models. Each of these aspects is analysed differently and separately. The first two models investigate the impact of the COVID-19 pandemic on combined profitability both conventional and Islamic banks in the Republic of Turkey. Afterwards, their individual results are compared to detect their difference(s), if any.

The models are based and expanded from a basic panel data model. This is formulated as follows:

$$\gamma_{nt} = \alpha + \beta x_{nt} + \varepsilon_{nt}$$

where γ_{nt} denotes the dependent variable, α is the intercept, β is a $k \times 1$ vector of parameter, x_{nt} is the vector of the observations

The first model (Model 1) investigates on the combined impact of COVID-19 on the profitability of both Islamic and conventional banks in Turkey that are considered in this study. The model hypothesises that the banks' profitability in Turkish banks was affected by COVID-19 among other bank specific and macroeconomic variables. For the purpose of this study the basic panel model is extended to the following equation.

$$\begin{aligned}
ROE_{it} = {} & \alpha + \beta_1 ROA_{it} + \beta_2 GRA_{it} + \beta_3 LNGDPPC_{it} + \beta_4 LNTL/TA_{it} \\
& + \beta_5 LNTA_{it} + \beta_6 INFLA_{it} + \beta_7 CAR_{it} + \beta_8 NPL_{it} + \beta_9 LNTD \\
& + \theta_1 COVID_{it} + e_{it}
\end{aligned}$$

where ROE denotes the Return on Assets. β_1 to β_{91} together with θ_1 respectively are the coefficients of determinant variables and the dummy variable and e is the error term. ROA is the return on Assets, GRA is the growth rate of Assets, LNGDPPC is the natural log of GDP per capita, LNTL/TA is the natural log of loan to asset ratio, LNTA is the natural log of total asset showing the size of bank, INFLA is inflation, CAR is the Capital Adequate Ratio, NPL are the Non-Performing Loans, LNTD is the natural log of Total Deposits and COVID is a dummy variable showing the period of the COVID-19 pandemic.

Model 2 explores the effect of the pandemic on the combined operational efficiency of conventional and Islamic banks in the Republic of Turkey. The model's hypothesis states that the banks' operational efficiency in Turkish banks is affected by COVID-19 among other bank specific and macroeconomic variables. It is modelled as follows:

$$LNEFFI_{it} = \alpha + \beta_1 ROA_{it} + \beta_2 GRA_{it} + \beta_3 LNGDPPC_{it} + \beta_4 LNTL/TA_{it} + \beta_5 LNTA_{it}$$
$$+ \beta_6 INFLA_{it} + \beta_7 CAR_{it} + \beta_8 NPL_{it} + \theta_1 COVID_{it} + e_{it}$$

Where LNEFFI denotes the operational efficiency. β_1 to β_8 together with θ_1 are the coefficients of determinant variables and the dummy variable respectively and e is the error term. ROA is the return on Assets, GRA is the growth rate of Assets, LNGDPPC is the natural log of GDP per capita, LNTL/TA is the natural log of loan to asset ratio, LNTA is the natural log of total asset showing the size of bank, INFLA is inflation, CAR is the Capital Adequate Ratio, NPL are the Non-Performing Loans and COVID is a dummy variable showing the period of the COVID-19 pandemic.

Model 3 and Model 4 probes separately the effect of the pandemic on the profitability and operational efficiency of conventional and Islamic banks in the Republic of Turkey. These two models are analysed independently and separately. Afterwards their results are compared to detect their difference(s), if any. The main aim of this part is to scrutinise and establish the impact of the pandemic in each of the bank category (Islamic and Conventional). Finally, the study intends to compare these two results to exhibit any inference from that.

5   Results and discussions

5.1   Descriptive statistics

The first step is to do a descriptive analysis of the data. This helps in cleaning the data to ensure it is suitable for the main analysis. The descriptive analysis of the data for this study is presented on Table 5.

5.1.1   Correlation analysis

To quantify the strength of the relationship between our variables, the study used Karl Pearson's coefficient of correlation. The Pearson correlation coefficient is a measure of the strength of a linear association between two or more variables. The correlation analysis is sometimes used to any detect multicollinearity within the data. A higher association among the variables indicate that there might be a problem of multicollinearity within the data sample. Table 6 depicts the correlation analysis conducted on this study.

Table 5 Descriptive statistics

Variables	Mean	Standard deviation	Max	Min	Observations
CAR	0.162519	0.032769	0.300000	0.110000	70
GRA	0.463577	0.803384	5.200000	0.020000	70
lnGDPPC	0.046000	0.030019	0.100000	0.009000	70
lnEFFI	4.026692	0.247235	4.882044	3.349904	70
lnTA	23.01229	4.631578	28.98523	14.15500	70
lnTD	22.38648	4.638310	27.57532	14.35450	70
TL/TA	4.059934	0.623346	4.502029	0.198851	70
COVID	0.285714	0.455016	1.000000	0.000000	70
NPL	0.032467	0.001000	0.080100	0.001000	70
ROA	0.010011	0.006692	0.026000	0.000600	70
ROE	0.156704	0.107810	0.291300	0.021700	70
INFLA	0.152471	0.092784	0.365000	0.075000	70

Source: Developed by the author

Table 6 Correlation matrix

	car	npl	roe	roa	gra	lneffi	lntlta	covid	infla	lntd	lnta	lngdppc
car	1.0000											
npl	0.0883	1.0000										
roe	-0.0298	-0.2330	1.0000									
roa	0.0094	-0.0176	0.4032	1.0000								
gra	0.6475	-0.2610	-0.1905	-0.1472	1.0000							
lneffi	-0.0548	-0.1065	0.1312	0.1401	0.1371	1.0000						
lntlta	0.2353	0.1779	0.2866	0.1475	-0.0674	0.2077	1.0000					
covid	0.2029	0.0890	0.2841	0.2387	0.0030	-0.1755	0.0945	1.0000				
infla	0.1091	0.0859	0.4348	0.2918	-0.0404	0.0038	0.1227	0.6277	1.0000			
lntd	-0.1725	-0.4160	-0.3128	-0.1782	0.1351	-0.0536	-0.1438	-0.5017	-0.5587	1.0000		
lnta	0.1679	-0.0220	0.2626	0.6571	0.1200	0.1351	0.2058	0.1579	0.1757	-0.1347	1.0000	
lngdppc	-0.0371	-0.2939	0.1939	0.1721	0.0701	-0.0608	0.0285	0.2759	0.5794	0.3312	0.0739	1.0000

Source: Developed by the author

5.1.2 Cross-sectional dependence test

This section involves testing for cross-sectional dependence in the model. This is an essential part of choosing which unit root test to apply. When there exists a cross-sectional dependency, second generation unit root tests are the most suitable. When there is no cross-sectional dependency the first-generation tests are preferred over the other (Baltagi, 2001). The results presented in Table 7 indicate that there is no cross-sectional dependence. Therefore first-generation unit root test is applied. The first-generation test adopted are PP–Fisher chi-square and Hadri.

Table 7   Cross-sectional dependence test results

Frees' test of cross-sectional independence	0.654
Alpha	0.10 = 0.3583
Alpha	0.05 = 0.4923
Alpha	0.01 = 0.7678

Source: Developed by the authors

5.1.3 *Panel unit root test results*

This section contains the results of the panel unit root test results of all variables relevant to this study. In an econometric model as a prerequisite or starting point the stationarity of the dataset has to be tested. As no cross section dependence, was detected within the data PP–Fisher chi-square and Hadri. The first-generation unit root test adopted by the study. The main reason for using two different techniques is to arrive at a more robust conclusion which is concluded by at least two tests.

It is deduced from the results in Table 8, that the PP–Fisher chi-square panel unit root test has a null hypothesis stating that the panel series has a unit root, and the alternative hypothesis is that the panel series is stationary, whereas Hadri conducts a test whereby the null hypothesis is that the panel series is stationary against the non-stationary alternative. All variables adopted by the model are found to be stationary at first in all tests applied. The null hypothesis of unit root is rejected.

Table 8   Unit root tests results

	Level		First Difference	
Variables	*PP–Fisher chi-square (Prob)*	*Hadri (Prob)*	*PP–Fisher chi-square (Prob)*	*Hadri (Prob)*
ROA	0.0001***	0.0076***	0.0000***	0.0234**
ROE	0.9071	0.0003***	0.0453**	0.0034***
GRA	0.9594	0.0003***	0.0000***	0.0000***
GDPPC	1.0000	0.0000***	0.0031**	0.1732
GDPGR	0.9969	0.0029***	0.0109**	0.0000***
EFFI	0.1214	0.0005***	0.0001***	0.0000***
TL/TA	0.1265	0.0000***	0.0002***	0.0170**
TA	0.4637	0.0000***	0.0001***	0.1228
INFLA	1.0000	0.0000***	0.0013***	0.0000***
CAR	0.0420**	0.0006***	0.0024***	0.1241
NPL	0.2895	0.0000***	0.0209**	0.0000***
TD	0.1886	0.0000***	0.0703*	0.0010***
COVID	0.9988	0.0000***	0.0004***	0.0095***

*, ** and *** show the null hypothesis rejection at 10%, 5% and 1% significance level respectively

5.2   Results of model estimations

This section shows the results of all the estimations that are capturing different objectives that the study intends to explore and investigate. The results are as follows:

5.2.1   The impact of COVID-19 pandemic on the profitability of Turkish banks (Islamic and conventional combined)

This section focuses on the first objective of this study which is to establish the COVID-19 pandemic's impact on the combined profitability of Turkish banks involved in this study. The COVID-19 factor (as a dummy variable) is modelled among other bank specific financial ratios and macroeconomic variables in order to deduce its significance in impacting ROE (profitability) of the banks.

After conducting the Hausman test, the results show that the null hypothesis that says Random Effect is the best model fit cannot be rejected, Table 9 show estimation results of both Fixed Effect and Random Effect in order to get an inference from the two and also to allow comparisons between the two results.

Table 9   Model estimation results summary

	ROE					
	Random Effect			*Fixed Effect*		
Variable	*Coeff*	*Std err*	*Prob*	*Coeff*	*Std err*	*Prob*
ROA	0.4243829	3.088019	0.001***	2.922521	3.635383	0.005***
GRA	–0.0247862	0.0302949	0.413	–0.0290047	0.0385329	0.455
GDPPC	–0.3867437	0.6291821	0.009***	–0.1933162	0.6783046	0.007***
TL/TA	0.01506	0.0230316	0.513	0.0299516	0.0249472	0.236
TA	–0.0174612	0.0270298	0.001***	–0.0368123	0.0309726	0.000***
INFLA	0.4286718	0.2208814	0.052**	0.4253686	0.2412777	0.084**
CAR	–0.0040388	0.6945391	0.995	–0.0115716	0.8620903	0.989
NPL	–0.3731366	0.8871616	0.004***	0.2128966	1.133256	0.002***
TD	0.0205235	0.0271396	0.450	0.0254366	0.0295718	0.394
COVID	**0.0305025**	**0.0362278**	**0.400**	**–0.0225684**	**0.0374583**	**0.550**
R–squared	0.1925			0.1907		
F-statistic	9.63			1.18		
Prob (F-statistic)			0.002			0.001
Hausman test			0.8266			

*, ** and *** show the null hypothesis rejection at 10%, 5% and 1% significance level respectively.

Table 9 show estimation results of both Random effect and Fixed effect models. Despite their different set ups, the results of the two models are very close to each other. Their differences lie mostly on their respective coefficients but the significant variables are the same. According to the Random effect (which was declared the most reliable by Hausman test) model ROA (at 1%), GDPPC (at 1%), TA (at 1%), INFLA (at 5%) and

NPL (at 1%) are all statistically significant in explaining the ROE (combined profitability of Turkish banks). However, COVID which is our variable of focus is found to be statistically insignificant in influencing the ROE (combined profitability of Turkish banks). This implies that COVID-19 pandemic has no statistical impact on the profitability of Turkish Banks.

The results show that Turkish banks were not affected much by the COVID-19 pandemic, thanks to their diversified product portfolios. This enabled most of them to absorb the economic shock induced by COVID-19 pandemic. Both types of banks (conventional and participation) were able to provide valuable banking services continuously during the crisis with minimal interruptions and disturbances.

5.2.2   The impact of COVID-9 pandemic on the operational efficiency of Turkish banks (Islamic and conventional combined)

The second objective of this study is to establish the impact of COVID 19 pandemic on the operational efficiency of the Turkish banks. The COVID-19 pandemic effect (as a dummy variable) is modelled among other banks' specific financial ratios and macroeconomic variables in order to ascertain its significance in influencing EFFI (operational efficiency) volatilities. Below are estimation results of both Random effect and fixed Effect.

Table 10 show estimation results of both Random effect and Fixed effect models. Again despite their different set ups, the results of the two models are very close to each other. According to the Random effect (which was declared the most reliable by Hausman test) model ROA (at 1%), INFLA (at 1%), TL/TA (1%) CAR (at 1%) are all statistically significant in explaining the ROE (profitability of Turkish banks combined). As for our focus variable COVID it is found to be statistically significant at 5% in influencing the volatilities in EFFI (operational efficiency of Turkish banks combined). This implies that COVID-19 pandemic has a negative impact on the operational efficiency of Turkish banks.

In order to counter the spread of the disease during the COVID-19 pandemic, banks were only allowed a specified number of customers at bank counters and within their premises. This development limited the interactions between the banking staff and their clients. Moreover, many of their personnel were forced to work from home which was a new tradition to the banking ecosystem and was not effective due to a plethora of reasons.

Some banks digitalised their operations, but this was not sufficient as many clients still could not access banking services. This means that fewer than normal banking transactions were executed. Fewer transactions translate into less operational revenue. As operational revenue decreased, the operational expenditures increased, and this decreased the operational efficiency. This decrease came as a direct result of the economic shock induced by the COVID-19 pandemic.

5.2.3   Comparing the effect of COVID-19 pandemic on the profitability of Islamic banks and conventional banks (separated)

Another objective of this study is to compare the impact of COVID-19 pandemic on the profitability of Islamic banks and conventional banks. These bank categories are analysed independently and separately in order to capture the impact of the pandemic on the two sets of banks.

Table 10 Model estimation results summary

	EFFI					
	Random effect			Fixed effect		
Variable	Coeff	Std err	Prob	Coeff	Std err	Prob
ROA	6.048521	6.378461	0.001***	3.721181	7.048107	0.000***
GRA	0.0792182	0.0645063	0.219	0.0207796	0.0757075	0.785
GDPPC	−1.503599	1.215364	0.216	−0.7192312	1.295628	0.581
TL/TA	0.1251816	0.0466562	0.007***	0.1155609	0.049275	0.023**
TA	0.0026773	0.0121611	0.826	0.0230249	0.0251341	0.92
INFLA	0.653754	0.4442029	0.002***	0.3693136	0.4748362	0.000***
CAR	−1.42877	1.476949	0.000***	−0.2622687	1.702781	0.000***
NPL	−0.0587485	1.9022	0.975	0.7876111	2.203094	0.722
COVID	**−0.1727606**	**0.0719602**	**0.016****	**−0.1939721**	**0.0739813**	**0.011****
R–squared	0.2111			0.0958		
F-statistic	15.91			1.75		
Prob (F-statistic)			0.1023			0.1023
Hausman test			0.8133			

*, ** and *** show the null hypothesis rejection at 10%, 5% and 10 significance level respectively.

Table 11 Model estimation results summary

	ROE	
	Coefficients	
Variable	Islamic Banks	Conventional Banks
ROA	7.820023***	1.458515**
GRA	−0.0144421	0.0328052
GDPPC	−0.3505557***	−0.0013827
TL/TA	0.0286813	−0.1208458***
TA	0.0165804	−0.1249144
INFLA	0.0285679	0.4422972
CAR	−0.0220423	−0.545708
NPL	−0.5431137**	−0.807552**
TD	0.0106057	0.1186342
COVID	**−0.0101728**	**−0.047372**
R-squared	0.2246	0.1872
F-statistic	18.18	5.53
Prob (F-statistic)	0.0000***	0.011**
Hausman test	0.0000	0.8618

*, ** and *** show the null hypothesis rejection at 10%, 5% and 1% significance level respectively

The results above in Table 11 show two estimations on profitability of both Islamic and conventional banks. The Hausman test has declared Fixed effect as the most reliable model for Islamic banks. For conventional banks, Random effect was the most reliable. However, the results were compiled accordingly.

According to the Fixed effect model on Islamic banks ROA (at 5%), TL/TA (at 1%) and NPL (at 5%) are all statistically significant in explaining the ROE (profitability of Turkish Islamic banks). However, COVID (which is our variable of interest) is found to be statistically insignificant in influencing the ROE. This implies that COVID-19 pandemic has no impact on the profitability of Turkish Islamic banks.

As for the Random effect model on conventional banks, ROA (at 1%), GDPPC (at 1%), TA (at 1%), and NPL (at 5%) are all statistically significant in explaining the ROE (profitability of Turkish conventional banks). However, COVID which is our focus variable was found to be statistically insignificant in influencing the ROE. This implies that COVID-19 pandemic on the profitability of Turkish conventional banks could not be established.

From these results it can be concluded that the COVID-19 pandemic has no significant impact on the profitability of either Turkish Islamic or conventional banks' profitability.

5.2.4   Comparing the effect of COVID-19 pandemic on operational efficiency of Islamic banks and conventional banks (separated)

The final objective of this study is to compare the impact of COVID-19 pandemic operational efficiency of Islamic banks and conventional banks. Once again, as presented in Table 12, these bank categories are analysed independently and separately in order to capture the impact of the pandemic in each bank class.

Table 12   Model estimation results summary

	EFFI	
	Coefficients	
Variable	Islamic Banks	Conventional Banks
ROA	–4.99571	9.790915**
GRA	0.1880777***	0.2216822
GDPPC	–0.8325871	–2.077173***
TL/TA	0.1006058**	0.1764103
TA	0.0063915	0.0181099
INFLA	1.994071***	–0.5134233**
CAR	–4.589957***	–1.207193
NPL	1.008864	–0.0228833
COVID	**–0.1770487****	**–0.1879134**
R-squared	0.5594	0.3787
F-statistic	31.74	15.24
Prob (F-statistic)	0.0002***	0.0846*
Hausman test	0.9391	0.856

The results above show results of two estimations on operational efficiency of both Islamic and conventional banks. The Hausman test has declared Random Effect as the most reliable model for both Islamic and conventional bank categories and the results are compelled accordingly.

According to the results regarding Islamic banks, GRA (at 1%), TL/TA (at 5%), INFLA (at 1%) and CAR (at 5%) are all statistically significant in explaining the EFFI (operational efficiency of Turkish Islamic banks). Moreover, COVID which is our variable of interest is found to be statistically significant at 5% in influencing the operational efficiency of Islamic banks. This implies that COVID-19 pandemic has a negative impact on the operational efficiency of Turkish Islamic banks.

As for the conventional banks, the results show that ROA (at %), GDPPC (at 1%), and INFLA (at 1%) are all statistically significant in explaining the EFFI (operational efficiency of Turkish Islamic banks). However, as for COVID, which is our focus variable, it is found to be statistically insignificant in influencing the EFFI (operational efficiency). This implies that the impact of COVID-19 on the operational efficiency of Turkish conventional banks could not be established. As such, it seems that the pandemic had a more devastating effect on Islamic banks than the conventional ones. This is mainly due to the age factor. Most of the Islamic banks in this study were exposed to the pandemic whist they were in their infancy. For instance, Vakif Katilim and Ziraat Katilim were founded only three years before the pandemic. In contrast, the majority of conventional banks were already well-established when COVID-19 pandemic started, and they were able to shrug off its shock. A summary of the estimation models is provided in the following Table 13.

Table 13   Summary of estimation models

	Research objective	*Result*
All banks Combined	The impact of COVID-19 pandemic on the combined profitability of Turkish banks	COVID-19 pandemic has no impact on the profitability of Turkish banks
	The impact of COVID-9 pandemic on the combined operational efficiency of Turkish banks)	COVID-19 pandemic has a negative impact on the operational efficiency of Turkish banks
Banks Separately analysed	Comparing the effect of COVID-19 pandemic on the profitability of Islamic banks and conventional Banks	COVID-19 pandemic has no significant impact in either Turkish Islamic or conventional banks' profitability
	Comparing the effect of COVID 19 pandemic on operational efficiency of Islamic banks and conventional Banks.	COVID-19 pandemic has no impact on the operational efficiency of Turkish conventional banks, but it has a significant impact on Islamic banks

6   Conclusion, implications, and discussion

The first question of this study revolves around the effect of the pandemic on the profitability of Turkish banks. Ten banks have been included in the study. Of these, five banks are from the participation (Islamic) sector and the other five from conventional

sector. These ten banks control over 75% of the market share in the Turkish banking sector. The second question is related to the effect of the pandemic on the operational efficiency of these two bank categories. Once more, the analysis is done on the banks' sets combined and separately.

Depending on the results from the Hausman test panel data with Random and Fixed effects is adopted as the analytical methodology of the study. Among other financial ratios and macroeconomic variables, the significance of COVID-19 pandemic in influencing both profitability and operational efficiency of Turkish banks is empirically tested. Firstly, the results indicate that the COVID-19 pandemic had no impact on the profitability of the Turkish banks (Islamic and conventional combined). Thanks to their diversified product portfolios and thanks to their flexibility in adoption of digital banking systems, the pandemic has a minimal effect on their profitability.

Moreover, the results of this study confirm the negative impact of the pandemic on the operational efficiency of both Turkish conventional and participation (Islamic) banks. These results imply that the pandemic had a more pernicious effect on the banks' operational efficiency rather than their profitability. This was mostly due to specific factors including the ban of face-to-face interactions between the bank personnel and their clients. The results show that banks during periods of pandemic must employ mechanism that improve their efficiency. These include ways of enhancing customer service, regular training of employees, effective streamline communications, employee retention and elimination of bottlenecks.

The final objective of the study is comparing the effect of the pandemic on each bank category between the Islamic and conventional banks. According to the results, the COVID-19 pandemic has no impact on the profitability of the Islamic banks as well as that of conventional banks. These results are in line with the results of the analysis conducted on the two sets of banks combined. However, as for the operational efficiency, its impact was only detected on Islamic banks, and it was negative. This shows that the pandemic had a more devastating effect on the operational efficiency of Islamic banks. This is mainly due to the age aspect of most of the Islamic banks. Most of these banks were exposed to the pandemic whilst they were in their infancy. For instance, Vakif Katilim and Ziraat Katilim were founded only three years before the pandemic.

The results of this study imply that having a diversified product portfolio is an important instrument to protect profitability against economic shocks. This has helped Turkish banks absorb and withstand any negative impact induced by the COVID-19 pandemic. Moreover, some Turkish banks have opened numerous foreign branches overseas, and this has been effective in them spreading risk across different economies.

As previously mentioned, government restrictions on face-to-face interactions with customers negatively impacted banks' operational efficiency. This shows how important it is for banks to have alternative interaction networks with customers such as digitalisation of services. In preparation for future pandemics banks should accelerate their digitalisation programs.

Considering the above discussion, the existing literature has provided mixed findings related to the effects of the recent pandemic on the performance of banks. The findings of this study are in line with some studies in the literature but in conflict with the findings of some others. Studies of Rehman et al. (2021), Yasser et al. (2021), Almonifi et al. (2021), Akkas and Al Samman (2021), and finally, Katusiime (2021), are all considered among the first category that conforms with the findings of this study. On the other hand, the findings of studies of Barua and Barua (2021), Arafat et al. (2021), Fajri et al. (2022), and

Sohibien at al. (2022), are all in conflict with the findings of this study. with respect to the impact of the pandemic on the performance and profitability of banks. In a nutshell, while a general agreement could be form on the negative impact on banking sector, a consensus on the specific impact on performance and profitability of banks is yet to be reached. This, in turn, could open the door widely for future research to explore the topic further, as will be more illuminated in the next section.

7 Research limitations and future directions

It must be acknowledged that this study has some limitations from various aspects including research population, sample size, and time span of the study. Therefore, a considerable research gap still exists for future research to be conducted. In this study, only 10 banks (Islamic and conventional) are covered, while future research can expand the population to include many more banks in Turkey or outside Turkey. Furthermore, the period of the study has covered only seven years, from 2015 to 2021, whereas future research can extend the period to cover a longer period which may help to give a clearer picture of the impact of COVID19 on banks performance, especially in the years after the pandemic. Lastly, this study is restricted to explore the pandemic impact on the profitability and operational efficiency of Turkish banks, though future research may look into the impact of the pandemic on other aspects of banks and banking sector such as productivity, customer satisfaction, financial soundness, volatility of share prices, banks' responses to COVID-19 development, and fintech embracement, among other aspects.

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