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The impact of new millennium crises on the power of Islamic banks in deposit markets

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Abstract
We investigate the impact of three crises on the power of Islamic banks in deposit markets: the Global Financial Crisis, 2007–2009 (GFC), the Arab Spring political crisis, 2011–2013, and the COVID-19 health crisis, 2020–2022. Applying difference-in-difference (DID) and GMM techniques to panel data for 2004–2022, we find that the power of Islamic banks increased in countries most affected by the GFC, but only for oil-exporters, as elevated oil prices inflated deposited liquidity. In contrast to the GFC, the market power of countries highly affected by the Arab Spring decreased as depositors withdrew *en masse*. For these countries, oil export status was irrelevant, and whilst government integrity is significant, it accounts for a small amount of heterogeneity in the country-level cross-section due to widely held public attitudes towards institutions during the crisis. For COVID-19, the market power of Islamic banks initially increased at the outset of the pandemic due to a surge in precautionary deposits, but later decreased due to economic activity constraints. The stringency of lockdowns had little effect on market power in countries that suffered the highest COVID-19 death rates. These and other findings specific to each crisis provide a rich array of private and public policy implications relevant to crises of different types for bank liquidity crisis management, financial conduct policies, and state-backed lending stimulus packages.

KEYWORDS
Arab Spring, COVID-19, deposits, global financial crisis, Islamic banking, market power

1 | INTRODUCTION

Market power captures competitive advantages related to revenue and cost structures (White, 2013). In banks, this includes the pricing of loans, and the pricing of deposits. Whilst prior studies test the relationship between bank market power and economic outcomes such as bank stability (e.g., Beck et al., 2006; Beck, De Jonghe, & Schepens, 2013; Berger et al., 2009; Boyd & De Nicolo, 2005; Carletti & Vives, 2009; Keeley, 1990) and bank efficiency (e.g., Ariss, 2010; Berger & Hannan, 1998; Delis & Tsionas, 2009), few ask questions of crises in particular. We ask: how does the provenance of a crisis, for example, banking versus political versus health, determine its impact on the market power of banks, and what happens to the power of banks in deposit markets during a crisis?

These questions matter to a diverse array of private and public policies. For example, banks need to price deposits to manage liquidity stress during crises, and their responses depend on how market power changes. Financial conduct authorities need to anticipate changes to the distribution of market power caused by a crisis. If a crisis redistributes market power between banks, or confers excessive power to banks at the expense of consumers, then anti-trust and/or financial conduct policies may become ineffective, for example, in maintaining competitive markets. The size and type of government interventions to reinstate bank lending after a crisis also motivate our directing market power questions to crises in particular; the expected effects of alternative government interventions, for example, subsidized funding to banks, state-guaranteed lending, etc., are informed by how each alternative (used in isolation or in combination) elicits the desired response from banks, which in turn, depends on how a particular type of crisis alters their market power.

The objective of this paper is to understand the impact of new millennium crises, that is, the global financial crisis, 2007–2009 (GFC), the Arab Spring political crisis, 2011–2013, and the COVID-19 pandemic, 2020–2022, on the power of Islamic banks in the deposit markets. Each of these crises impacted deposit flows in both conventional and Islamic banks in countries where these banks compete alongside each other (in so-called "dual-banking" systems).[1] Whilst evaluating the impact of each of these crises on the deposit market power of both bank types is important, this study focuses on Islamic bank deposits for various reasons. First, these banks have grown rapidly in size and number over the last two decades, acquiring systemic significance in 15 countries out of 72 (ICD-Refinitive, 2020; IFSB, 2021).[2] The emergent systemic importance of Islamic banks has created a need to understand their market power during crises, not least because market power influences bank stability (ibid) in ways that may ameliorate or exacerbate the effects of a crisis.

Second, whilst Islamic banks are geographically dispersed, they are more highly concentrated in countries impacted by the Arab Spring than conventional banks (e.g., in MENA countries). By focussing on Islamic banks, the Arab Spring political crisis—which has scarcely been studied—is brought into view. Including the Arab Spring also permits a fuller exploration of the link between the provenance of a crisis and its impact on market power.

Third, the power of banks in the deposit markets affects their ability to make loans (e.g., Li et al., 2023), and the funding sources of Islamic banks are particularly concentrated in deposits (Baldwin et al., 2019). Thus, it is important to understand the deposit market power of Islamic banks during crises, when the provision of credit by banks may be substantially rationed or cut-off altogether.

Fourth, each crisis induced dissimilar changes to Islamic bank deposits. Stability reports published by the Islamic Financial Services Board (IFSB) show that the CAGR for Islamic bank deposits on a global basis is 17.7% for the GFC (IFSB, 2013), 16.1% for the Arab Spring (IFSB, 2015), and 8.4% for the Covid pandemic (calculated from year-on-year statistics in IFSB, 2021; IFSB, 2022; IFSB, 2023). Whilst the GFC and Arab Spring statistics appear comparable, bank runs during the Arab Spring in highly affected countries (Gobat & Kostial, 2016; Ouedraogo et al., 2022) imply that an Islamic deposit CAGR of 16.1% for the Arab Spring masks widely dissimilar deposit inflows in some countries, versus deposit outflows in others. These deposit changes further imply that changes to deposit market power may also be dissimilar in each crisis, and importantly, depend on crisis provenance. However, this dependence is not reported in the literature.

Islamic banks predominantly raise their funds using *participatory* deposits (Arshed & Kalim, 2021; Baldwin & Alhalboni, 2020). These deposits have no conventional equivalent. This is because participatory depositors earn returns by investing in assets managed on their behalf by the bank without the bank being obliged to guarantee their returns or repay their principal. This leads to potentially uncapped depositors' returns, as well as other advantages.[3] For its participatory depositors' funds' management role, the bank receives a share of positive asset returns. Any investment losses vest entirely with participatory depositors.

It is notable that studies which isolate the power of banks in deposit markets using non-structural measures (e.g., Bresnahan, 1982; Lau, 1982) are rare (Bikker, 2003 is one). We contribute to this section of the literature by invoking the non-structural measure developed for participatory deposits in Baldwin and Alhalboni (2023).[4] This measure addresses a fundamental feature of participatory deposits that distinguishes them from conventional deposits, in that cash flows paid to participatory depositors represent a distribution of returns from managed assets and not an expense for the bank (Baldwin & Alhalboni, 2023). This means that our study is to the exclusion of conventional banks, as it is not possible to measure their deposit market power on a comparable basis.

To evaluate the market power of banks at a country-level for each crisis, we use a sample of 144 Islamic banks in 32 countries for the period 2004–2022. We employ DID and two-step system GMM estimations with crisis severity indicators[5] to explore how market power changes in countries highly affected by each crisis versus countries which are less affected. We also investigate macroeconomic and government-related factors that explain cross-sectional heterogeneity in highly affected countries during each crisis.

Our results find evidence of an increase in the market power of Islamic banks in countries highly impacted by the GFC. However, this was only for oil-exporters; the market power of Islamic banks decreased in highly affected countries with no oil export dependence. This result shows that the destabilizing effects of the GFC did not translate to a loss in the market power of Islamic banks in oil exporting countries. This is because higher oil prices during the GFC increased liquidity channelled to deposits, allowing banks in these countries to reduce depositors' profit rates without inducing deposit withdrawals (Hesse & Poghosyan, 2016; Khandelwal et al., 2016). In contrast, for Islamic banks in highly affected countries without oil dependence, market power decreased as banks elevated profit rates paid to depositors to attract/retain deposits. These findings challenge a widespread belief that Islamic banks were more resilient than conventional banks to the GFC's *direct* effects (e.g., Alexakis et al., 2019; Beck, Demirgüç-Kunt, & Merrouche, 2013). This assertion is rooted in the strength of their liquidity and capital positions relative to conventional banks, and to a self-imposed abstinence from asset-backed securities ("toxic" assets) having incurred substantial write-downs during the GFC.[6] Contrary to being insulated, Islamic banks in highly affected countries with low oil export dependence witnessed an erosion of their market power during the GFC.

Results for the Arab Spring contrast sharply with the GFC; the deposit power of Islamic banks decreased significantly in highly affected countries.[7] Moreover, unlike the GFC, the impact of the Arab Spring on all highly affected countries was similar, with oil export status being irrelevant, and cross-sectional heterogeneity due to government integrity being significant but small. The Arab Spring was a crisis of confidence of civilians in their political and financial institutions due to concerns over entrenched corruption. This crisis consistently impacted Islamic banks in all highly affected countries; depositors withdrew managed capital *en masse* from the banking system. Large-scale withdrawals of depositors' funds reduced the market power of Islamic banks, incentivizing them to increase profit rates paid to depositors to stem deposit outflows. The deterioration of market power during the Arab Spring is important; it shows that whilst highly affected oil-exporting countries witnessed increased market power during the GFC, their oil-exporting status provides no enduring advantage to maintain market power during crises in general. The contrasting impacts of the GFC versus Arab Spring also evidence the potential of political crises to result in diametrically opposite effects on market power relative to financial crises.

Our results for COVID-19 show that in highly affected countries during the pandemic, market power first increased and then decreased. The initial increase can be traced to a surge in deposit funds due to precautionary motives, which allowed Islamic banks to maintain or lower profit rates. However, as repeated lockdowns reduced economic output, earnings pressure on banks increased due to higher loan non-performance and reduced business opportunities. This lowered market power because it incentivized banks to boost current period earnings by lowering deposit returns below their long-term value-maximizing rate. Our study also reveals that despite different degrees of lockdown severity and government-imposed measures to manage the pandemic across highly impacted countries, these factors, along with oil dependency, contribute negligibly to the variances observed in the pandemic's impact on market power. Similar to the limited role of government integrity during the Arab Spring, the effects of COVID-19 also appear unaffected by the varying severity of restrictions among highly affected countries.

Our paper makes several contributions. This is the first study to isolate the power of Islamic banks in participatory deposit markets perse, and during crises in particular. Our findings challenge previous research that Islamic banks are more insulated from the direct effects of crises relative to conventional banks (ibid). Moreover, the vulnerability of Islamic banks to weakened market power during crises fundamentally depends on crisis provenance. This study also provides a clear understanding of what happens to the market power of Islamic banks *during* a crisis, unlike other market power studies that are silent on this aspect. Ours is also the first study to evaluate how and why the market power of Islamic banks changed during the Arab Spring, a political crisis that affected many Islamic banks. Lastly, we make several private and public policy implications drawn from our findings that are valuable to bank liquidity crisis management, financial conduct policies, and state-backed lending stimulus packages.

The rest of the paper is as follows. Section 2 provides a literature review and develops testable hypotheses. Section 3 details data and variables. Section 4 explains our econometric methodology. Section 5 presents results. Section 6 explains theoretical implications. Section 7 concludes with policy implications.

2 | LITERATURE REVIEW AND HYPOTHESIS DEVELOPMENT

2.1 | Global financial crisis

From a theoretical perspective, the effect of banking crises on market power is unclear (Cubillas & Suárez, 2018). After the onset of a banking crisis, banks (at least initially) lower risk-taking by investing in less risky projects with smaller margins, which reduces their market power (Detragiache et al., 2000). This effect was reinforced during the GFC by the moral suasion of governments to encourage banks to continue lending to the real economy at lower rates to ease the debt servicing costs of obligor firms (Han & Melecky, 2013). For state-assisted banks, market power was further lowered by government pressure to recognize loan losses (Igan et al., 2020). Concerning deposits, downward pressure on market power also resulted from banks raising deposit rates to stem deposit outflows (Acharya & Mora, 2015; Ivashina & Scharfstein, 2010).

In contrast to the above, the GFC also induced effects that increased the market power of banks. Due to enhanced regulatory requirements, the GFC reduced competition by deterring new entrants from establishing banking operations (Igan et al., 2021). Banking sector consolidation also lowered competition, as failed banks were either liquidated, merged, or acquired (Laeven & Valencia, 2008; Wheelock, 2011). This effect of the GFC is corroborated by Berger (1995), who finds that banks which survive a crisis have more market power (than before) due to greater market share, higher margins and improved cost efficiencies. Indeed, banks that survived the GFC implemented extensive cost-cutting to make up for lost income (Cubillas & Suárez, 2013). Surviving banks also benefitted from reduced funding costs due to government support, which included state loans at reduced rates made directly to banks to alleviate the credit crunch, and state guarantees in favour of bank creditors, which lowered credit risk premiums (Han & Melecky, 2013).

The GFC impacted the power of Islamic banks in deposit markets through several channels. In accordance with the market power-increasing effect of consolidation (Berger, 1995; Laeven & Valencia, 2008; Wheelock, 2011), a significant increase in both the frequency and scale of mergers and acquisitions among Islamic banks during the GFC (see Baldwin & Alhalboni, 2020) increased the deposit market power of banks that survived. The GFC also motivated regulatory enhancements that led to reduced competition and increased market power (Igan et al., 2021). However, Islamic banks also faced deposit withdrawals (Farooq & Zaheer, 2015). Similar to the response of conventional banks (Acharya & Mora, 2015; Ivashina & Scharfstein, 2010), a spike in withdrawal risk incentivized Islamic banks to increase deposit returns, thereby lowering market power.

The impact of loan losses[8] on deposit market power during the GFC is ambiguous. Participatory depositors' assets managed by an Islamic bank comprise receivables that are commingled and jointly managed with the bank's own assets. Depositors' assets therefore share the same performance characteristics as loans owned by the bank. In the early stages of the GFC, specifically from 2007 to 2008, Islamic banks showed greater resilience compared to conventional banks, attributed to superior asset quality and stronger capitalization (Beck, Demirgüç-Kunt, & Merrouche, 2013). However, this scenario changed in 2009, especially among larger Islamic banks, as inadequate risk management practices and inefficiencies in cost management emerged when the crisis extended into the real economy (Cihak & Hesse, 2010; Olson & Zoubi, 2017). Given, the pressure on Islamic banks to stem deposit withdrawals (Farooq & Zaheer, 2015), we conjecture it is unlikely that higher loan losses on managed assets during the GFC (albeit lower in Islamic banks than in conventional banks, Baele et al., 2014) would have been passed on to depositors. This assertion is further supported by the customary use of smoothing reserves by Islamic banks to make up return shortfalls on managed assets to align cash returns paid to participatory depositors with conventional deposit rate benchmarks (Baldwin et al., 2019; Chong & Liu, 2009).

Overall, given the ambiguous net impact of the GFC on deposit market power, the following hypothesis is examined:

> **Hypothesis 1.** The GFC had no overall impact on the power of Islamic banks in deposit markets in highly affected countries.

2.2 | The Arab Spring

The Arab Spring was a period of political upheaval in which public uprisings and protests against the governments of several countries, including Tunisia, Egypt, Bahrain, Libya, and Yemen, created political instability. In some instances, for example, Libya and Yemen, these uprisings led to the overthrow of autocratic political regimes (Chau et al., 2014). Despite the absence of political reform or regime change in countries like Syria, the consequences of the Arab Spring crisis still resulted in significant financial instability (Elfeituri, 2022). However, the financial resilience of Arab countries to the crisis also depended on their wealth levels (Schlumberger & Matzke, 2012). For example, oil-rich countries such as the United Arab Emirates and Saudi Arabia witnessed a decline in stock markets but not a rapid outflow of investment capital.

Bank market power tends to be higher in autocratic regimes compared to democracies, as evidenced by studies such as Lavezzolo (2020) and Agoraki et al. (2020). Autocratic regimes utilize state-owned banks to secure political backing from influential factions who might otherwise challenge their authority. This is achieved through practices like directing credit towards loyal supporters, as discussed by Sapienza (2004) and Khwaja and Mian (2005). Private banks are also valuable to autocratic regimes due to various corrupt practices that enable the unjust enrichment of powerful individuals, for example, weak/corrupt enforcement of financial regulations and abuse of the legal framework (Ansani & Daniele, 2012). Indeed, the political value attributed by autocratic regimes to banks underpins their propensity to provide bailouts during financial distress (Rosas, 2006). Moreover, these administrations often enforce limitations on the entry of banking institutions into the market, whether they are foreign-owned or domestic. This strategy serves to weaken competition and raise the market power of incumbents, as highlighted by Keeley (1990). The dissimilar market power held by banks in each type of political system implies that a transition away from autocracy towards democracy would reduce the market power of banks.

Banks are directly affected by political uncertainty[9] in both making loans and taking deposits. For example, companies delay their investment decisions until political uncertainties have been resolved (Bloom et al., 2007), resulting in a decrease in new loan activities. For deposits in particular during the Arab Spring, concerns over institutional corruption and capital expropriation led to withdrawals (Ghosh, 2016). These withdrawals would have dramatically impacted the overall access of banks to funds during the Arab Spring. This is because under-developed capital markets in countries affected by the crisis (Ariss, 2010) create an overreliance on deposits. Political instability also suppresses GDP growth and can lead to soaring inflation, which drives away domestic and foreign investment, further reducing liquidity supplied to banks (Noutary & Luçon, 2013). In response to the outflow of deposits in countries affected by the Arab Spring, we expect that Islamic banks increased deposit rates to prevent further withdrawals, thereby reducing their deposit market power.

Based on the market power-reducing effects of transition away from autocracy and the expected response of banks to deposit outflows, the following hypothesis is tested:

> **Hypothesis 2.** The Arab Spring negatively impacted the power of Islamic banks in deposit markets in highly affected countries.

2.3 | COVID-19

The pandemic during 2020–2022 far exceeded the geographical reach of its most recent comparable antecedent, the SARS outbreak in 2003 (Ceylan & Ozkan, 2020), creating a considerably larger economic fallout by comparison (Polyzos et al., 2021). While SARS mainly disturbed the tourism sector, the COVID-19 pandemic interrupted global economic activities due to widespread lockdowns aimed at restricting its spread (Fotiadis et al., 2021). Given the absence of literature examining COVID-19's impact on bank market power and the limited applicability of SARS research to COVID-19 due to distinct economic consequences, this review examines potential effects of COVID-19 on bank market power due to bank deregulation during the pandemic, loan losses, and shifts in deposit flows.

During the COVID-19 pandemic, central banks[10] temporarily relaxed capital constraints to stimulate their respective economies (Haas & Neely, 2020). Deregulating banks by loosening capital requirements increases the availability of funds for consumer and corporate loans (Laeven, 2019) and reduces market power by increasing competition (Valverde et al., 2003). Banks also experienced higher credit losses, further reducing their market power (Carletti et al., 2020; Kozak, 2021).

An important consequence of the pandemic was a surge in both consumer and wholesale deposits (Acharya & Steffen, 2020a; Acharya & Steffen, 2020b; Levine et al., 2021; Li et al., 2020). Possible causes include: an increase in precautionary savings as concerns about economic disruptions and unemployment deepened (Acharya & Steffen, 2020a; Acharya & Steffen, 2020b; Levine et al., 2021); the reallocation of funds from investments due to uncertainty surrounding the extent of the pandemic (Kozak, 2021); and expansionary monetary and fiscal policies (Agarwal et al., 2020). A surge in deposits allows banks to reduce deposit rates, thereby increasing their power in deposit markets (Baldwin & Alhalboni, 2023). However, during the pandemic, firms also accessed pre-existing credit lines in a bid to secure immediate financing as economies rapidly slowed (Acharya & Steffen, 2020a; Acharya & Steffen, 2020b; Li et al., 2020). In response to these drawdowns, banks, particularly the largest ones, raised deposit rates (Berger & Demirgüç-Kunt, 2021; Levine et al., 2021), thereby potentially diminishing their market power.

Since the overall effect on deposit market power of the aforementioned considerations is ambiguous, we test the following hypothesis:

> **Hypothesis 3.** The COVID-19 pandemic had no overall impact on the power of Islamic banks in deposit markets in highly affected countries.

2.4 | Distinction between this study and prior related literature

Three main aspects distinguish our study from prior research on bank market power. First, our focus is the particular impact of crises on the market power of banks. Whilst prior studies include crisis periods within their sample data, they do not isolate their specific effects. Instead, the effects of crises falling within their sample periods are typically combined with those of non-crisis periods.[11]

Second, previous studies apply holistic measures to investigate bank market power, such as the Lerner Index, which combine the power of banks in the markets for loans and deposits. In contrast, we investigate *only* the power of Islamic banks in participatory deposit markets, using a measure specific to Islamic banks (see Baldwin & Alhalboni, 2023). This approach is essential to formulate effective competition and micro-prudential regulations (among others), not least because participatory deposits comprise most Islamic banks' funds (Baldwin et al., 2019).

A third distinction concerns the connection between bank stability and market power. This literature polarizes between two schools of thought, namely, "competition-stability" and "competition-fragility".[12] Our study is distinct from this literature for the following reason. If market power intermediates the impact of crises on bank stability, that is, if crises impact market power, and market power impacts bank stability, then our study concerns the former effect, whilst the competition-stability/fragility literature concerns the latter. However, if crises impact bank stability directly, that is, market power has no intermediary/moderating role—which is the case for banking crises by definition—then our study is still distinct because it explores causality in the opposite direction. In other words, this study concerns the impact (of crises) *on* market power, whereas the competition-stability/fragility literature concerns the impact *of* market power (on bank stability).[13]

3 | DATA AND VARIABLES

Financial statements are from LSEG, Fitch Connect, and BankFocus databases. If data is duplicated, Fitch Connect takes precedence. Conventional bank "Islamic windows" were excluded. Only banks with data available three years before and during each crisis were included. We also exclude banks for a specific interval if any variables needed to calculate market power, or to run our estimations, are unavailable. Rigorous checks for reporting errors or inconsistencies were conducted. The final sample comprises 144 Islamic banks across 32 countries from 2004 to 2022, thereby covering 2007–2009 (GFC), 2011–2013 (Arab Spring), and 2020–2022 (COVID-19). This time span permits examining pre-crisis dynamics in the three years preceding the GFC starting 2004, and analysis of the COVID-19 crisis ending in 2022. Our sample bank and country distributions are shown in Appendix A, Table A1. Our control variables and data sources are in Table 1:

Summary statistics for each of these variables are provided in Appendix B.

4 | METHODOLOGY

Our empirical analyses employ both cross-sectional and time-series variations in the exposure of banks to crises: the former reflects cross-country variations in the effects of crises on banks' market power, whilst the latter reflects differences in market power during crises compared to normal times. Our estimations evaluate the overall effect of crises at a country level.

4.1 | Baseline model

Our baseline model first tests the impact of crises by comparing market power during each crisis with the period just before. We define crisis and pre-crisis periods by following (among others) Kroszner et al. (2007), Dell'Ariccia et al. (2008) and Fernández et al. (2013). Defining a precise end to a crisis period can be difficult; hence, we define each crisis as spanning 3 years, encompassing years t, $t+1$, and $t+2$, where t is the first year of the crisis. Similarly, the pre-crisis period

TABLE 1 Variable descriptions.

Variable	Description	Source
Panel A. Main variable		
Market power	One divided by the percentage of the absolute deviation of the actual profit-sharing ratio from the optimal profit-sharing ratio (Baldwin & Alhalboni, 2023).	Author calculation Input data: Fitch, LSEG and BankFocus
Panel B. Bank-level controls		
Deposit growth rate	Deposit volume growth rate p.a. aggregated across all tenors. See Baldwin and Alhalboni (2023).	Fitch, LSEG and BankFocus
Inefficiency	Non-interest expenses to the total assets. See Berger (1995).	Fitch, LSEG and BankFocus
Diversification	Non-interest income to total income. See Valverde and Fernández (2005), De Guevara and Maudos (2007), Amidu and Wolfe (2013) and Alexakis and Samantas (2020).	Fitch, LSEG and BankFocus
Capitalization	Total equity to total assets. See Berger et al. (2009) and Delis et al. (2016).	Fitch, LSEG and BankFocus
Revenue growth	Total growth in revenue p.a. See Cubillas and Suárez (2013).	Fitch, LSEG and BankFocus
Bank size	Natural logarithm of total bank assets. See Bikker and Bos (2005) and De Guevara et al. (2005).	Fitch, LSEG and BankFocus
Liquidity	Liquid assets to total assets. See Acharya and Viswanathan (2011) and Nguyen et al. (2017).	Fitch, LSEG and BankFocus
Credit risk	Gross loans to total assets. See Berger et al. (2009).	Fitch, LSEG and BankFocus
Panel C. Macroeconomic-level controls		
GDP	The growth rate of GDP per capita p.a. See Angelini and Cetorelli (2003) and Kusi et al. (2022).	DataStream
Inflation rate	Percentage change in Consumer Price Index (CPI). See Angelini and Cetorelli (2003) and Demirgüç-Kunt and Huizinga (2004).	DataStream
Panel D. Market-level controls		
Financial freedom	This index assesses the level of security and the degree of financial institutions' independence from governmental influence. See Alexakis and Samantas (2020).	Heritage foundation
Bank market concentration	Proportion of total bank assets held in each country by the top five largest commercial banks. See De Guevara and Maudos (2007), Fungáčová et al. (2010) and Anzoátegui et al. (2012).	World Bank's financial structure dataset
Financial development	Private credit of deposit money banks and other financial institutions to GDP. See Rajan and Zingales (1998).	World Bank's financial structure dataset
Panel E. Institutional quality, bank regulatory and supervisory-level controls		
KKZ index	Average value of 6 governance indicators to proxy institutional quality. These 6 indicators are: Voice and Accountability; Political Stability and Absence of Violence; Government Effectiveness; Regulatory Quality; Rule of Law, and Control of Corruption. See Agoraki et al. (2020).	The World Bank institute's governance group
Activity restrictions	An indicator based on assigning a numerical value to the level of restrictions in 4 bank activities: securities-related activities, insurance, property investing, and owning/controlling non-financial firms. See Claessens and Laeven (2004) and Fonseca and González (2010).	World Bank's regulation and supervision database

(Continues)

TABLE 1 (Continued)

Variable	Description	Source
Barriers to entry	An indicator derived from 8 different types of information required of banking licence applicants. See Keeley (1990) and Claessens and Laeven (2004).	World Bank regulation and supervision database
Barriers to foreign entry	An indicator derived from the incidence of foreign bank ownership of domestic banks using 4 criteria. See Delis et al. (2016), Claessens and Van Horen (2014), Alexakis and Samantas (2020) and Yildirim et al. (2021).	World Bank's regulation and supervision database
Capital regulation	An indicator based on 3 criteria that determine the stringency of capital regulations. See Cubillas and Suárez (2018).	World Bank's regulation and supervision database
Official supervision	An indicator based on 4 criteria concerning the extent to which official authorities can involve themselves in the decisions of bank managers. See Cubillas and Suárez (2018).	World Bank's regulation and supervision database
Private monitoring	An indicator of the transparency of accounting information for public purposes based on 11 criteria. See Barth et al. (2004), Beck et al. (2006) and Alexakis and Samantas (2020).	World Bank's bank regulation and supervision database
Property rights	An index of the protection level concerning property rights.	Heritage foundation
Panel F. Robustness and heterogeneity controls		
Country Bank Z-score	Simple average of banks' Z-scores.	International monetary fund
Country NPLs to gross loans	Country total nonperforming loans to country total gross loans.	International monetary fund
Oil price	Average annual OPEC crude oil price.	Statista
Death rate conflict	The death rate due to civil conflict.	Institute for health metrics and evaluation, global burden of disease
Global peace index	The average of 10 indicators of peacefulness within a country.	Institute for economics & peace (IEP)
Covid deaths	Total deaths due to COVID-19 per million.	Our world in data, COVID-19 dataset
Total cases	Total number of COVID-19 confirmed cases per million.	Our world in data, COVID-19 dataset
Deposits to GDP	Total demand, time and saving deposits at domestic deposit money banks to GDP.	International monetary fund
Government integrity	The average scores for 3 equally weighted sub-factors. The sub-factors are: (1) Perceptions of corruption; (2) Bribery risk; and (3) Control of corruption, including "capture" of the state by elites and private interests.	Heritage foundation
Stringency index	An aggregate measure of 9 response metrics. Measures applied in calculating this index: closure of schools; closure of workplaces; public event cancellations; public gathering limitations; public transport closures; extent to which people are required to stay at home; public information campaigns; internal movement limitations; overseas travel controls.	Our world in data, COVID-19 dataset

Note: This table provides definitions and sources for the variables used in our analyses.

spans 3 years, covering years $t-3$, $t-2$, and $t-1$. Starting years for each crisis are: GFC, 2007; Arab Spring, 2011; and COVID-19, 2020.

The baseline model we run separately for each crisis, that is, GFC, Arab Spring and COVID-19, is as follows:

$$MP_{i,j,t} = a_0 + a_1 MP_{i,j,t-1} + a_2 X_{i,j,t} + a_3 Y_{j,t} + a_4 M_{j,t} + a_5 Z_{j,t} + a_6 During_t + \varepsilon_{i,j,t} \quad (1)$$

In (1), i, j, and t signify the bank, country, and year (resp.). $MP_{i,j,t}$ measures the level of power of bank i, in country j, in year t in the market for participatory deposits. $During_t$ is a dummy variable equal to one in crisis years, and equal to zero for each year in the pre-crisis period. Thus, coefficient a_6 captures the difference between market power during a crisis relative to its pre-crisis period. $X_{i,j,t}$ is a bank-level control variables' vector. $Y_{j,t}$ is a macroeconomic control variables' vector. $M_{j,t}$ is a market structure control variables' vector. $Z_{j,t}$ is a business environment control variables' vector (see Table 1 for definition of control variables). $\varepsilon_{i,j,t}$ is a white-noise error term. To estimate (1), we employ the two-step system Generalized Method-of-Moments (GMM) technique after conducting tests for autocorrelation, endogeneity, multicollinearity, and stationarity. Further details can be found in Appendix C.

4.2 | Difference-in-difference (DID) approach

We use a DID model to compare treatment banks located in countries significantly affected by a crisis, with control banks in countries less impacted, both before and during the crisis. This method helps to mitigate bias from omitted variables by using differences to eliminate trends that uniformly influence banks regardless of crises, such as evolving customer sentiments. We check the pre-shock parallel trends' assumption for the market power of the control and treatment groups in Appendix D.

To facilitate a comparison between countries that are highly affected and those less affected before and during the crisis, and to improve the robustness of causal inferences, we adjust model (1) by classifying the country-year observations in our sample. This is achieved by incorporating a time dummy ($During_t$) and a treatment dummy ($Affected_{j,t}$). This leads to the DID specification in (2):

$$MP_{i,j,t} = \beta_1 \left(During_t \times Affected_{j,t}\right) + \beta_2 Affected_{j,t} + \beta_3 During_t + \beta_4 X_{i,j,t} + \beta_5 Y_{j,t} + \beta_6 M_{j,t} + \beta_7 Z_{j,t} + \beta_8 \theta_j + \beta_9 \gamma_t + \varepsilon_{i,j,t} \quad (2)$$

In (2), $Affected_{j,t}$ is a binary indicator that equals 1 if a country is highly affected by a crisis, and zero if less affected. To identify whether a country is highly affected or not, we use severity indicators. For the GFC, we measure changes in the average bank Z-score pre-crisis versus during crisis. A country is highly affected by the GFC if its average bank Z-score decreases, and zero otherwise. For the Arab Spring, a country is highly affected if it experiences a (political) regime overthrow, militarized civil insurrection, or major demonstrations. A country is highly affected by COVID-19 if Covid deaths are above the median for the entire panel.

For (2) to be interpreted causally, the assignment of the treatment should not be affected by country-specific characteristics. Banks respond to crises in diverse ways because of their unique policies, stakeholder expectations, and regulatory demands, factors that the empirical model may overlook. To mitigate this, we incorporate bank fixed effects (θ_j) to control for any unobserved bank characteristics that might lead to differential responses to a crisis. Furthermore, we incorporate time fixed effects (γ_t) to account for the progression of the crisis and other unobservable trends.

Our DID estimation in (2) compares outcomes between countries that are highly affected by a crisis versus those that are less affected. However, assigning countries to one of two sub-samples (highly affected vs. less affected) in a binary approach does not account for heterogeneity in the intensity of crisis impact across countries. Therefore, we supplement our estimations using a continuous treatment as follows:

$$MP_{i,j,t} = \partial_1 \left(During_t \times Severity_{j,t}\right) + \partial_2 Severity_{j,t} + \partial_3 During_t + \partial_4 X_{i,j,t} + \partial_5 Y_{j,t} + \partial_6 M_{j,t} + \partial_7 Z_{j,t} + \partial_8 \theta_j + \partial_9 \gamma_t + \varepsilon_{i,j,t} \quad (3)$$

$Severity_{j,t}$ is a continuous measure capturing the specific impact severity of a crisis across time and across countries. This measure allows us to distinguish differences in country-level outcomes before and during a crisis, and accounts for trends and vulnerability to crisis shocks whilst distinguishing between control and treatment groups.[14]

To measure GFC severity, we use the inverse of the country average of bank Z-scores, with a robustness check for this choice that instead uses Country NPLs to Gross Loans. For the Arab Spring, we use the death rate due to the conflict, with a robustness check based on the inverse of the Global Peace index. For COVID-19, we use the COVID-19 deaths per million of the population, with robustness check based on total COVID-19 cases.

4.3 | Cross-sectional heterogeneity

The results we derive from estimations (1), (2) and (3) explain *how* market power changed during each crisis. However, to understand *why* market power changes as it does in highly affected countries, that is, what specific factors cause market power to change, we apply the following estimation:

$$\begin{aligned} MP_{i,j,t} = {} & \lambda_1 \left(During_t \times Variable_{j,t}\right) + \lambda_2 Variable_{j,t} \\ & + \lambda_3 During_t + \lambda_4 X_{i,j,t} + \lambda_5 Y_{j,t} \\ & + \lambda_6 M_{j,t} + \lambda_7 Z_{j,t} + \lambda_8 \theta_j + \lambda_9 \gamma_t + \varepsilon_{i,j,t} \end{aligned} \tag{4}$$

In (4), $Variable_{j,t}$ represents an explanatory factor that may cause changes to the market power of banks during the crises we study. We estimate (4) in 12 separate estimations for which we assign one (or an interaction) of the following factors to $Variable_{j,t}$.

The first factor is deposits to GDP. This choice is supported by previous studies such as Drechsler et al. (2017, 2021) and Baldwin and Alhalboni (2023), which highlight that the growth in deposits plays a significant role in influencing the market power of participatory deposits.

The second factor we consider is the oil export status of a country. This decision is influenced by Bitar et al. (2016), who suggest that in oil-exporting countries, banks benefit from oil returns, which contribute to higher deposit levels. In this estimation of (4), $Variable_{j,t}$ equals one if a country exports oil, and zero otherwise.

The third factor is the oil price itself. This is because upturns in oil prices lead to higher oil revenues, an expanded deposit base, and increased lending opportunities (Hesse & Poghosyan, 2016; Khandelwal et al., 2016).

The fourth factor is the inverse of the government integrity index. This factor is particularly relevant to the Arab Spring since a lack of government integrity reduces public trust, erodes economic freedoms/vitality, and increases business costs (Finger & Gressani, 2014).

The last factor is the Stringency Index. Economic activity during COVID-19 slowed substantially due to lockdowns and other restrictions. Stricter COVID-19 rules in highly affected countries may have caused the pandemic to have a greater impact on market power.

We estimate (4) as follows:

1. $Variable_{j,t}$ equals Oil export status. We set the dummy variable $During_t$ equal to 1 for the crisis period at-hand, and zero otherwise (3 estimations).
2. $Variable_{j,t}$ equals Deposits to GDP for each crisis (3 estimations).
3. $Variable_{j,t}$ equals Oil × (Deposits to GDP) for each crisis (3 estimations).
4. $Variable_{j,t}$ equals Oil price for the GFC only (1 estimation).
5. $Variable_{j,t}$ equals Inverse Government Integrity for the Arab Spring only (1 estimation).
6. $Variable_{j,t}$ equals Stringency Index for the COVID-19 crisis only (1 estimation).

5 | RESULTS

We now present results for our baseline market power estimation (1), binary and continuous severity indicator DID estimations (2) and (3) (resp.), and cross-sectional heterogeneity model (4).

5.1 | Baseline results

Table 2 presents the results of baseline tests for the *During* coefficient in (1), which reveals whether changes to market power in the overall sample were significant during each crisis relative to the corresponding pre-crisis period. Both the GFC and Arab Spring show no significant change in market power. In contrast, the change in market power during the Arab Spring is significant and positive.

5.2 | DID results with binary *affected* indicator

The DID estimation results divide the sample into countries which are highly affected by each crisis, and those which are less affected. DID estimation results for (2) are presented in Table 3; these results are robust to a placebo shock applied one year before the actual crises (see Appendix E).

The treatment dummy, *Affected*, denotes whether a country is highly affected by a crisis. Table 3 shows that banks in countries highly affected by the GFC experienced increased market power, whilst those in less affected countries witnessed a decrease in market power. The DID estimation shows a dissimilar impact of the GFC across countries that is not revealed by our baseline results (which estimate market power for the overall sample). Moreover, the mean difference in the change in market power between highly affected countries and others during the GFC is 12.2. This difference is c. 25% of the mean market power of banks for the whole sample in the GFC period (2007–2010), thereby underscoring its importance.

For countries highly (less) affected by the Arab Spring, banks experienced a decrease (increase) in their market power. The mean difference in the change in market power between highly affected countries and others is 15.1, which is c. 27% of bank market power averaged across the whole sample for 2011–2013 (the Arab Spring period). In other words, there is a clear polarization in the Arab Spring's impact between our two country sub-samples. This observation ties back to our summary statistics (Appendix B—Table B1), which show a high level of skew in civilian death rates due to unrest during the Arab Spring.

For COVID-19, the mean difference in the change in market power between highly affected countries and others is not statistically significant.

Lastly, entropy balancing results for each crisis confirm our DID results based on a binary *Affected* indicator (see Appendix F).

5.3 | DID results with continuous *severity* indicator

Continuous Severity indicator variables, plus variables used to check their robustness, are shown in Table 4:

Results for DID estimation with continuous severity indicator (3) are presented in Table 5: these results also hold when using a placebo shock one year before each crisis (see Appendix E).

During the GFC, as the severity of the crisis increased, the market power of banks in highly affected (less affected) countries increased (decreased). We observe the same results whether using the Inverse Z-score or Country NPLs to Gross Loans, that is, this result is robust to the choice of severity indicator. In contrast, as the severity of the Arab Spring crisis increased, that is, as death rates due to the conflict escalated, the market power of banks in highly affected (less affected) countries decreased (increased). This result is the same even if we use the Inverse Global Peace index. In COVID-19, we observe no significant change in bank market power between highly affected countries and less affected countries whether using our primary indicator or our alternative indicator to check the robustness of this finding.

In summary, our DID results with a continuous severity indicator confirm those generated using a binary indicator of severity for each crisis. We therefore conclude for the GFC, that since market power in highly affected countries increased, Hypothesis 1 is *rejected*. In contrast, market power in less affected countries decreased. This disparity between highly affected and less affected countries arises from the net effect of the GFC, which encompasses both bank and state-level responses. Countries not only selected different responses to the crisis, but the extent and effectiveness of these measures also varied significantly. This diversity contributes to the heterogeneous impact of the crisis across different countries. For example, lower market power results from reducing investment risks (which lowers returns, e.g., Cubillas & Suárez, 2018) and increasing deposit rates to mitigate deposit withdrawal risk (e.g., Acharya & Mora, 2015). However, higher market power results from cost-cutting, state-subsidized funding (Han & Melecky, 2013), and sectoral consolidation (e.g., Laeven & Valencia, 2008).

For the Arab Spring, market power in highly affected countries decreased—therefore, Hypothesis 2 is *not rejected*. Our results distinguish between countries based on the market power-reducing effects of civil unrest, as measured by related deaths. The political underpinnings of the Arab Spring distinguish it from other crises. This cautions us against assuming that the response of banks, depositors, and other stakeholders to the Arab Spring can be learned from their response to other crises. For example, unlike financial crises, in which capital is redirected to safer alternatives ("flight-to-safety", e.g., Cornett et al., 2011), as stock markets plummeted during the Arab Spring, investors did not redirect capital withdrawn from equities to bank deposits (Ghosh, 2016).

Lastly, COVID-19 had no overall impact on market power in highly affected countries—therefore, Hypothesis 3 is *not rejected*. The COVID-19 pandemic was unprecedented, creating dissimilar deposit flows to both the GFC and Arab Spring crises (e.g., Acharya & Steffen, 2020a; Acharya & Steffen, 2020b). In particular, COVID-19 was neither characterized by a fear of banks failing (as in the GFC), nor civilian distrust of financial institutions (as in the Arab Spring). Market power changes during the pandemic also showed no significant difference between highly affected and less affected countries. In the next section we examine which country-level characteristics, if any, distinguish the effects of the pandemic, and the GFC and Arab Spring crises, on the market power of Islamic banks in highly affected countries.

5.4 | Cross-sectional heterogeneity results

In this section, we analyse heterogeneity in the cross-section of highly affected countries only.

Results for the GFC are reported in Table 6.

Table 6 shows that banks in countries highly affected by the GFC *and* which are oil exporters experienced an increase in market power compared to those in highly affected countries that do not export oil. The average

TABLE 2 Baseline results showing the effects of each crisis on market power: Entire sample.

Variables	GFC	Arab spring	COVID-19
Lag MP	0.392***	−0.184***	0.180*
	(0.14)	(0.04)	(0.09)
Deposit growth rate	0.007	0.001	−0.012**
	(0.02)	(0.00)	(0.01)
Inefficiency	4.718	4.172***	2.322*
	(3.66)	(1.11)	(1.29)
Diversification	−0.071	−0.025	−0.008
	(0.15)	(0.06)	(0.00)
Capitalization	−0.999	0.287*	1.190***
	(0.61)	(0.16)	(0.35)
Revenue growth	0.042	0.005	0.039**
	(0.06)	(0.02)	(0.01)
Bank size	1.375	6.530**	6.133
	(6.76)	(3.21)	(4.07)
Liquidity	0.095	0.221	0.457
	(0.31)	(0.14)	(0.35)
Credit risk	0.022	−0.068	0.280
	(0.49)	(0.12)	(0.33)
DURING	−2.662	8.916***	0.903
	(4.03)	(1.77)	(3.68)
GDP	0.995**	0.070*	0.411***
	(0.43)	(0.04)	(0.14)
Inflation	0.866	0.031	0.389***
	(0.79)	(0.07)	(0.11)
Financial freedom	−0.360	−0.657***	0.027
	(0.23)	(0.18)	(0.33)
Bank market concentration	0.430	0.214*	0.201
	(0.31)	(0.12)	(0.14)
Financial development	0.102	0.024	−0.180
	(0.17)	(0.06)	(0.13)
KKZ index	26.226**	5.640	2.449
	(12.41)	(6.49)	(8.29)
Activity restrictions	1.545	−0.883***	−0.931
	(1.06)	(0.33)	(0.96)
Barriers to entry	0.181	0.643	0.193
	(1.55)	(0.39)	(1.66)
Barriers to entry foreign	−6.537	1.087	2.534
	(5.13)	(2.17)	(5.81)
Capital regulation	0.306	0.266	1.687
	(1.64)	(0.77)	(1.11)
Official supervision	−2.195	−0.670	2.890
	(4.87)	(1.00)	(4.57)
Private monitoring	−0.423	0.709	1.775

TABLE 2 (Continued)

Variables	GFC	Arab spring	COVID-19
	(1.59)	(0.59)	(1.43)
Property rights	−0.137	0.210	0.221
	(0.49)	(0.22)	(0.18)
Constant	−21.176	−89.593	−159.645
	(146.44)	(80.84)	(99.51)
No of bank	144	144	144
No. of instruments	33	51	42
Prob > F	0.000	0.000	0.000
AR1 (*p*-value)	0.052	0.066	0.009
AR2 (*p*-value)	0.365	0.108	0.189
Hansen-J (*p*-value)	0.145	0.220	0.134

Note: Table 2 reports the GMM estimates for analysing the effects of GFC, Arab Spring and the COVID-19 crisis on bank market power in Equation (1). Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.

TABLE 3 Difference-in-difference analysis: Binary severity indicators.

Variables	GFC	Arab spring	COVID-19
MP	12.203*	−15.106*	−2.009
	(7.26)	(7.67)	(5.52)
Time fixed effects	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes
Bank, macroeconomic and institutional controls	Yes	Yes	Yes

Note: Table 3 reports results for analysing the effects of GFC, Arab Spring and COVID-19 crises on bank market power in Equation (2). Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.

TABLE 4 Continuous severity indicators.

Crisis	Primary indicator	Robustness variable
GFC	Mean inverse Z-Score	NPL to gross loans
Arab Spring	Death rate due to conflict	Inverse of global peace index
COVID-19	COVID-19 death rate	Total COVID-19 cases

difference in market power change between these two country-types during the GFC compared to pre-crisis is 17.95, which is substantial, being c. 36.4% of average market power during the GFC for the whole sample. We also observe a direct interaction between oil export status and the ratio of deposits to GDP, with the oil price itself showing a significant and positive effect.

These results confirm that an increase in oil revenue in oil exporting countries highly affected by the GFC led to a rise in deposits, thereby increasing the market power of banks. This finding is supported by the literature (e.g., Hesse & Poghosyan, 2016; Khandelwal et al., 2016). An elevated oil price contributes to greater oil revenues in oil-exporting countries, which in turn stimulates government expenditure, increases growth in non-oil sectors, and enhances bank liquidity.

Results for the Arab Spring are reported in Table 7.

Table 7 shows during the Arab Spring, that banks in highly affected countries with lower government integrity experienced a larger decrease in market power relative to those with higher government integrity. However, the average difference in market power change between these two country-types is 1.61, which is small, being only c. 2.8% of the average market power of all sample banks during the Arab Spring (2011–2013). This result shows that the decrease in bank market power during the Arab Spring was ostensibly blind/agnostic to the level of government integrity. Whilst there is strong support for the bank market power-reducing effects of political instability due, for example, to postponed investment (Julio & Yook, 2012; Lee & Lee, 2019; Saif-Alyousfi et al., 2021), decreased investor and consumer confidence (IMF, 2019; Rother et al., 2016), higher loan non-performance (Gertler & Kiyotaki, 2010; Gobat &

TABLE 5 Difference-in-difference analysis: Continuous severity indicators.

Variables	Inverse Z-score	NPL to gross loan	Death rate conflict	Inverse global peace index	Total cases	Covid death
MP	0.977*	6.119**	−0.083*	−7.561*	−0.000	−0.000
	(0.53)	(2.39)	(0.05)	(4.49)	(0.00)	(0.00)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank, macroeconomic and institutional controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Table 5 reports results for analysing the effects of GFC, Arab Spring and COVID-19 crisis on bank market power using continuous treat variable in Equation (3). Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.

Kostial, 2016), and weakened fiscal position (Gupta et al., 2004), it is less well known that the level of government integrity has almost no bearing on the impact of political instability on the market power of banks. Lastly, we do not find that the oil exporting status of highly affected countries is significant during the Arab Spring (unlike Ghosh, 2016).

Finally, Table 8 reports COVID-19 results. To investigate cross-sectional heterogeneity during the pandemic, we use a Stringency Index, which is a composite measure that captures the severity of restrictions on civilian movement and economic activities. We apply this test to highly affected countries only, that is, countries with high Covid-related death rates (relative to the median).

Table 8 shows that banks in countries highly affected by COVID-19 *and* with a stricter government response to the crisis experienced falls in their market power compared to countries highly affected by COVID-19 with fewer restrictions (for which market power increased). However, the average difference in market power change between these two country-types is 0.545, which is negligible.

This narrow dispersion of market power in the cross-section of highly affected countries based on the severity of restrictions is explained by the literature. The pandemic induced a precautionary surge in deposits as households faced job losses (Demir & Danisman, 2021; Elnahass et al., 2021), and drawdowns on credit lines increased, especially by riskier firms (Acharya & Steffen, 2020a; Acharya & Steffen, 2020b). Increased loan demand and deposit inflows put upward pressure on market power. However, the pandemic also led to the closure of businesses and slowed economic growth (Duan et al., 2021; Samitas et al., 2022). Lost revenue, higher non-performing loans and other cost increases put downward pressure on market power (Beck & Keil, 2021; Silva et al., 2022). Our results show little heterogeneity in the cross-section of highly affected countries based on the severity of restrictions because once restrictions were enforced, their negative impact on market power through progressively slower/reduced economic activity offset the effects of a precautionary increase in capital deposited with banks and increased loan demand. This conclusion is also borne out by the trajectory of market power in the whole sample (Appendix B—Figure B1), which shows that market power first increased (as deposits surged and firms drew down credit lines) and later decreased (as economic slowdowns reduced bank performance).

6 | THEORETICAL IMPLICATIONS

There are two key theoretical implications of our study. First, crises which differ in provenance manifest dissimilar changes to the deposit market power of Islamic banks. This is because deposit market power is endowed to banks by virtue of the propensity of depositors to maintain deposits (Drechsler et al., 2017, 2021; White, 2013). However, their incentives to do so change during a crisis based on its nature/type. For example, during the Arab Spring, depositors withdrew deposits due to concerns over corruption, whereas during COVID-19, depositors increased deposits due to precautionary savings incentives. This theoretical implication is empirically supported by our results, which show that in highly affected countries, market power increased during the GFC banking crisis, decreased during the Arab Spring political crisis, and was ostensibly unchanged by the COVID-19 health crisis.

A second theoretical implication is that non-financial crises create homogenous market power effects across Islamic banks. This is because the response of depositors to a non-financial crisis, such as a political or health crisis, is not calibrated to bank-level financial characteristics, such as balance sheet leverage or liquidity ratios. Instead, during a non-financial crisis, depositors respond similarly to information/events that are external to banks, irrespective of which banks they maintain

TABLE 6 Cross-sectional heterogeneity in the reaction of bank market power to the GFC crisis.

Variables	Oil	Deposit to GDP	Deposit to GDP × Oil	Oil price
MP	17.945*	−0.113	0.373*	0.407**
	(9.77)	(0.47)	(0.20)	(0.19)

Note: Table 6 reports the regression estimates for analysing the effects of the GFC crisis on bank market power in Equation (4). The table organizes the cross-sectional variables into the following categories: (i) oil export and non-oil export countries, (ii) Deposit to GDP, (iii) Deposit to GDP × oil, (iv) oil price. Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.

TABLE 7 Cross-sectional heterogeneity in the reaction of bank market power to the Arab Spring crisis.

Variables	Oil	Deposit to GDP	Deposit to GDP × Oil	Inverse government integrity
MP	−20.411	1.170*	−0.600	−1.610*
	(34.10)	(0.62)	(0.58)	(0.89)

Note: Table 7 reports the impact of the Arab Spring on bank market power as per Equation (4). The table arranges the cross-sectional variables as follows: (i) oil export and non-oil export countries, (ii) Deposit to GDP, (iii) Deposit to GDP × oil, (iv) Inverse Government Integrity. Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.

TABLE 8 Cross-sectional heterogeneity in the reaction of bank market power to the COVID-19 crisis.

Variables	Oil	Deposit to GDP	Deposit to GDP × Oil	Stringency index
MP	−0.683	0.223*	0.044	−0.545*
	(4.62)	(0.12)	(0.05)	(0.29)

Note: Table 8 reports the impact of the COVID-19 crisis on bank market power as per Equation (4). The table arranges the cross-sectional variables as follows: (i) oil export and non-oil export countries, (ii) Deposit to GDP, (iii) Deposit to GDP × oil, (iv) Stringency index. Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.

deposits with. Moreover, if non-financial crisis events (e.g., pandemic or uprisings) affect multiple countries, then market power is impacted homogenously at a cross-country level. This is illustrated by at least two findings. First, government integrity almost negligibly influenced the impact of the Arab Spring on market power in highly affected countries, even though government integrity differs between countries in our sample. Second, the impact of COVID-19 on market power in highly affected countries could not be distinguished by the stringency of containment measures, even though state-level responses differed in the country cross-section.

7 | CONCLUSION AND POLICY IMPLICATIONS

This paper investigated the deposit market power of Islamic banks during three new millennium crises. We find that market power is dissimilarly impacted by each crisis. For highly affected countries, market power increased during the GFC, decreased during the Arab Spring, and was unchanged overall by COVID-19. We also find substantial cross-sectional heterogeneity between highly affected countries during the GFC, but very little cross-sectional heterogeneity during each of the other crises. Whilst oil export status cushioned crisis effects in countries most impacted by the GFC, it played no role in changes to market power during either the Arab Spring or COVID-19 pandemic. This is because each of these crises transcended measurable differences between highly affected countries not only related to oil, but also to either their root cause (i.e., government integrity for the Arab Spring), or state remedies to control the problem (i.e., stringency index for COVID-19). Once each of these crises started, all highly affected countries were similarly impacted.

The character of each crisis is relevant to the design of bank liquidity management policies, economic stimulus/recovery packages, and financial conduct regulations.

Fundamentally, the GFC was a bank liquidity crisis. Banks faced difficulties meeting the liquidity demands of creditors as they withdrew loaned funds. To prevent unwanted deposit withdrawals, crisis management policies typically provide banks with special measures to substantially increase deposit rates. However, this study finds that during the GFC, the oil-export status of a country played an important role in whether this special measure was actually required. During the GFC, Islamic banks in highly affected oil-exporting countries experienced a rise in market power due to an increase in oil prices. Therefore, for liquidity crises in general, *special* *deposit pricing measures should incorporate a country's oil-export status* and the extent to which oil revenues feed through the financial system to liquidity provision to banks. Moreover, whilst the asymmetric passthrough of interest rate changes between loans and deposits is a well-known practice,[15] this study particularly finds that consumers were at a higher risk of exploitation by these banks through the under-pricing of deposits. Therefore, the remit of *financial conduct policies aimed at protecting consumers against bank malpractice should include scope to influence bank deposit price-setting* in such situations, for example, by using adjustable deposit rate floors. Lastly, since lower deposit market power reduces a bank's willingness to lend (Li et al., 2023), *Islamic banks in highly affected non-oil exporting countries require higher state-level support during liquidity crises* (compared to those in oil-exporting countries) to resume lending to the real economy.

The Arab Spring political crisis was characterized by uprisings against autocratic regimes. As such, it represented an extreme form of political instability.[16] To safeguard their funds, and to realize their opposition to corrupt state and institutional practices, depositors withdrew deposit capital from banks,[17] thereby reducing bank market power. Furthermore, bank-level responses intended to mitigate withdrawals, such as deposit pricing hikes, would have been ineffective. This is because the ethical/moral principles-based opposition to corruption underscoring depositors' withdrawals would have not been ameliorated by financial incentives to behave differently (by withdrawing capital, depositors are said to have "voted with their feet" in the absence of democratic voting rights). We therefore conclude that direct state interventions, for example, state-backed bank creditor guarantees, are imperative to stabilize banks affected by extreme forms of political instability, and that as a matter of policy, *state-level liquidity support needs to be provided to shore-up bank liquidity as a first resort during extreme political crises*, rather than relying on bank-specific measures, which are likely to prove ineffective.

As a health crisis, the COVID-19 pandemic is characterized by global lockdowns to contain the spread of the virus. Our study finds that lockdowns during the pandemic induced offsetting effects on bank market power. Whilst early in the pandemic, lockdowns induced precautionary savings incentives that led to a surge in deposits and an increase in deposit market power, the ensuing economic slowdown—particularly due to reduced mobility—later reduced market power. Whilst these effects offset overall, their timing differs. Since market power and bank lending are positively related (Li et al., 2023), state support to encourage bank lending would have been more effective once the early increase in market power from a surge in deposits was reversed by economic slowdown. The policy implication in the event that lockdowns are used to contain the future spread of disease, is to *delay government support for bank lending at least until bank market power starts to decrease*. This avoids economic spillovers created by excessive government support.

Our final comment concerns future research. This study examined market power at the country level, uncovering insights that go beyond the scope of aggregate market power measures, such as the Lerner Index. Further bank-level investigation offers the potential for a yet deeper understanding of how crises impact market power, and in particular, how deposit market power is subsequently redistributed among banks by each crisis genre.

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CONFLICT OF INTEREST STATEMENT

The authors declare no conflict of interest.

DATA AVAILABILITY STATEMENT

Research data are not shared.

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ENDNOTES

[1] Several authors find increased deposit withdrawals in both bank types during the GFC, with less pronounced effects in Islamic banks (Farooq & Zaheer, 2015). During the Arab Spring, Ghosh (2016) finds no significant difference between the influence of the crisis on deposit dynamics in conventional versus Islamic banks. Furthermore, the Covid-19 pandemic had a pervasive effect on the banking sector overall (IsDB, 2020), with diminished spending and increased market volatility causing positive deposit growth in both conventional and Islamic banks in the Middle East and North Africa (MENA) region (EY, 2022).

[2] Sustained growth is also expected to continue: total Islamic bank assets grew by 12.2% and 9.4% in 2021 and 2022 (resp.); expected growth in 2023 (actual yet to be confirmed) is 10.0% (S&P, 2023).

[3] Whilst the risk-bearing structure of participatory deposits provides an Islamic alternative to conventional deposits, it also results in other advantages. For example, participatory depositors enjoy uncapped positive returns, whereas in conventional interest-bearing deposits, the maximum possible return is fixed.

Moreover, participatory depositors invest in a pool of (typically) well-diversified assets without the entry barriers associated with mutual funds and other managed investment schemes that often stipulate minimum investment requirements to the financial exclusion of small investors. Lastly, information conveyed by deposit returns provides an opportunity for participatory depositors to monitor the risk-taking behaviour of Islamic banks in support of market discipline and bank stability (Alaeddin et al., 2017).

[4] In this measure, market power is highest when the deposit rate is closest to a bank's idiosyncratic value-maximizing optimum. Pricing above this optimum to attract/retain deposits, or below the optimum to boost current period earnings, reduces market power.

[5] Crisis severity indicators are country-average bank Z-scores for the GFC; deaths due to civil unrest for the Arab Spring; and a Covid death rate.

[6] So-called "second wave" indirect impacts due to interconnectedness with conventional banks are well-recognized, e.g., Beck et al., 2013a.

[7] The market power-reducing effects of political instability are well-known, for example, Gupta et al., 2004; Gertler and Kiyatoki, 2010; Julio & Yook, 2012; Rother et al., 2016.

[8] See related Islamic bank financial stability analyses in Parmankulova et al. (2022) and Kanapiyanova et al. (2023).

[9] Political uncertainty takes several forms. Most research concerning the relevance of political uncertainty to finance/financial systems frames it within the context of elections, heterogenous cross-state political policies, and terrorist attacks (e.g., Bradley et al., 2016; Francis et al., 2014). In contrast, the Arab Spring was a political upheaval that for some affected countries led to the reform or replacement of entire political structures (Chau et al., 2014).

[10] Central banks that relaxed capital constraints during the pandemic include the Federal Reserve, European Central Bank, Bank of England, and Bank of Japan.

[11] Notable exceptions include Efthyvoulou and Yildirim (2014), Cubillas and Suarez (2018), Mirzaei, A. (2019), and Igan et al. (2020, 2021) for the GFC, and Lavezzolo (2020) and Elfeituri (2022) for the Arab Spring.

[12] The competition-stability literature finds that competition leads to greater stability (e.g., Beck et al., 2004; Boyd & De Nicolo, 2005; Carletti & Vives, 2009), whereas the competition-fragility literature finds the opposite (e.g., Ariss, 2010; Berger et al., 2009; Cetorelli & Peretto, 2000; Keeley, 1990).

[13] Indeed, this distinction also applies to the literature on the impact of market power on bank efficiency (e.g., Ariss, 2010; Berger & Hannan, 1998; Delis & Tsionas, 2009). Whilst we explore the impact (of crises) *on* market power, the market power-bank efficiency literature concerns the impact *of* market power (on bank efficiency).

[14] In essence, it is possible to interpret the estimations which apply this new variable as DID regressions subject to all groups (countries) receiving the treatment (shock) to varying degrees.

[15] See for example: Hannan & Berger, 1991; Neumark & Sharpe, 1992; Hofmann & Mizen, 2004; Payne, 2006.

[16] More modest forms of political instability include national elections and party leadership challenges.

[17] In some countries, the rapid withdrawal of deposits led to bank runs. See Gobat and Kostial (2016) and Ouedraogo et al., (2022).

[18] We essentially regress the market power during the placebo period as a binary indicator that equals one during the year before the crisis and zero otherwise, with the same controls as the DID Equation (2).

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APPENDIX A: SAMPLE COUNTRY AND BANK DISTRIBUTION

TABLE A1 Sample country and bank distribution.

Country	Number of banks
Afghanistan	2
Algeria	2
Bahrain	9
Bangladesh	5
Brunei	2
Egypt	1
Indonesia	13
Iran	3
Iraq	7
Jordan	1
Kenya	1
Kuwait	5
Malaysia	15
Maldives	1
Mauritania	3
Nigeria	2
Oman	3
Pakistan	6
Palestine	3
Qatar	5
Saudi Arabia	3
Senegal	2
Somalia	1
Sri Lanka	1
Sudan	19
Syria	3
Thailand	1
Tunisia	2
Turkey	5
UAE	9
UK	5
Yemen	4
Total	144

APPENDIX B: SUMMARY STATISTICS OF VARIABLES

Summary statistics for each of our variables are provided in Table B1.

TABLE B1 Summary statistics for all sample data 2004–2022.

Variables	Mean	p25	p50	p75	SD
Market power	56.061	41.077	59.772	76.035	24.728
Deposit growth rate (%)	21.340	−4.901	12.145	31.416	119.527
Inefficiency (%)	2.929	1.487	2.276	3.698	2.582
Diversification (%)	32.889	13.862	24.876	45.166	50.560
Capitalisation (%)	18.898	8.050	11.484	19.060	20.172
Revenue growth (%)	19.589	−2.676	11.152	28.375	75.944
Bank size	21.143	19.596	21.166	22.564	1.913
Liquidity (%)	25.634	11.929	20.360	32.660	19.594
Credit risk (%)	52.998	37.889	58.690	69.548	22.157
GDP (%)	0.281	−0.770	2.387	4.427	17.059
Inflation (%)	11.251	2.033	3.925	9.597	31.187
Financial freedom	43.350	20.000	40.000	60.000	20.199
Bank market concentration (%)	76.606	63.129	76.735	93.048	17.225
Financial development (%)	53.183	17.013	43.287	75.096	41.677
KKZ index	−0.418	−1.114	−0.277	0.273	0.839
Activity restrictions	8.450	7.000	9.000	12.000	5.048
Barriers to entry	7.158	6.000	9.000	10.000	4.082
Barriers to entry foreign	0.351	0.000	0.000	1.000	0.596
Capital regulation	3.519	2.000	4.000	5.000	2.464
Official supervision	2.487	1.000	3.000	4.000	1.524
Private monitoring	1.962	1.000	2.000	3.000	1.579
Property rights	45.986	31.100	45.000	55.000	19.100
Country bank Z-score	17.103	11.027	15.694	22.484	9.032
Country NPL to Gross Loan (%)	6.115	3.442	4.808	8.300	4.375
Death rate conflict	7.070	0.000	0.080	4.150	33.618
Global peace index	2.201	1.679	2.058	2.833	0.699
Covid deaths	0.0575	0.000	0.000	0.0359	0.1380
Total cases	230.0	0.000	0.000	72.6	800.0
Deposit to GDP (%)	58.252	29.623	47.303	81.522	39.079
Government integrity	39.288	28.000	43.000	50.000	11.901
Stringency index	52.561	41.026	57.813	68.636	17.600

The 25:75 inter-quartile market power range for the whole sample is 34.96, that is, 58% of the median, showing a wide dispersion of market power in the panel. The deposit growth rate is minus 4.90% at the 25th centile, but 31.42% at the 75th, showing both deposit contraction and deposit growth (resp.), that is, diverse deposit-funding conditions in the panel. Median credit risk, that is, loans to total assets, is 58.7%; the panel comprises mostly commercial bank lenders for which loans are a large proportion of total assets. The standard deviation of the GDP growth rate per capita is 17.1%, that is, approx. 7.1 times the median GDP growth rate; this variation is

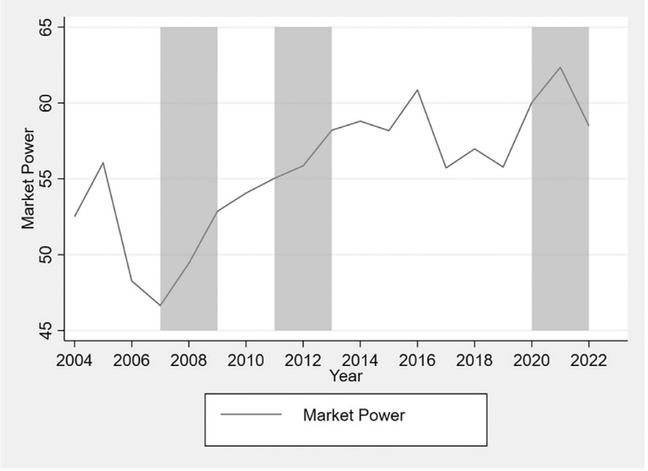

FIGURE B1 Average bank market power.

substantial, primarily due to the severe economic fall-out of the GFC. Statistics for death rates due to civil unrest during the Arab Spring are: 25th centile 0.00, 50th centile 0.08, 75th centile 4.15, and mean 7.07, that is, nearly one-half of the death rates are zero or slightly above zero, whilst countries more impacted by deaths were impacted with high rates that skewed the distribution. This implies that government authorities either managed the crisis whilst preventing deaths, or were unable to do so, and death rates were high. The stringency index during COVID-19 shows a narrow range around the median, reflecting similarity in the measures taken by a large number of countries to control the spread of the virus; the 25:75 range is 27.61, whilst the median value is 57.83.

The change in average power of Islamic banks in the market for participatory deposits during the sample period 2004–2022 is shown in Figure B1.

In Figure B1, crisis periods are depicted by shaded columns. Figure B1 shows a pronounced decrease in market power in 2006 and during the GFC in 2007, and then an increase in 2008 and 2009 as banks recovered from the crisis. Market power then trended upwards, and continued to do so throughout the Arab Spring period from 2011 to 2013. Market power then fluctuated between 2014 and 2019 with no discernible trend until the onset of COVID-19 in 2020. During the early part of the COVID-19 crisis from 2020 to 2021, market power increased. However, during the latter part of the pandemic from 2021 to 2022, market power decreased.

APPENDIX C: ASSESSING DATA QUALITY

C.1 | GMM specification and endogeneity

In our study, we utilize the two-step system Generalized Method-of-Moments (GMM) estimation as our preliminary test method. This choice is driven by the distinctive characteristics inherent in our dataset, notably the presence of fixed individual effects and potential endogeneity issues within the regressors.

The inclusion of lagged values of the dependent variable as explanatory variables necessitates careful consideration due to the risk of omitted variable problems and endogeneity with other bank-specific characteristics. In our dynamic panel data model, we acknowledge the persistence of lagged market power, as documented by Alexakis and Samantas (2020) and other researchers. However, this persistence introduces a challenge owing to the correlation between the lagged dependent variable and the disturbance term. To mitigate this challenge, we adopt the two-step system GMM estimators, drawing on insights from seminal works by Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998).

TABLE C1 Variance inflation factor.

Variable	Variance inflation factor
Market power	1.26
Deposit growth rate (%)	1.06
Inefficiency (%)	1.66
Diversification (%)	1.12
Capitalisation (%)	1.92
Revenue growth (%)	1.21
Bank size	2.18
Liquidity (%)	3.15
Credit risk (%)	2.92
GDP (%)	1.49
Inflation (%)	2.05
Financial freedom	3.15
Bank market concentration (%)	1.78
Financial development (%)	3.17
KKZ index	5.15
Activity restrictions	3.54
Barriers to entry	5.78
Barriers to entry foreign	1.87
Capital regulation	1.38
Official supervision	5.26
Private monitoring	1.46
Property rights	3.89
Mean variance inflation factor	2.57

Another potential source of endogeneity arises from the possibility of reverse causality between market power and bank-specific variables, such as risk and capitalisation, as highlighted in Berger et al., 2009. Following the methodology outlined by Alexakis and Samantas (2020), we classify all bank-specific variables as endogenous to address reverse causality concerns.

To ensure the validity and reliability of our model, we undertake several checks and tests. We set the lag length to the first lag for all bank-specific controls, guided by the Sargan test for over-identifying model restrictions. Despite this, we remain cautious of the potential drawbacks associated with an excessive number of instruments in GMM estimators, as highlighted in the literature. Therefore, we run extensive tests to investigate additional lags of both the dependent and independent variables as instruments. Additionally, we consider using fewer instruments, following the recommendation of Roodman (2009).

The robustness and fitness of our system GMM estimator model is anchored on two testable assumptions that are critical to ensuring the reliability of our analytical framework. First, we undertake an assessment of instrument validity through the Hansen J-statistic. Second, we examine the stationarity of the error terms post-instrumentation using the Arellano and Bond (1991) test. Empirical validation of these two assumptions is provided in Table 2. The outcomes of these tests affirm the fulfilment of both criteria.

Furthermore, we ensure adherence to the "Arellano-Bond condition," which dictates that the number of groups should surpass the number of instruments utilized in the estimation process. Adhering to this condition safeguards against the occurrence of overfitting, wherein an excessive number of parameters relative to observations may lead to inefficient and inconsistent estimates. The confirmation of consistency in our estimates is evidenced by the congruence between the number of banks and instruments, as explained in Table 2.

Furthermore, F-test results further validate the fitness of our model by rejecting the hypothesis of zero coefficients, affirming the joint significance of independent variables.

Finally, in our empirical assessment of endogeneity, we perform a test based on the hypothesis that endogenous regressors can be treated as exogenous. Consistent with the methodology outlined by Baum et al. (2007), the test statistic adheres to a chi-squared distribution. The obtained test results with Chi-sq = 28.153 and *p*-value = 0.0004 decisively reject the null hypothesis, providing compelling evidence for the presence of endogeneity in our model.

C.2 | Autocorrelation

We use the F-test of the Wooldridge test to examine first-order autocorrelation. The result is 7.309, which

TABLE C2 Lagrange multiplier test.

Estimation	Test statistic	p-value
GFC	23.693	0.537
Arab Spring	27.968	0.309
COVID-19	13.798	0.965

rejects the null hypothesis of no first-order autocorrelation in panel data. It is important to note that this test specifically focuses on autocorrelation in the full disturbance term, which includes fixed effects and is expected to exhibit autocorrelation due to its dynamic nature.

To test for autocorrelation other than from fixed effects, the Arellano–Bond test is applied to the residuals in differences. The results of these tests, presented in Table 2, reveal the absence of second-order serial correlation for all three models.

C.3 | Multicollinearity

We employ the Variance Inflation Factor test for multicollinearity. We calculate the Variance Inflation Factor for each variable. The results in Table C1 are all lower than the recommended threshold of 10, according to Kennedy (2008). This indicates that the variables in our regression model exhibit a low level of multicollinearity.

It is worth noting that, in a few instances, certain country-level variables, such as *Barriers to entry*, *Official supervision*, and *KKZ*, demonstrated a moderate level of multicollinearity. However, it is crucial to interpret these findings in the context of the nature of these variables. Specifically, these variables are categorical in nature, and therefore moderate multicollinearity is expected due to their inherent structure. Importantly, this characteristic does not raise any substantive concerns regarding the validity of our results.

C.4 | Stationarity

In our study, we employ the Choi (2001) unit root test, specifically designed for panel data analysis. The choice of this test aligns with the characteristics of our dataset, where each group is assumed to possess distinct non-stochastic and stochastic components, accommodating potential differences in time spans across groups. Notably, the Choi test is well-suited to handle the situation where some groups exhibit a unit root while others do not. The results from the Choi unit root tests show p-values less than 0.01, which is robust evidence of stationarity for all variables incorporated into our model.

Furthermore, we also address concerns of mean stationarity by conducting the Lagrange multiplier test proposed by Magazzini and Calzolari (2020) following each of our system GMM estimations. The results of these tests, as presented in Table C2, affirm both the mean stationarity of the variables and the validity of the "level" moment conditions, adding a layer of confidence for the robustness of our methodology.

APPENDIX D: PARALLEL TRENDS' ASSUMPTION FOR DID

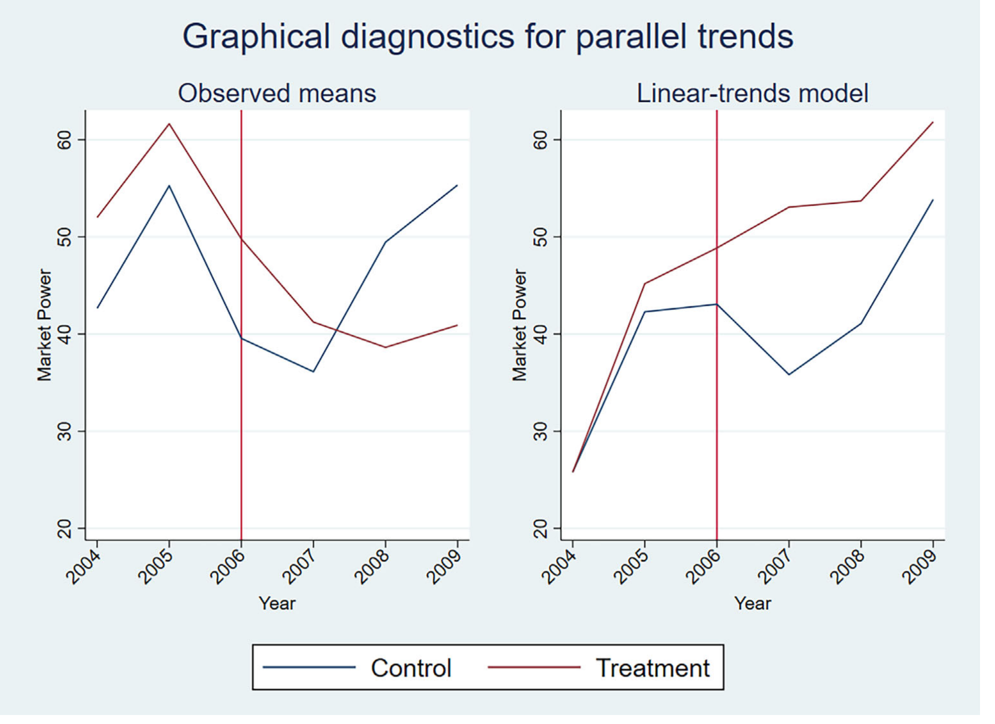

FIGURE D1 Parallel trends—GFC. [Colour figure can be viewed at wileyonlinelibrary.com]

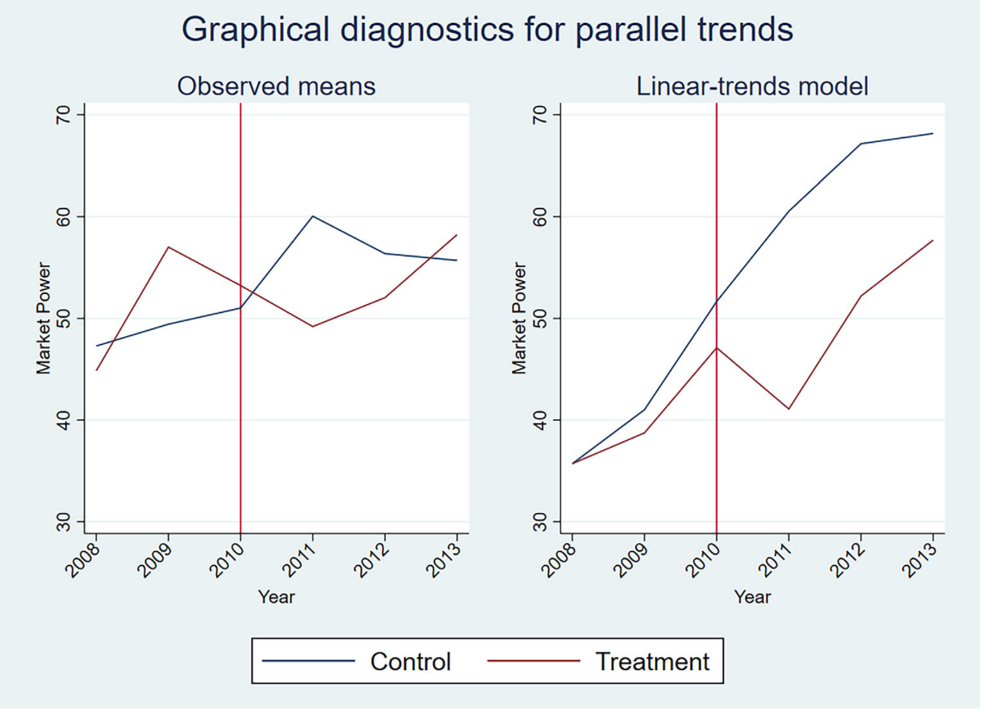

FIGURE D2 Parallel trends—Arab Spring. [Colour figure can be viewed at wileyonlinelibrary.com]

The DID methodology requires that both the control and treatment groups in the analysis display similar trends before the shock occurs, a condition known as the "parallel trends assumption" (Angrist & Pischke, 2009).

Figures D1–D3 plot the means of the respective outcome trajectories prior to treatment.

Plots D.1 and D.2 show trajectories that are somewhat similar, but nevertheless, different, to those in Figure D3. This observation is further reinforced by the

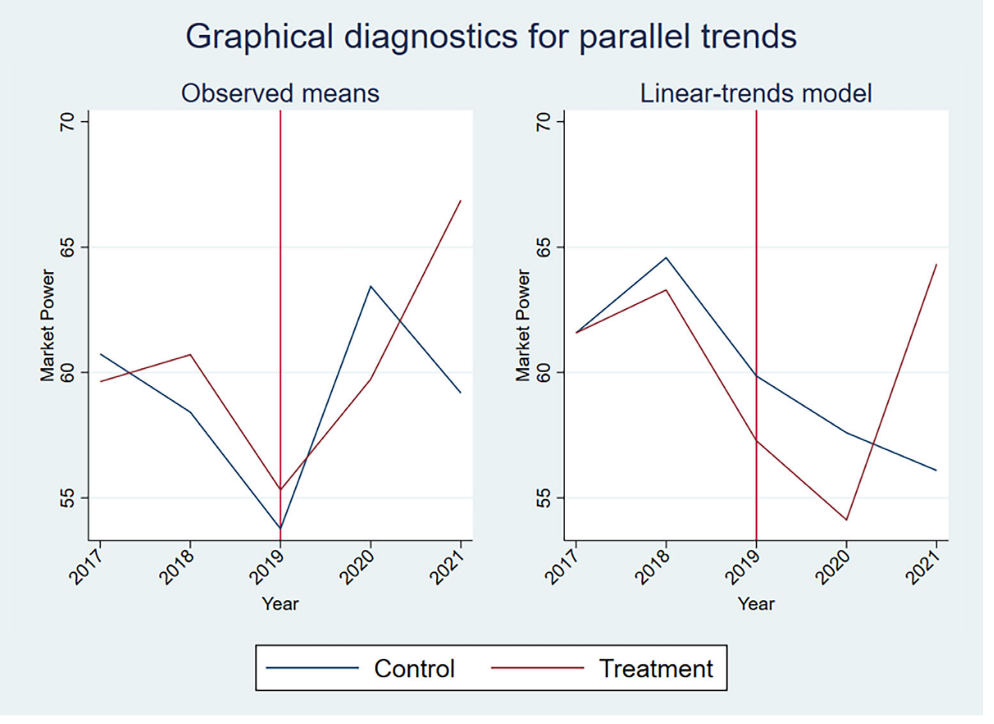

FIGURE D3 Parallel trends—COVID-19. [Colour figure can be viewed at wileyonlinelibrary.com]

TABLE D1 Parallel-trends test (pre-treatment period).

H0: Linear trends are parallel	GFC	Arab Spring	Covid
F-test	0.30	0.44	0.10
Prob > F	0.590	0.511	0.755

Note: Table D1 reports test statistics when assuming that banks in the control and treatment groups exhibit parallel trends. *, **, *** show significance at 10%, 5%, 1% resp.

TABLE D2 Granger causality test.

H0: No effect in anticipation of treatment	GFC	Arab Spring	Covid
F-test	0.96	1.58	0.03
Prob > F	0.393	0.215	0.969

linear-trends' model on the right-hand-sides of Figures D1–D3, showing they are indeed parallel for all crises. These observations graphically validate the parallel trends' assumption.

However, we also formally test the null hypothesis that the pre-treatment period trajectories are parallel by comparing their slopes.

F-test results in Table D1 show that we cannot reject the null hypothesis. Moreover, non-parallel trajectories indicate no change in behaviour arises in the control and treatment groups in anticipation of the treatment. For testing this assumption, we fit a Granger-type causality model augmented by dummies to indicate the future treatment status for each period before the treatment. Table D2 presents F-test results for causality, showing that we cannot reject the null hypothesis of no effect in anticipation of treatment.

APPENDIX E: DID PLACEBO RESULTS

Applying Poczter (2016), we perform a placebo DID. This method involves simulating placebo shocks occurring one year before each actual crisis to assess the robustness of our findings. We therefore rerun the DID regressions with a placebo shock one year before.[18] If the results of this test differ from the original DID test, then the causal interpretation of our results is supported. We regress market power during the placebo period using the same binary severity indicators and controls as (2); these results are reported in Table E1. We then repeat this analysis using continuous severity indicators with the same controls as (3); these results are reported in Table E2.

All coefficients of the post-placebo shock variables in Table E1 are not significant for any of the crises. The coefficients of the post-placebo shock variables in Table E2 are significantly negative for GFC, significantly positive for Arab Spring, and not significant for the COVID-19 crisis.

These findings suggest that for the GFC, market power after the placebo shock (i.e., in normal times) is negative until the actual GFC crisis started in 2007, after which it turned positive. For the Arab Spring, market power after the placebo shock (i.e., in normal times) is positive until the actual crisis shock started in 2011, after which it turned negative. Therefore, this falsification test for the GFC (Arab Spring) reinforces the causal interpretation of our results, since we fail to detect a positive (negative) treatment effect.

TABLE E1 Placebo results for binary severity indicators.

Variables	GFC	Arab Spring	Covid
MP	4.532	4.472	−3.498
	(12.98)	(7.61)	(4.80)
Time fixed effects	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes
Bank, macroeconomic and institutional controls	Yes	Yes	Yes

Note: Table E1 presents placebo shock results using binary treatment. Applying the method in Poczter (2016), we invoke a placebo shock 1 year before the actual shock. Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.

TABLE E2 Placebo results for continuous severity indicators.

	(1)	(2)	(3)	(4)	(5)	(6)
Variables	Inverse Z-score	NPL	Violence Death	Inverse Global Peace index	Total cases	Covid Death
MP	−0.189	−5.660**	1.761**	−20.662	0.000	0.000
	(0.40)	(2.47)	(0.88)	(32.88)	(0.00)	(0.00)
Time fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Bank, macroeconomic and institutional controls	Yes	Yes	Yes	Yes	Yes	Yes

Note: Table E2 presents placebo shock results using continuous treatment. Columns (1 + 2) show results for the GFC, columns (3 + 4) show results for the Arab Spring, and columns (5 + 6) show results for COVID-19. Applying the method in Poczter (2016), we invoke a placebo shock 1 year before the actual shock. Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.

APPENDIX F: DID RESULTS WITH ENTROPY BALANCING

Panel A presents the covariate balance after entropy balancing, in which the first three moments of the treatment group (Affected = 1) and the control group (Affected = 0) are equalized. The last three columns show achievement of a covariate balance for all control variables, and that the distribution of control variables for the two groups is identical.

Panel B presents results for the regression after achieving covariate balance via entropy balancing. The positive (negative) treatment effect of the GFC (Arab Spring) crisis on bank market power remains significant, suggesting that the GFC (Arab Spring) crisis triggers an increase (decrease) in bank market power rather than latent variables.

TABLE F1 Difference-in-difference analysis with entropy balancing.

Panel A. Covariate balance: Differences in covariates' distributions after entropy balancing

	Treatment			Control					
Covariate variables	Mean	Var	Skew	Mean	Var	Skew	Mean |diff|	Var |diff|	Skew |diff|
GFC									
Deposit growth rate	38.51	8975.00	1.13	38.51	8975.00	1.13	0.00	0.00	0.00
Inefficiency	2.07	2.40	3.22	2.07	2.40	3.23	0.00	0.00	0.01
Diversification	26.86	436.60	−0.07	26.86	436.60	−0.07	0.00	0.00	0.00
Capitalisation	19.05	451.10	2.75	19.05	451.20	2.75	0.00	0.10	0.00
Revenue growth	29.13	6169.00	4.06	29.14	6171.00	4.06	0.01	2.00	0.00
Bank size	21.89	1.47	−0.51	21.89	1.47	−0.51	0.00	0.00	0.00
Liquidity	26.75	291.20	1.30	26.75	291.30	1.30	0.00	0.10	0.00
Credit risk	58.08	281.40	−1.04	58.08	281.40	−1.04	0.00	0.00	0.00
Arab Spring									
Deposit growth rate	40.08	13867.00	1.94	40.08	13867.00	1.94	0.00	0.00	0.00
Inefficiency	2.25	1.44	1.95	2.25	1.44	1.95	0.00	0.00	0.00
Diversification	44.15	1135.00	0.62	44.16	1138.00	2.19	0.01	3.00	1.57
Capitalisation	23.40	363.70	2.15	23.39	363.80	2.15	0.01	0.10	0.00
Revenue growth	26.42	2272.00	1.61	26.42	2272.00	1.61	0.00	0.00	0.00
Bank size	20.79	2.57	0.48	20.79	2.57	0.48	0.00	0.00	0.00
Liquidity	32.34	480.00	0.64	32.33	479.90	0.64	0.01	0.10	0.00
Credit risk	46.81	480.10	0.11	46.82	480.20	0.11	0.01	0.10	0.00
COVID-19									
Deposit growth rate	11.53	10766.00	5.28	11.52	10778.00	5.28	0.01	12.00	0.01
Inefficiency	2.54	2.64	1.07	2.54	2.64	1.07	0.00	0.00	0.00
Diversification	34.97	793.70	1.18	34.97	793.80	1.17	0.00	0.10	0.00
Capitalisation	12.56	108.60	2.63	12.56	108.70	2.64	0.00	0.10	0.00
Revenue growth	22.65	10995.00	4.58	22.65	10995.00	4.58	0.00	0.00	0.00
Bank size	21.33	4.09	0.23	21.33	4.10	0.23	0.00	0.00	0.00
Liquidity	29.14	593.10	0.93	29.13	593.00	0.93	0.01	0.10	0.00
Credit risk	46.63	502.40	−0.36	46.63	502.50	−0.36	0.00	0.10	0.00

Panel B. Regressions with post-balancing sample

Variables	GFC	Arab Spring	Covid
MP	0.828*	−2.932**	−0.955
	(0.49)	(1.15)	(2.90)

TABLE F1 (Continued)

Panel B. Regressions with post-balancing sample			
Variables	**GFC**	**Arab Spring**	**Covid**
Time fixed effects	Yes	Yes	Yes
Bank fixed effects	Yes	Yes	Yes
Bank, macroeconomic and institutional controls	Yes	Yes	Yes

Note: Table F1 presents the results of entropy balancing to enhance the covariate balance between the control and treatment groups. This procedure weights observations so that the distribution moments post-weighting for each matching dimension for the control and treatment samples (being the mean, variance, and skewness) are equal. The procedure matches covariates (which are listed in Panel A) comprising an array of bank characteristics. Panel B presents results for the same regressions as in Equation (2) except using the post-weighting control and treatment observations used in entropy balancing. Standard errors are shown below coefficients' estimates. *, **, *** show significance at 10%, 5%, 1% resp.