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Global perspectives on open banking: Regulatory impacts and market response

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ABSTRACT

This study investigates the adoption of open banking across several diverse global jurisdictions, focusing specifically on regulatory and market implications. Employing a comparative analysis, we examine the dual nature of open banking as both a regulatory framework and a technological innovation, exploring how different regulatory approaches shape its implementation and market reception. Results indicate significant variation in market responses to open banking announcements, presenting evidence of the underlying factors driving these disparities, such as the role of regulatory environments, technological infrastructures, and bank size in shaping market reactions.

1. Introduction

Open banking, an increasingly prevalent regulatory and technological initiative, has generated significant global attention, particularly in major advanced economies such as the United States and the United Kingdom and emerging economies such as India and Brazil. However, the concept remains somewhat amorphous, encompassing regulatory mandates and financial technology solutions. Diverse regimes exist worldwide, varying in data-sharing practices and regulatory approaches, ranging from clear mandates, as seen in the EU's Payment Services Directive Two (PSD2) and the UK's Open Banking Standard, to market-driven strategies, as observed in the United States. Market-led and regulatory approaches are blended in countries such as Singapore, Japan, South Korea, and India. Open banking aims to empower consumers through enhanced control over financial data (Preziuso et al., 2023), foster competition, and drive innovation within the banking sector (Stefanelli and Manta, 2023), all of which represent a positive development for digitally-engaged customers.¹ But while customers generally appear to benefit from open banking, the question remains whether open banking is good for the banking sector, representing the underlying primary research question in the following analysis. To date, there appears to be no clear answer *a priori*. Increased ease of customer switching and elevated collaboration with third-party providers may boost future profitability for some banks but pose challenges for others, particularly those reliant on market power and customer lock-in. Adapting to open banking requires substantial investment in digital infrastructure. However, the heightened transparency and customer control over their data could drive banks to improve service

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E-mail address: abhishek.mukherjee@waikato.ac.nz (A. Mukherjee).¹ Colangelo and Khandelwal (2024) summarise the empirical evidence to date as 'traditional banking customers lose out relative to users of digital banking.'<https://doi.org/10.1016/j.intfin.2025.102159>

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delivery, which can reduce operational costs over time (Preziuso et al., 2023). Furthermore, as banks integrate more comprehensive data analytics, they can better tailor their offerings to meet customer needs, a critical factor in attracting and retaining customers in a competitive landscape (He et al., 2023). Finally, open banking presents an opportunity to reach under-served populations and collaborate with fintech companies, offering a pathway to potentially offset losses in traditional areas (Dratva, 2020; Kavuri and Milne, 2021).

Uniform impacts on the banking sector from open banking are unlikely, especially when considering the impact of bank size. While smaller banks could potentially benefit from elevated market share owing to easier customer switching, larger banks, with advanced digital capabilities, could better leverage the opportunities presented by open banking, particularly through enhanced data analytics that enable tailored customer offerings (He et al., 2023). Furthermore, the initial costs of implementing open banking frameworks could particularly depress profitability in smaller banks with limited resources. Therefore, our second research question focuses on whether bank size is conducive to differential open banking investor acceptance or rejection.

Finally, owing to the global interlinkages in the banking sector and broader financial system, open banking announcements in one country could potentially influence bank stock prices and market dynamics in other countries through contagion effects. Just as an unexpected monetary policy shift in a major economy can lead to significant market reactions in other countries (Albagli et al., 2019; Ha, 2021), the announcement of open banking initiatives could have ripple effects across global financial markets. The possibility of this dynamic motivates our third research question: does the announcement of open banking in one country have spillover effects on banks in other countries? Except for (Fang and Zhu, 2023), who show open banking adoption is associated with a decline in lending by traditional banks and a rise in lending by informal financial institutions in the BRICS countries, empirical evidence surrounding the changes in actual bank valuation owing to the implementation of open banking remains sparse. By examining the effects of open banking announcements on the abnormal returns of 3,484 G12-based financial institutions surrounding specific announcement dates, we not only quantify investor response but also consider the effect of public and media interest in open banking as quantified through online searches and newspaper coverage.

While the impact of open banking announcements on bank returns has not been studied, previous research has established that announcements, particularly monetary policy announcements, can significantly affect banking returns; see Madura and Schnusenberg (2000), Yin et al. (2010), Ricci (2015).² We argue that open banking announcements, like monetary policy announcements, are critical events for banks and banking returns. Open banking announcements signal significant changes to the future competitive landscape in the banking sector, potentially benefiting some banks (e.g., agile new entrants) while creating challenges for others (e.g., large incumbents). Further, even if the announcement of open banking is expected, the announced detail can influence market expectations and valuations. Again, the analogy with monetary policy announcements holds. Monetary policy announcements are often seen as pivotal because they often clarify the specifics of an expected policy action: the magnitude of an expected interest rate cut, for example. Similarly, in the case of open banking, the market may anticipate its introduction, but the specific details, such as the scope of data-sharing requirements or the role that banks will play in shaping the regime, represent key information for investors as they form perceptions of future bank profitability and therefore bank returns. By focusing on the announcement of open banking, we highlight how they act as a catalyst for market reassessment, documenting their significance in determining bank share price performance.

This paper makes several distinct contributions. First, we provide novel empirical evidence surrounding the direct influence of open banking on perceived bank profitability as quantified by abnormal returns. Secondly, we identify an important lesson for countries that have yet to adopt open banking: the more banks are involved in the regulatory process, the more positive the regulation change is likely to be perceived. The third contribution shows that regulatory changes in major economies can generate significant spillover effects, specifically, contagion effects upon other countries. Hence, fostering international dialogue and coordination is essential to managing these global impacts effectively. Finally, using sentiment and news data, we capture the effects of alternative phenomena on abnormal returns other than the announcement of the regulatory intervention; these phenomena include ‘anticipation effects’ as potential regulation is discussed and effects that occur once the regulation becomes operational. In the case of open banking, this might be because banks and third-party providers develop and market their new products.

This paper is structured as follows: Section 2 outlines the foundational research upon which our selected research questions develop, specifically discussing the key similarities and differences across the banking sector while discussing the existing and developing open banking regimes adopted across G12 countries. Section 3 presents the data and methodology employed, while Section 4 presents the associated results. Further, Section 5 presents a thorough discussion regarding the presented results, along with associated policy implications and potential directions for future research. Finally, Section 6 concludes.

2. Previous research and the development of open banking

Open banking has recently captured much attention, where its development has been mapped by Gupta et al. (2024), while regional perspectives surrounding open banking are provided for the Netherlands (Preziuso et al., 2023), Europe more broadly (Preziuso et al., 2023), and emerging markets (Fang and Zhu, 2023). More specifically, Ziegler (2021) emphasised the importance of harmonising open banking regulations across jurisdictions to ensure smooth international operations, reflecting the model’s focus on standardisation and cross-border compatibility. In contrast, the market-driven model, highlighted by Smith and Geradin (2022), relies on innovation and competitive dynamics driven by market forces, suggesting that the financial services

² To the best of the author’s knowledge, no prior studies examining these exact research questions based on all of the selected cases were identified.

market, propelled by consumer demands and technological advancements, effectively regulates itself. This perspective on regulatory and market-driven models sets the stage for understanding their direct impact on the competitive and innovative dynamics within the financial sector. Open banking influences various activities, from market dynamics to service offerings. Strategic partnerships, vital under open banking, enable banks to remain competitive and innovate alongside fintech firms (Stefanelli and Manta, 2023). Dratva (2020) notes that banks must enhance their technological capabilities to stay relevant. Moreover, integrating advanced analytics and customer data allows banks to effectively tailor their offerings to meet consumer preferences (Grassi et al., 2022). Open banking also shifts consumer expectations, demanding greater transparency and improved customer experiences from financial institutions (Chan et al., 2022). Furthermore, adopting new technologies in response to open banking regulations allows financial institutions to reach under-served sectors, thereby expanding the competitive landscape (Kavuri and Milne, 2021). These insights reveal that open banking levels the playing field between established banks and new entrants and drives innovation through the increased demand for customer-focused financial solutions. Given this transformative influence, assessing how such shifts translate into financial outcomes for banks, particularly concerning profitability, is critical. Open banking introduces challenges and opportunities significantly influenced by a bank's capacity to navigate new regulatory environments and capitalise on technological advancements (Kavuri and Milne, 2021; Chan et al., 2022; Stefanelli and Manta, 2023). While the existing literature highlights the potential benefits and costs of open banking for banks qualitatively, there has been little effort to quantify these effects. The exception is (Fang and Zhu, 2023), who examine the impact of open banking on bank lending in BRIC countries. By studying the effects of open banking on bank returns, we provide a more comprehensive assessment of its impact on overall profitability compared to a narrower focus on lending. Furthermore, while (Fang and Zhu, 2023) focuses on major developing economies, the effects of open banking on banks in advanced economies remain unstudied. We fill this gap in the literature.

While individual banks may navigate the shifts brought about by open banking to enhance their profitability and market position, it is equally crucial to consider the broader implications of these changes on the global financial landscape. The cross-country impact and global linkages of open banking illustrate how financial announcements in one country can significantly influence stock prices and market perceptions in others, underscoring the importance of coordinated regulatory approaches and international cooperation in financial regulation. Studies highlight how monetary policies, similar to open banking regulations, influence asset prices and the broader economy through changes in the cost of capital and investment opportunities (Thorbecke, 1997; Cochrane and Piazzesi, 2002; Bernanke and Kuttner, 2005). Just as an unexpected monetary policy shift can lead to significant market reactions, the announcement of open banking initiatives can have ripple effects across global financial markets (Rigobon and Sack, 2004). Additionally, the unexpected nature of some policy announcements can cause significant volatility, with markets reacting not just to the policies themselves but also to their potential future implications (Reinhart and Simin, 1997; Farka, 2009).

2.1. Banking sector characteristics

Summary statistics that capture the heterogeneous nature of the banking sectors in our sample prior to open banking being adopted are presented in Table 1. It is observed that in terms of concentration, as measured by asset share of the three largest commercial banks, Sweden, Belgium, and Switzerland are the most concentrated markets, whilst the United States and Japan appear to have less concentrated banking sectors. The Boone index, which measures competition using the elasticity of bank profits to marginal costs, suggests Australia and the Netherlands were the less competitive banking sectors in the decade before 2012, whilst the Spanish, Swedish, Canadian and United States banking sectors were the most competitive. The Australian and Canadian banking sectors appear to be the best performers in terms of profitability, with their net interest margin and return on assets falling at the top of the ranges for these two metrics. Conversely, Germany and Japan appear to be the worst performers in terms of profitability when those metrics are considered. Germany's and Japan's low profitability, when viewed with the fact that they have a low percentage of non-performing loans, suggests a distinct level of conservatism in their respective banking sectors. Such conservatism might reflect the importance of banks in these countries as a source of finance for firms in those economies. Corporations in Germany and Japan (and Italy) rely more on bank financing than market financing in other countries in our sample, as evidenced by the ratio of stock market capitalisation to bank assets.

Open banking involves the sharing of financial data with third-party providers. Data sharing will be more likely where there exists high trust, more disclosure, and legal frameworks that will resolve conflicts. (Ergungor, 2004) and Aggarwal and Goodell (2016) suggests an economy where trust and disclosure are more prevalent and the legal system more effective at enforcing contracts, it could therefore be hypothesised that open banking might be better received in countries where market finance is traditionally more prevalent given market finance relies on social trust, extensive disclosure, and confidence in contractual agreements; see Aggarwal and Goodell (2016). Conversely, open banking represents a threat in countries where the banking system is built on long-term relationships, trust is lower, and the legal system is less well-placed to deal with conflict. Open banking could, therefore, be more disruptive in countries where bank financing has traditionally been more prevalent.

2.2. Open banking regime characteristics

In Table 2, we report the key characteristics of the open banking regime implemented in each country in our sample, reporting the announcement date of open banking upon which our analysis is built. Europe was the first region to implement development, followed by the UK in 2016 and Australia and Switzerland in 2017. Japan and Canada announced open banking in 2018, while the US was the last adopter in our sample. Further information surrounding the rationale for adopting open banking in each country is included. Enhancing competition is the most prevalent reason. However, part of the rationale for open banking in Canada and

Table 1
Selected comparative banking statistics on our sample.

Country	Top 3	Boone	Net interest margin	After tax ROA	Foreign owned	Non performing loans	Regulatory capital to risk-weighted assets	Electronic pmt	Bank Assets to GDP	Non-Bank Assets to GDP	Market:Bank finance ratio
Australia	89.60	0.00	2.03	1.01	41.73	1.08	10.86	79.19	196.61	63.73	1.11
Belgium	93.71	-0.04	1.29	0.22	40.82	3.71	14.85	71.05	290.18	28.18	0.56
Canada	88.42	-0.09	2.36	0.80	39.91	0.65	14.25	69.22	165.42	59.32	0.92
France	73.31	-0.03	0.95	0.29	5.00	4.29	11.79	65.14	347.42	63.31	0.72
Germany	85.94	-0.04	0.98	0.04	13.82	2.86	13.99	64.20	347.09	34.47	0.33
Italy	67.23	-0.03	1.98	0.51	8.00	13.80	11.39	27.85	201.12	19.95	0.48
Japan	54.28	0.00	1.21	0.03	1.09	2.43	12.20	44.80	294.19	46.91	0.40
Netherlands	88.67	0.01	0.97	0.52	44.45	3.10	12.97	80.16	352.38	69.95	0.75
Spain	82.79	-0.36	1.92	0.54	7.09	7.48	11.72	43.41	289.19	27.56	0.58
Sweden	97.75	-0.07	1.31	0.61	1.00	0.70	10.80	84.90			1.72
Switzerland	92.27	-0.06	0.80	0.20	21.82	0.80	14.41		329.83	47.04	1.36
United Kingdom	70.86	-0.05	1.50	0.20	54.91	3.59	13.95	65.26	742.34	31.07	1.15
United States	41.34	-0.06	3.50	0.92	26.73	3.30	13.51	64.29	111.20	104.91	2.35

The variables we use from the 2017 World Bank Global Financial Development survey are: *Top 3* (Assets of three largest commercial banks as a share of total commercial banking assets), *Boone* (The elasticity of bank profits to marginal costs. An increase suggests less competition), *Net interest margin* (net interest revenue as a share of its average interest-bearing (total earning) assets), *After tax ROA* (Bank return on assets (% , after tax)), *Foreign owned* (Percentage of the number of foreign owned banks to the number of the total banks in an Economy), *Non-performing loans* (Ratio of defaulting loans to total gross loans, %), *Regulatory capital to risk-weighted assets*, *Electronic pmt* (The percentage of respondents who used electronic payments in the past 12 months to make payments on bills or to buy things using money from their accounts (% age 15+)). These variables are the averages over the period 2002–2012 or the averages of the available data within that period, except for non-performing loans, which is the 2012 value and electronic payments which is its 2011 value. The ratio of *Bank Assets to GDP* and *Non-bank Assets to GDP* are the 2006–12 averages from the Financial Stability Board monitoring report. Non-bank Assets are the sum of assets of institutions that are classified as performing economic functions EF1–EF5. Institutions performing those functions are classed as shadow banks; see the FSB Global Shadow Banking Monitoring Report 2017, p.8. *Market:Bank finance ratio* is the 1996–2003 mean of the ratio of Domestic stock market capitalisation divided by domestic assets of deposit money banks from Aggarwal and Goodell (2009) and Aggarwal and Goodell (2016).

Table 2
Summary of open banking implementation by country.
Source: Colangelo and Khandelwal (2024) and authors' own research.

Country	Open banking announcement date	Rationale	Type of regime	Data sharing	Notes on phasing
Australia	20-Jul-17	Consumer empowerment	Regulatory	Mandatory and reciprocal	Started with largest banks
Canada	26-Sep-18	Data privacy and security competition	Regulatory	Mandatory	
Europe	24-Jul-13	Consumer empowerment	Regulatory	Mandatory and asymmetric	Started with nine largest banks
Japan	1-Jun-18	Competition			
Switzerland	6-Nov-17	Competition	Market driven		
UK	9-Aug-16	Competition	Regulatory	Mandatory and asymmetric	
US	19-Oct-23	Data privacy and security/competition	Market driven	Mandatory and asymmetric	

the US was to improve data security and, in Australia and Canada, to empower customers by giving them greater control over their data. Most countries require the mandatory sharing of data, where the sharing of data in Japan is defined as semi-mandatory.³ Finally, turning to the type of regime, most of the open banking regimes in our sample are regulatory regimes, that is, open banking with regulator-endorsed standards. Switzerland and the US are the only countries with market-led open banking regimes, defined as 'bilateral and/ or voluntary industry associations and standards for competitive differentiation'.⁴

3. Data and methodology employed

3.1. Open banking implementation dates

We generate a timeline of announcements surrounding the implementation of open banking projects across G12 nations. The collated dates of formal open banking announcements are presented in Table 3. This broad process was conducted using several distinct sub-processes, including detailed searches of all respective central bank websites and databases, searching for the first initial statement regarding the specific term "open banking". Such results are then supported and further verified using the LexisNexis database. As noted in Section 2, open banking was first adopted in the European Union in 2013. Starting with the UK announcing it was implementing open banking in mid-2016, there has been a steady adoption of open banking by countries in our sample, with Canada being the latest in our sample to adopt in mid-2018.

3.2. Measuring public interest and media coverage of open banking

Media coverage and public interest surrounding open banking will not be solely concentrated around the announcement of open banking. Before the announcement of open banking, there exists topical debate in the media about the merits of implementing open banking. Further, there may also be informal signals from policymakers and politicians that open banking is on the horizon, promoting public interest and media comment. After the announcement of open banking, further details might emerge about how the open banking regime will be operationalised, and there is likely to be increases in media and public interest once new products

³ To explain why Japan is classed as semi-mandatory, aDeloitte report noted 'the FSA has established an authorisation process for TPPs, introduced an obligation for banks to publish their Open APIs policies, and encouraged banks to contract with at least one TPP by 2020. Most Japanese banks are taking this regulatory encouragement very seriously and are on track to fulfil the 2020 deadline'.

⁴ These definitions were obtained in the following WhitePaper, Open Banking in Switzerland part 1.

Table 3
Dates of Key Open Banking Announcements.

Country	Date	Details	Link
Canada	26-Sept-18	Canadian government expressed interest in exploring the potential benefits and challenges of open banking. This interest was part of a broader trend towards financial innovation and consumer-driven finance. The government's objective was to assess how open banking could provide consumers with more control over their financial data, promote greater competition and innovation in the financial sector, and contribute to the overall health of the economy.	Available here
France Germany Italy Belgium Netherlands Spain Sweden	24-Jul-13	The Second Payment Services Directive (PSD2) was announced by the European Commission on July 24, 2013. This directive aimed to modernise Europe's payment services to benefit consumers and businesses, promoting innovation, competition, and efficiency in the market. It introduced strict security requirements for electronic payments and the protection of financial data, encouraging lower prices for payments. PSD2 was a key regulatory framework enabling Open Banking by mandating banks to provide third-party providers access to their customers' accounts (with the customers' consent), thereby fostering a more integrated and competitive financial ecosystem.	Available here
Japan	01-Jun-18	Japanese Financial Services Agency (FSA) began promoting it as part of its broader efforts to enhance the competitiveness and functionality of the financial sector. This initiative was part of a strategy to encourage banks to open their APIs (Application Programming Interfaces) to third parties, such as fintech companies, to create new services and improve the customer experience in the financial industry. The FSA aimed to facilitate a more efficient and innovative banking ecosystem, promoting financial technology to stimulate economic growth and enhance consumer convenience.	Available here
United Kingdom	09-Aug-16	Open Banking was first announced in the United Kingdom in August 2016. The Competition and Markets Authority (CMA) issued a report that mandated nine of the UK's biggest banks to allow licensed startups direct access to their data, with the customer's consent. This initiative aimed to increase competition and innovation in the financial services industry, allowing consumers to share their financial data with third-party providers securely. Open Banking officially went live in the UK in January 2018.	Available here
United States	19-Oct-23	The Consumer Financial Protection Bureau (CFPB) issued a proposed rule related to Section 1033 of the Dodd-Frank Act on October 19, 2023. This proposed rule, known as the "Personal Financial Data Rights" rule, aims to implement Section 1033 by requiring covered financial institutions to provide consumers and authorised third parties with access and portability options for their financial data.	Available here
Australia	20-Jul-17	The Open Banking initiative in Australia was officially announced in the 2017-18 Federal Budget. Following this, on 20 July 2017, the Australian Government commissioned the Open Banking Review, led by Mr Scott Farrell, to recommend the most appropriate model for implementing Open Banking in Australia.	Available here
Switzerland	06-Nov-17	Swisscom launched its Open Banking Hub towards the end of 2017, positioning itself as one of the pioneers in the Swiss open banking sector. This move was part of a broader industry trend towards embracing open banking, even without strict regulatory mandates like those in the EU (PSD2). The Swisscom Open Banking Hub is a platform facilitating the exchange of financial data and services between banks and third-party providers (TPPs), aiming to foster innovation and enhance the digital offerings available to customers.	Available here

and services are developed and marketed. Media coverage is critical as it amplifies awareness of open banking initiatives and critically examines their impact, challenges, and potential to revolutionise how consumers interact with financial services. Media entities contribute significantly to these innovative banking models' broader acceptance and integration into everyday financial activities by drawing attention to key developments and fostering a discourse on open banking. For these reasons, in addition to studying the effects of the announcement of open banking on bank returns, we also study how media attention and public interest in open banking affect banks' returns. To measure public interest in open banking, we utilise Google search data as collated by Google Trends, which has been employed by numerous studies to track public interest in topics (Stephens-Davidowitz, 2017). Google Trends tracks searches for specific terms and topics, and we use it to track global interest in the topic of open banking, where the data is normalised so that the observation with the most searches possesses an index value of 100. Associated media attention is measured via counting the frequency of articles returned using language-specific search terms for "open banking" and similar search terms in

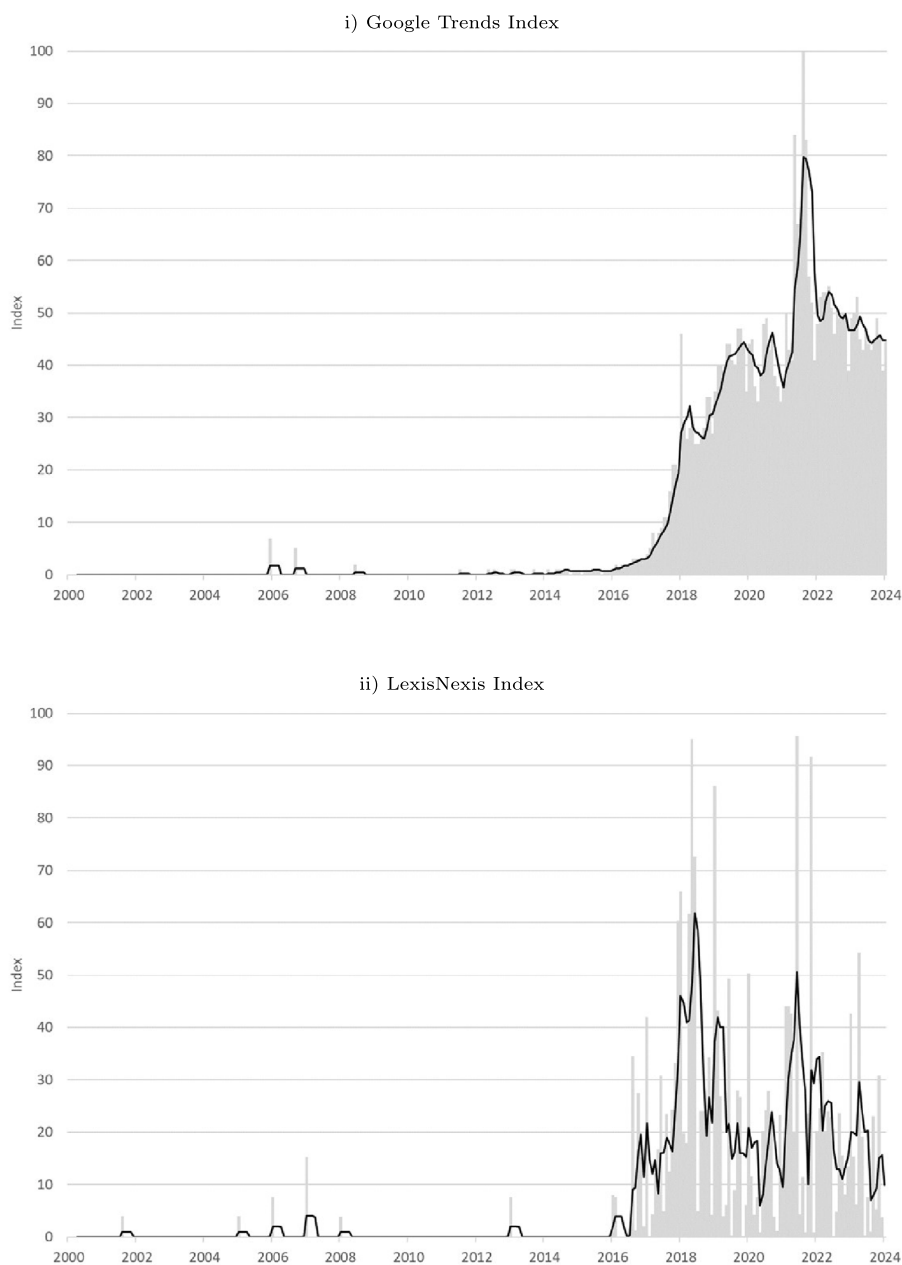


Fig. 1. G12 news coverage and public interest in open banking.

Note: In our analysis, we utilise LexisNexis and Google Trends to investigate the media coverage surrounding open banking. LexisNexis provides a comprehensive database of news articles, allowing us to gauge the extent of media attention devoted to open banking. We track mentions and discussions of open banking in mainstream global financial newspapers to understand its portrayal and reception in the media. Additionally, we leverage Google Trends to explore public interest in open banking as evidenced by their search behaviour.

mainstream global financial newspapers via the LexisNexis newspaper database⁵ We create global and country-specific versions of this metric.

Fig. 1 presents evidence of global public interest in open banking as measured by Google searches. Several distinct periods of particular interest in open banking exist. The first is identified during the early stages of the banking crisis associated with the collapse of the subprime credit market in the United States, highlighting the public's quest for alternative banking models in the

⁵ Several papers have studied how newspaper coverage can influence stock prices; see Barber and Odean (2008) and Wu and Lin (2017), for example.

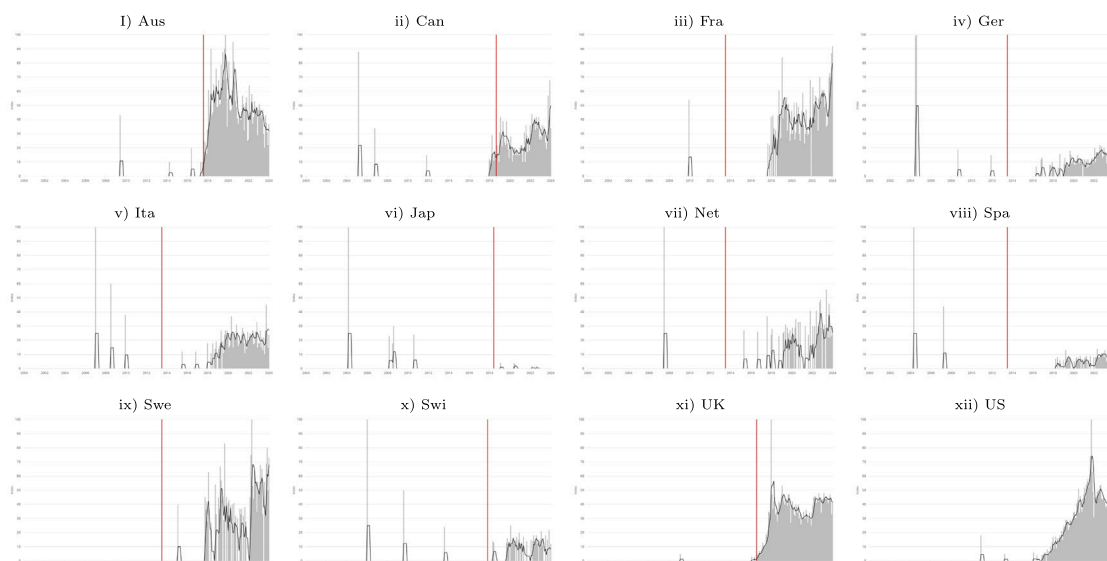


Fig. 2. Indexed news search intensity, LexisNexis.

Note: In our study, we utilised LexisNexis to analyse and index media coverage based on open banking in each country examined. This database allowed us to search for and retrieve articles from various sources, providing comprehensive news coverage and opinions. The included red line indicates the date on which formal open banking announcements were introduced in each country respectively. By examining articles published in various newspapers and publications, we could track the evolution of media attention towards open banking over time. This analysis helped us understand how media coverage influenced public awareness and perception of open banking, providing valuable insights into its potential impact on bank returns. .

wake of financial instability. This period marks a critical juncture where trust in traditional banking was questioned, paving the way for discussions around more open and transparent banking frameworks (Meegan et al., 2018; Corbet et al., 2022; Akyildirim et al., 2022). Subsequent phases of heightened interest, particularly post-2011, correlate with significant technological advancements and regulatory interventions aimed at rehabilitating and innovating the financial services sector. The uptrend started around 2013 but accelerated substantially after 2016, aligning with the progressive rollout of regulatory frameworks such as PSD2 in Europe, which explicitly sought to foster a more competitive and innovative banking ecosystem by mandating data sharing and third-party access.

The peak of interest observed in early 2021 can be attributed to the unprecedented challenges posed by the COVID-19 pandemic. The pandemic catalysed accelerated digital transformation across sectors, with the banking industry at the forefront of adopting digital-first solutions to address the limitations imposed by physical distancing and lockdown measures (Elnahass et al., 2021; Tabak et al., 2022) and several prominent attempts to implement sweeping changes through global banking through the use of FinTech (Cuadros-Solas et al., 2024), and in particular, CBDC (Cioroianu et al., 2023; Hoang et al., 2023; Corbet et al., 2024). Global media attention presents a similar trend as that observed with Google search data, but global media coverage had a more noticeable period of elevation in 2018 when the standards accompanying Europe's Second Payment Services Directive (PSD2) were published to protect customer data and ensure payment security.⁶

The phases of media interest and specific coverage relating to open banking are far from uniform across countries, and this is illustrated by Fig. 2. We observe regional clusters where the initial surge of interest in open banking within European nations can be attributed to the aftermath of the financial crises that particularly hit the region. The Global Financial Crisis and the subsequent economic downturns led to reevaluating existing financial systems and exploring more robust, transparent, and consumer-friendly banking models. Open banking, with its promise of fostering competition, enhancing customer choice, and driving innovation, naturally aligned with these objectives. Further, sustained growth of interest has been broadly identified in all countries in our sample since 2016, except for Germany, Japan, Spain, and Switzerland. In line with its adoption of open banking towards the end of the sample period, the media interest in open banking in the US is concentrated around the period 2021 through 2023.

3.3. Data description

To examine the effects of open banking announcements upon the international banking system, several distinct approaches are undertaken. First, stock price data is collated across respective G12 stock markets, where banking institutions are identified using

⁶ See the revised Payment Services Directive (PSD2) and the transition to stronger payments security, available [here](#).

Table 4
Summary statistics relating to corporate characteristics of each examined banking sector.

Country	Obs	Mkt Cap (log,\$US)	EPS	Gov. Pillar	Controv. Score
Australia	207	9.400	0.276	66.085	83.186
Belgium	32	9.728	1.019	44.330	100.000
Canada	365	9.335	0.814	37.171	87.458
France	59	9.685	6.115	60.310	78.781
Germany	149	9.374	0.449	53.622	86.425
Italy	62	9.740	-0.495	63.198	91.980
Japan	182	9.601	13.015	49.805	92.566
Netherlands	24	9.715	3.270	69.014	97.068
Spain	15	10.108	0.926	64.107	78.634
Sweden	67	9.612	3.967	44.727	96.836
Switzerland	54	9.827	6.778	42.670	91.788
United Kingdom	538	9.160	0.320	44.945	95.177
United States	1,729	9.507	1.695	47.081	90.422

Note: To investigate the impact of open banking on the global banking sector, data from 2000 to 2023 covering G12 countries' banking institutions was analysed. This data includes 3,484 institutions classified under the TRBC system with 6,264 daily observations. The analysis, summarised in the above Table, evaluates banks based on Environmental, Social, and Governance (ESG) criteria. This data highlights variations in bank size, ESG ratings, and readiness for controversies across different regulatory and operational environments.

TRBC classifications⁷ accounting for 3,484 institutions to analyse between 1 January 2000 and 29 December 2023, resulting in 6,264 daily observations. Table 4 provides a comparative overview of banking performance metrics, revealing that US banks generally underperform in terms of governance scores despite their dominance in total observations compared to their international peers. Further, banks in Canada, the US, the UK, Switzerland, and Sweden exhibit significantly lower governance scores. Additionally, Spanish, French, German, and Australian banks are noted for their higher exposure to controversies, suggesting a potential lack of preparedness in these areas. Summary statistics also indicate substantial differentials in average bank size, governance performance, and readiness for handling controversies, reflecting the diverse regulatory and operational landscapes in which these banks operate.

Next, Table 5 presents the descriptive statistics of the daily log returns of all bank stocks in our study by country. Countries like Germany and Spain display high levels of variance in their banking stocks, suggesting greater volatility. This could indicate their banking sectors' susceptibility to fluctuations in the national economic climate, regulatory changes, or broader economic pressures (Chira et al., 2013; Song, 2017; Danielsson et al., 2018). The extreme skewness and kurtosis observed, particularly in countries such as France, Germany, and Spain, suggest that infrequent yet high-impact events heavily influence stock returns. These may include significant policy shifts, geopolitical developments, or substantial economic transitions. The presence of fat tails in the return distributions, as indicated by high kurtosis, suggests that extreme gains and losses are more prevalent than one might expect under a normal distribution scenario. The negative returns observed at lower percentiles across all countries reflect the potential for considerable losses, likely influenced by downturns in the market, financial crises, or adverse economic conditions, such as those experienced during the European sovereign debt crisis (Grobys, 2014; Samarakoon, 2017; Eisdorfer and Misirli, 2020; Chen and McMillan, 2020). Conversely, positive returns at higher percentiles indicate periods of substantial profitability, possibly during economic booms or due to successful banking strategies or favourable monetary policies.⁸

Table 6 provides summary statistics for the various MSCI Indices, as well as the three control variables used in our empirical methodology. The MSCI indices track bank stocks across a range of market capitalisation, revealing nuanced behaviour patterns under varying economic conditions. The variance across these indices is relatively low, suggesting that bank stock prices generally exhibit moderate fluctuations. However, indices associated with smaller market capitalisation, such as the MSCI World Mid Cap and Small Cap Banks, show higher variance, indicating greater volatility. This reflects the higher risk profile of smaller banks, which may be more susceptible to market dynamics and economic disruptions. Skewness values are predominantly negative, indicating a propensity for returns to lean towards negative outcomes more frequently than positive ones. The significant kurtosis observed across the indices suggests that returns are heavily tailed or prone to outliers. This highlights the potential for extreme losses or gains, a characteristic often associated with the banking sector's exposure to systemic risks and abrupt market shifts. The percentile distribution points to a constrained range of returns, with lower percentiles often becoming negative, suggesting losses, while upper

⁷ The Refinitiv Business Classification (TRBC) is a global industry classification system for companies. Initially developed by the Reuters Group as the Reuters Business Sector Scheme (RBSS), it was re-branded as the Thomson Reuters Business Classification (TRBC) after the acquisition of Reuters Group by the Thomson Corporation in 2008. Subsequently, in 2020, it was re-branded again as The Refinitiv Business Classification (TRBC) following the formation of Refinitiv in October 2018. TRBC is owned and operated by Refinitiv and serves as the foundation for Refinitiv Indices. TRBC is a market-based classification system, akin to other systems such as the GICS and ICB, categorising companies based on their impact on markets rather than establishment-based systems like the North American Industry Classification System (NAICS). Primarily utilised in the financial investment and advisory realm, TRBC assists investors in identifying comparable companies, analysing trends, and making informed decisions. Its applications include fund allocation and portfolio benchmarking by investment managers, identification of acquisition targets and financial restructuring opportunities by investment bankers, and competitive analysis by corporations.

⁸ The modest median returns across these regions might point to these banking markets' inherent stability and maturity, suggesting that while opportunities for significant gains exist, the typical outcomes are conservative. This scenario likely mirrors the competitive nature of the international banking environment, where intense competition restricts large average profit margins.

Table 5
Descriptive statistics of banking stocks analysed by geographic region.

	Mean	Variance	Skewness	Kurtosis	Percentile								
					1%	5%	10%	25%	50%	75%	90%	95%	99%
Australia	0.0007	0.0001	26.1912	1,381.19	-0.0190	-0.0093	-0.0058	-0.0023	0.0005	0.0035	0.0071	0.0102	0.0198
Belgium	0.0004	0.0002	7.2421	212.49	-0.0340	-0.0163	-0.0100	-0.0037	0.0002	0.0045	0.0100	0.0158	0.0364
Canada	0.0034	0.0007	17.6128	390.36	-0.0178	-0.0089	-0.0059	-0.0022	0.0012	0.0054	0.0107	0.0157	0.0407
France	0.0026	0.0063	64.2499	4,521.04	-0.0222	-0.0129	-0.0094	-0.0041	0.0001	0.0049	0.0114	0.0182	0.0394
Germany	0.0076	0.2676	79.1573	6,269.86	-0.0193	-0.0098	-0.0067	-0.0027	0.0006	0.0042	0.0083	0.0114	0.0237
Italy	0.0010	0.0006	41.3666	2,060.60	-0.0201	-0.0110	-0.0076	-0.0030	0.0004	0.0040	0.0081	0.0116	0.0225
Japan	0.0004	0.0001	33.7480	1,601.30	-0.0198	-0.0094	-0.0062	-0.0023	0.0005	0.0032	0.0062	0.0087	0.0167
Netherlands	0.0003	0.0001	2.5631	78.16	-0.0219	-0.0111	-0.0071	-0.0029	0.0002	0.0037	0.0076	0.0107	0.0209
Spain	0.0096	0.3008	78.2078	6,167.36	-0.0472	-0.0199	-0.0111	-0.0046	0.0000	0.0039	0.0108	0.0200	0.1007
Sweden	0.0008	0.0031	75.2343	5,852.35	-0.0240	-0.0122	-0.0084	-0.0035	0.0000	0.0032	0.0077	0.0120	0.0277
Switzerland	0.0002	0.0001	0.0476	10.34	-0.0254	-0.0124	-0.0086	-0.0035	0.0002	0.0041	0.0087	0.0120	0.0249
United Kingdom	0.0019	0.0063	74.0751	5,709.83	-0.0231	-0.0131	-0.0089	-0.0037	0.0005	0.0048	0.0096	0.0134	0.0246
United States	0.0004	0.0002	1.0626	25.27	-0.0333	-0.0183	-0.0121	-0.0049	0.0004	0.0063	0.0126	0.0173	0.0323

Note: To examine the effects of open banking announcements upon the international banking system, stock price data is collated across respective G12 stock markets, where banking institutions are identified using TRBC classifications accounting for 3,484 institutions. Our sample considers the period between 1 January 2000 and 29 December 2023, resulting in 6,264 observations.

Table 6
Summary statistics of analysed MSCI indices and control variables.

Name	Mean	Variance	Skewness	Kurtosis	Percentile								
					1%	5%	10%	25%	50%	75%	90%	95%	99%
MSCI All Country World Large Cap	0.0001	0.0001	-0.7788	14.68	-0.0291	-0.0158	-0.0113	-0.0046	0.0001	0.0052	0.0110	0.0155	0.0283
MSCI All Country World Mid Cap	0.0000	0.0002	-0.8310	11.93	-0.0354	-0.0199	-0.0138	-0.0057	0.0001	0.0062	0.0131	0.0188	0.0333
MSCI All Country World Small Cap	0.0002	0.0002	-0.2255	8.85	-0.0399	-0.0209	-0.0147	-0.0067	0.0001	0.0070	0.0149	0.0213	0.0406
MSCI World Large Cap Banks Group	0.0002	0.0002	-0.3002	10.82	-0.0347	-0.0192	-0.0133	-0.0055	0.0002	0.0065	0.0135	0.0189	0.0333
MSCI World Mid Cap Banks Group	0.0000	0.0002	-0.5762	9.98	-0.0372	-0.0220	-0.0153	-0.0066	0.0003	0.0070	0.0148	0.0209	0.0355
MSCI World Small Cap Banks	0.0002	0.0002	-0.1455	8.47	-0.0418	-0.0217	-0.0157	-0.0071	0.0001	0.0074	0.0156	0.0228	0.0424
VIX Volatility Index	0.0024	0.0052	2.0364	17.19	-0.1485	-0.0939	-0.0716	-0.0377	-0.0030	0.0323	0.0791	0.1194	0.2394
WTI Crude	-0.0001	0.0024	-41.0299	2,461.20	-0.0684	-0.0378	-0.0265	-0.0120	0.0002	0.0130	0.0269	0.0369	0.0640
Gold	0.0004	0.0001	-0.0767	6.01	-0.0302	-0.0170	-0.0115	-0.0045	0.0000	0.0058	0.0123	0.0167	0.0273

Note: To examine the effects of open banking announcements upon the international banking system, various MSCI banking indices are were collected. Our sample runs between 1 January 2000 and 29 December 2023, resulting in 6,264 observations.

percentiles show modest gains. This range underscores the cyclical nature of the banking industry, which is heavily influenced by overall economic health and specific sectoral shifts. Furthermore, the extreme conditions experienced in smaller banks' located in both lower and upper percentiles underscore their vulnerability compared to larger banks, which tend to have more stable returns. This disparity can be attributed to smaller banks' limited diversification and higher operational risks.

3.4. Estimating the abnormal return owing to open banking on individual bank returns

We employ the exponential generalised autoregressive conditional heteroscedasticity (EGARCH) model developed by Nelson (1991). Our mean equation of the EGARCH(1,1) model is:

$$r_{i,t} = a_0 + \beta_1 r_{i,t-1} + \beta_2 RBM_{j,t} + \beta_3 d_{OB_{j,t}} + \beta X + \varepsilon_t, \varepsilon_t | F_{t-1} \sim N(0, h_t) \quad (1)$$

while we express the variance equation of our EGARCH(1,1) model as follows:

$$\ln(h_t^2) = \omega + \alpha \varepsilon_{t-1} + \gamma (|\varepsilon_{t-1}| - E(|\varepsilon_{t-1}|)) + \beta \ln(h_{t-1}^2) \quad (2)$$

For a bank indexed by i and listed on the share market in country j , $r_{i,t}$ ($r_{i,t-1}$) represents (the lagged value) of the observed bank returns. Bank returns are calculated as $r_{i,t} = \ln \frac{P_{i,t}}{P_{i,t-1}}$, where $P_{i,t}$ is the share price of bank i . $RBM_{j,t}$ represents the daily return of

the benchmark index of country j .⁹ X is a vector of control variables for global market conditions: the VIX, gold, and oil. The $d_{OB_{j,t}}$ term in Eq. (1) takes a value of one if the trading day is within a specified window around the open bank announcement in country j and is zero otherwise; we will discuss the windows in more detail below. The coefficient on $d_{OB_{j,t}}$, β_3 , therefore, estimates the impact of the open banking announcement in country j on abnormal bank returns. The term ε_t represents the error term at time t , capturing the idiosyncratic risk or the firm-specific risk not explained by the market return and other explanatory variables in our model. F_{t-1} is the information set at $t-1$. We also run specifications of Eq. (1), where $d_{OB_{j,t}}$ is dropped and in one specification replaced by GT_t and in another $News_{j,t}$; where GT_t is our Global Google Trends index based on searches for open banking and $News_{j,t}$ is our country-specific newspaper coverage index for open banking searches.

Our empirical framework falls within the Generalised Autoregressive Conditional Heteroskedastic (GARCH) family of models. The variance equation, Eq. (2), is needed to ensure that our estimated standard errors in Eq. (1) account for dynamic heteroskedasticity (Engle, 1982; Bollerslev, 1986). Not accounting for dynamic heteroskedasticity could lead to incorrect inferences about the significance of open banking announcements in our analysis. We considered various options within the Generalised Autoregressive Conditional Heteroskedastic (GARCH) family of models. The EGARCH model has the advantage of ensuring the positivity of estimated conditional variance without any parameter restrictions, in contrast to the alternative GARCH specifications.¹⁰ It also imposes fewer parameter restrictions to guarantee the stationarity of the conditional variance.

To adequately and robustly assess the impact of open banking on abnormal returns, we measure the impact over multiple windows surrounding each country's announcement at time t_0 : $[-60,-1]$, $[-20,-1]$, $[-10,-1]$, $[-5,-1]$, $[-3,-1]$, $[-2,-1]$, $[-1, t_0]$, $[t_0,+1]$, $[t_0,+2]$, $[t_0,+3]$, $[t_0,+5]$, $[t_0,+10]$, $[t_0,+20]$, and $[t_0,+60]$. In total, the results are selected based on the structure of best fit selected using each of the Akaike information criterion (AIC), the Bayesian information criterion (BIC) and the Hannan–Quinn information criterion (HQ), respectively. Each number refers to the specific trading days relative to each identified event. Specifically, the periods $[0,+20]$ and $[0,+60]$ are used to reflect abnormal return behaviour, respectively, for the periods one and three months after each identified event, reflecting the persistence of the effect of the announcements on returns in the aftermath of each event (Akyildirim et al., 2021).

3.5. Estimating the effect on country-level bank index returns

In addition to studying the effects of open banking announcements on individual bank returns, we also estimate the effects on banking returns at a country level. We re-estimate Eq. (1) for each country in our sample with returns on the relevant national MSCI banking index as the dependent variable. This model, therefore, estimates the average response to the announcement of open banking across all listed banks in the country. As with our bank-level analysis, we measure the effect of open banking across numerous windows around the open banking announcement date. Eq. (1) is modified to be:

$$r_{MSCI_{j,t}} = a_0 + \beta_1 r_{MSCI_{j,t-1}} + \beta_2 RBM_{j,t} + \beta_3 d_{OB_{k,t}} + \beta X + \varepsilon_t, \varepsilon_t | F_{t-1} \sim N(0, h_t) \quad (3)$$

where $r_{MSCI_{j,t}}$ is the daily return on the banking MSCI in country j . $d_{OB_{k,t}}$ takes a value of one if the trading day is within a specified window around the open bank announcement in country k and is zero otherwise. In some specifications, j and k are the same; that is, we estimate the impact of open banking announcements on banking returns within the same country. In other specifications, j and k are different: we estimate the effect of the announcement of open banking in one country on banking returns in another country. That is, we model cross-border spillovers of the announcement of open banking. Finally, to focus on the differential impact of open banking announcements by bank size, we estimate a final variant of Eq. (1).

$$r_{MSCI_{s,t}} = a_0 + \beta_1 r_{MSCI_{s,t-1}} + \beta_2 RW_t + \beta_3 d_{OB_i} + \beta X + \varepsilon_t, \varepsilon_t | F_{t-1} \sim N(0, h_t) \quad (4)$$

where $r_{MSCI_{s,t}}$ is the daily return on the world banking MSCI for banks in size category s . d_{OB_i} takes a value of one if the trading day is within a specified window around the announcement of open banking in any country in our sample and is zero otherwise. RW_t represents the returns of the World MSCI.

4. Empirical results

4.1. The effect of open banking announcements on banking institutions

In Eq. (1), β_3 estimates individual bank responses to the announcement of open banking. Each sub-figure in Fig. 3 presents, for a given country, the distribution of these individual bank responses across various event windows, highlighting how immediate financial market responses to regulatory changes in open banking vary markedly across countries. Specifically, countries such as

⁹ We also employed the selected companies' local stock market banking indices where available and other alternative measures such as the MSCI world index. However, results remained unchanged from those obtained from representative national market indices. Estimates of these additional results and testing procedures are available from the authors upon request.

¹⁰ EGARCH exploits information contained in realised volatility measures while providing a flexible leverage function that accounts for return-volatility dependence. While remaining in a GARCH-like modelling framework and estimation convenience, the model allows independent return and volatility shock. This dual shock nature leaves room for establishing a variance risk premium. In our selection, other competitive models included EGARCH, TGARCH, Asymmetric Power ARCH (APARCH), Component GARCH (CGARCH) and the Asymmetric Component GARCH (ACGARCH). The optimal model was chosen according to three information criteria, namely the Akaike (AIC), Bayesian (BIC) and Hannan–Quinn (HQ).

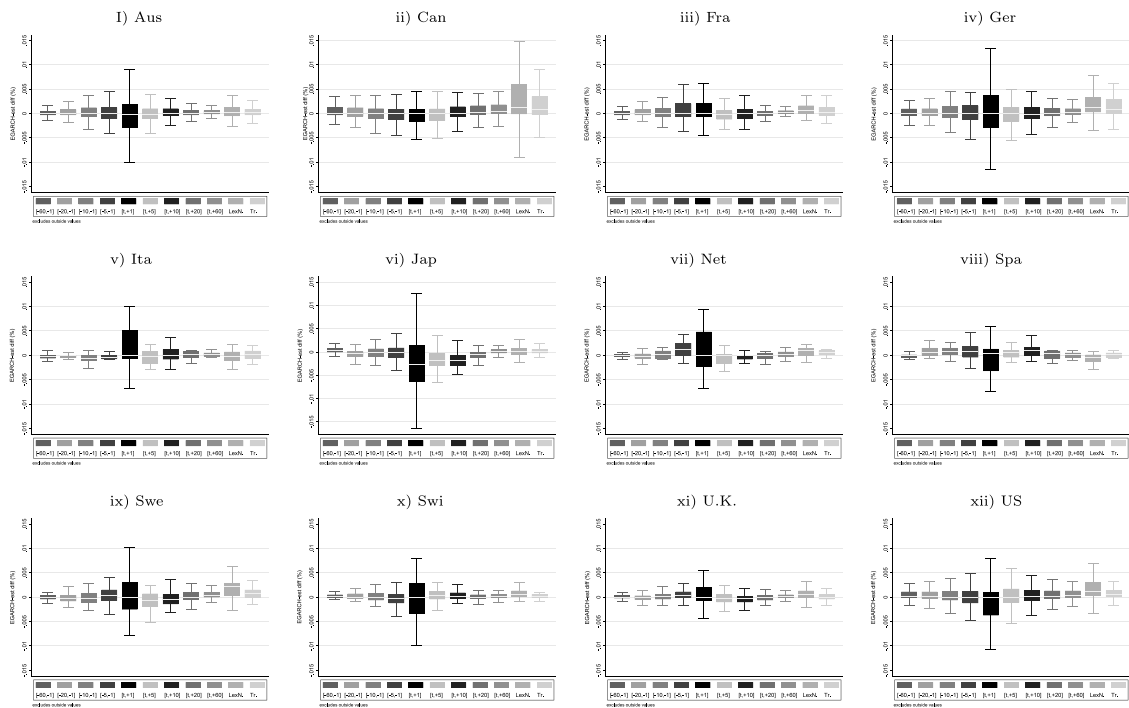


Fig. 3. EGARCH-estimated return differential due to open banking announcements (by geographic region).
 Note: We analyse the impact of open banking announcements utilising an EGARCH model specified as $r_{i,t} = a_0 + \beta_1 r_{i,t-1} + \beta_2 RBM_{j,t} + \beta_3 d_{OB_{j,t}} + \beta X + \epsilon_t$ where $r_{i,t-1}$ captures lagged returns of bank i , X is a vector of control variables, namely the VIX, and gold and oil prices, $RBM_{j,t}$ represents the returns of the benchmark index, and The coefficient on $d_{OB_{j,t}}$, β_3 , estimates the impact of the open banking announcement in country j on abnormal bank returns within the specified window.

Australia, Germany, Italy, Japan, the Netherlands, Spain, Sweden, Switzerland, and the United States exhibit a large variation in their banking sector abnormal returns on or about the announcement dates. The heterogeneity of individual bank responses indicates significant market sensitivity and suggests that open banking announcements are key informational events influencing investor expectations and assessments of future banking profitability and regulatory impact. In contrast, results indicate less heterogeneity in individual bank responses in Canada, France, and the United Kingdom. For Canada and the UK, the muted responses may reflect the likelihood that open banking was already anticipated. Since Europe had implemented open banking a few years earlier, in these countries, it was probably viewed as an evolutionary step in the financial landscape rather than a revolutionary one.

Further, in Fig. 3, the distribution of the response of the banks’ abnormal return to a one unit change in the country-specific newspaper coverage index and the Google Trends Index are also presented respectively (see the last two box plots labelled ‘Lexi’ and ‘Tr’ in each sub-figure). Primarily, it is observed across countries that the responses are more marked (both in a positive and negative direction) when considering media attention than public interest quantified through public search dynamics. Banking institutions in Canada, Germany and the United States exhibit (i) larger heterogeneity in individual bank responses at the time of open banking coverage and interest and (ii) a positive median response.¹¹

Fig. 4 extends the analysis presented in Fig. 3 through QQ plots, illustrating the distribution of banking returns around open banking announcements across all countries in our sample. These plots reveal that extreme values in the returns distribution — both positive and negative — become more pronounced during the announcement windows, suggesting heightened market volatility and investor sensitivity to news about open banking. Results indicate an initial negative market response, which reverses to positive as the market absorbs the implications of open banking developments. This suggests that while immediate reactions may be driven

¹¹ Research indicates that media coverage enhances stock liquidity by enriching the information environment and mitigating investor adverse selection. This enhancement, however, tends to diminish in highly transparent or emotionally charged investor environments (Aman and Moriyasu, 2022; Huang et al., 2024). Media’s influence is particularly significant during critical financial events like initial public offerings (IPOs) and seasoned equity offerings, where it shapes investor behaviour and impacts stock performance and investment efficiency (Guldiken et al., 2017). The effect of media reports on investor decisions varies depending on market conditions; they exert more influence during market upswings by highlighting optimistic news and less during downturns when pessimistic news prevails (Yang et al., 2017). Media exposure not only has the potential to reinforce investor biases, notably through encouraging the pursuit of past returns (Solomon et al., 2014), but it also plays an essential role in reducing information asymmetry and improving market liquidity, especially in markets predominantly involving retail investors (Bushee et al., 2020). Additionally, the emergence of social media complicates these interactions, as it alters how firms and investors respond to news based on its sentiment and certainty, thereby affecting stock returns in subtle ways (Peng et al., 2022).

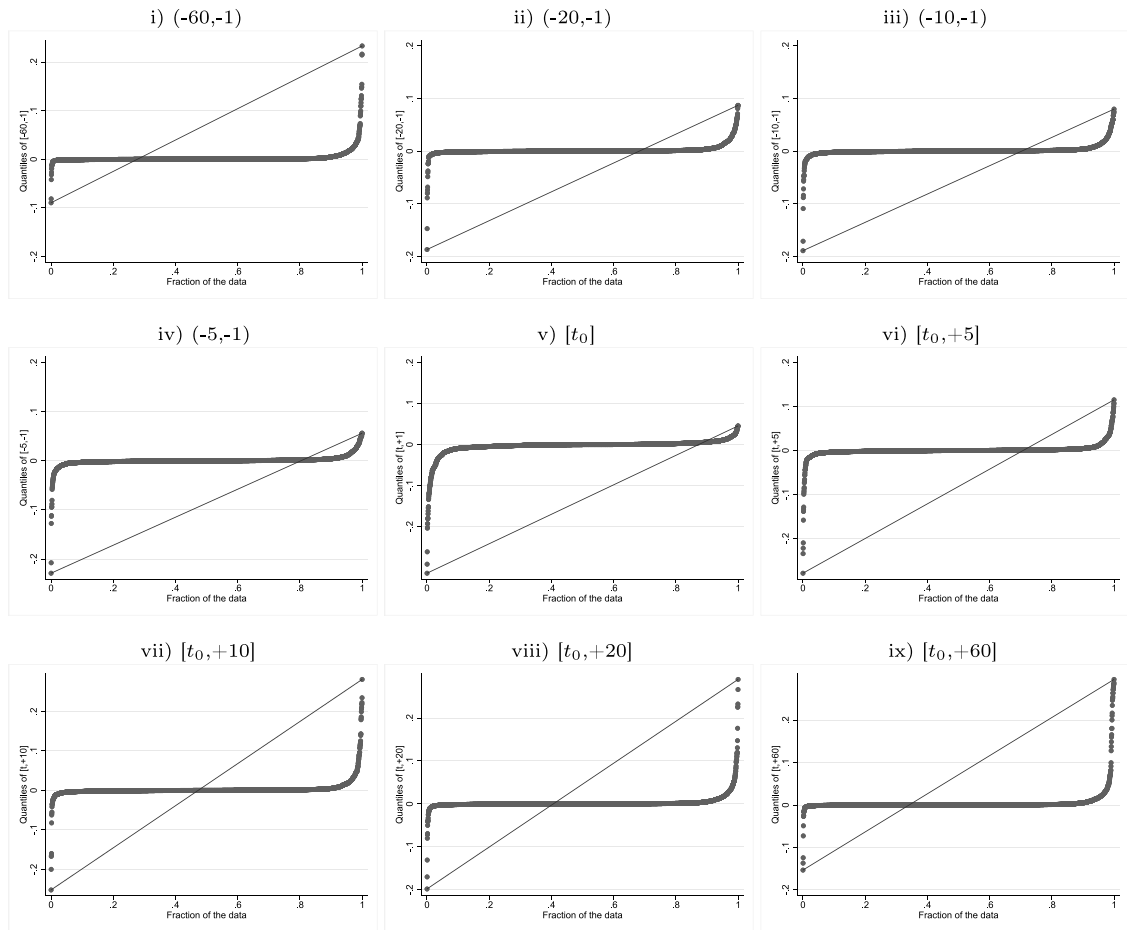


Fig. 4. QQ-plots of EGARCH-estimated volatility differentials due to open banking announcements.

Note: The above figures represent histograms based on the abnormal return response of each bank as a result of open banking events. Dummy variables are assigned for sub-periods before, during, and after each identified event and subsequently added to the mean equation of each individually examined EGARCH(1,1) specification. To adequately and robustly assess the time period surrounding each event, we measure abnormal returns using multiple estimation windows of six months after each identified event across a variety of different event windows, including $[-60,-1]$, $[-20,-1]$, $[-10,-1]$, $[-5,-1]$, $[-1, t_0]$, $[t_0,+1]$, $[t_0,+5]$, $[t_0,+10]$, $[t_0,+20]$, and $[t_0,+60]$, to test the pricing response both before and after the dates on which open banking announcements occur. Each number refers to the specific trading days relative to each identified event.

by uncertainty and risk aversion, the longer-term view on such announcements is generally positive, possibly reflecting anticipated benefits from open banking regulations, particularly benefits stemming from innovation in the banking sector.

Fig. 5 corroborates these findings by examining changes in the skewness and kurtosis of return distributions during different windows around the announcements. The results confirm a pattern of initial negative responses followed by positive reactions, highlighting a broader market adjustment to the new regulatory landscape shaped by open banking policies. This dynamic response pattern could be interpreted through the Efficient Market Hypothesis (EMH), which posits that financial markets are informationally efficient and reflect all available price information (Moennighoff et al., 2015; Andriosopoulos et al., 2017; Carboni et al., 2017; Bruno et al., 2018; Elayan et al., 2018). The observed market behaviour in response to open banking announcements suggests that financial markets quickly incorporate regulatory news into stock prices, albeit with initial overreactions that stabilise over time. These results collectively provide a nuanced understanding of how significant regulatory changes, such as introducing open banking, can disrupt financial markets initially but also offer new opportunities that markets eventually recognise and assimilate into stock valuations.

4.2. Understanding the regional response differential to open banking announcements

In Table 7, we present estimates of the effect of open banking announcements on country-level banking returns in the country where the announcement was made; the estimates are the β_3 coefficient estimates from Eq. (3) across various event windows. The results reveal distinct market reactions that reflect diverse financial landscapes. For instance, negative reactions in Australia and Canada, as evidenced by significant reductions in stock prices following the announcement of open banking, suggest apprehension

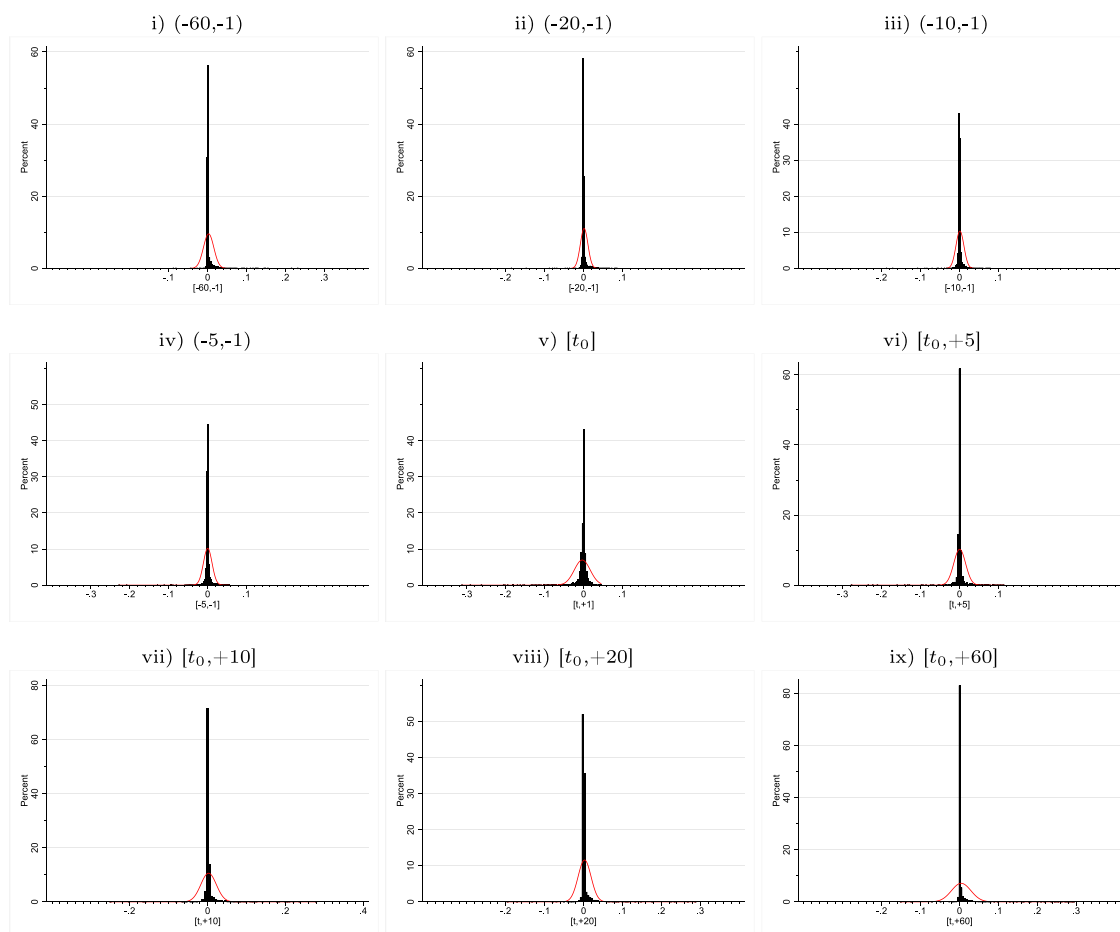


Fig. 5. Histograms of EGARCH-estimated volatility differentials due to open banking announcements.

Note: The above figures represent histograms based on the abnormal return response of each bank as a result of open banking events. Dummy variables are assigned for sub-periods before, during, and after each identified event and subsequently added to the mean equation of each individually examined EGARCH(1,1) specification. To adequately and robustly assess the time period surrounding each event, we measure abnormal returns using multiple estimation windows of six months after each identified event across a variety of different event windows, including $[-60,-1]$, $[-20,-1]$, $[-10,-1]$, $[-5,-1]$, $[-1, t_0]$, $[t_0,+1]$, $[t_0,+5]$, $[t_0,+10]$, $[t_0,+20]$, and $[t_0,+60]$, to test the pricing response both before and after the dates on which open banking announcements occur. Each number refers to the specific trading days relative to each identified event.

about the potential challenges to profitability, which is particularly interesting when considering that these two countries possessed the most profitable banking sectors in our sample prior to the introduction of open banking in each country respectively. Australia, an uncompetitive but highly profitable geographical region relative to other countries in our sample, shows a notable decrease of 3.02% shortly after the announcement, indicating strong market concerns that may stem from uncertainties about how bank profitability will be affected owing to increased competition.

Other markets exhibit a mixed response to open banking. German banks initially reacted positively (+0.74% the day of the announcement and the day following), perhaps due to a perceived opportunity to increase bank profitability via competition and innovation in a country where bank profitability had traditionally been low. However, this optimism appears to have been short-lived, as the sentiment turns negative in the longer term (-1.16% in the 20 days following the announcement), reflecting concerns about the disruptive impact. Italy and Japan also experience significantly negative abnormal returns after the announcement of open banking. For example, in the three days following the announcement, the estimated impact on abnormal returns is -4.42% and -4.74% in Italy and Japan, respectively). The US presents evidence of a markedly different pattern to other countries in our sample, with strong positive reactions (approximately +1.5%) following the open banking announcement, suggesting a bullish outlook on the potential for gains in the banking sector. This initial positive reception could also be attributed to the relatively significant role that the shadow banking sector plays in the US economy, as evidenced by the large value of non-bank assets as a percent of GDP (see Table 1). Fang and Zhu (2023) empirically established that non-traditional bank lending benefits from open banking adoption at the expense of traditional bank lending. Thus, much of the positive reaction to open banking observed in the US could reflect the perceived benefits to the non-traditional sector. Further, the market-led nature of the US regime might be seen as beneficial as participants can influence their own standards. On this note, the other country undertaking a market-led open banking

Table 7
National MSCI banking index response to open banking announcements.

	[-60,-1]	[-20,-1]	[-10,-1]	[-5,-1]	[-3,-1]	[-2,-1]	[-1, t ₀]	[t ₀ ,+1]	[t ₀ ,+2]	[t ₀ ,+3]	[t ₀ ,+5]	[t ₀ ,+10]	[t ₀ ,+20]	[t ₀ ,+60]
Aus	-0.0009 (0.0037)	-0.0049 (0.0041)	-0.0046 (0.0066)	0.0042 (0.0099)	-0.0011 (0.0117)	-0.0097 (0.0172)	-0.0029 (0.0255)	-0.0116 (0.0227)	-0.0302* (0.0175)	-0.0209* (0.0113)	-0.0138* (0.0076)	-0.0150* (0.0079)	-0.0056 (0.0055)	-0.0046 (0.0043)
Bel	0.0018 (0.0058)	-0.0200 (0.0163)	-0.0020 (0.0119)	0.0008 (0.0161)	0.0154 (0.0223)	-0.0096 (0.0333)	-0.0050 (0.0497)	0.0068 (0.0418)	0.0333 (0.0427)	-0.0085 (0.0186)	0.0128 (0.0144)	-0.0368 (0.0293)	0.0383** (0.0161)	0.0054 (0.0058)
Can	-0.0228 (0.0273)	-0.0253 (0.0202)	-0.0271 (0.0205)	-0.0368 (0.0216)	-0.0268 (0.0229)	-0.0104 (0.0154)	-0.0196 (0.0243)	0.0258 (0.0191)	-0.0132 (0.0162)	-0.0216 (0.0163)	-0.0145 (0.0126)	-0.0367 (0.0231)	-0.0202* (0.0115)	-0.0291*** (0.0090)
Fra	-0.0108* (0.0064)	-0.0052** (0.0090)	-0.0278* (0.0142)	-0.0398 (0.0189)	-0.0321 (0.0183)	-0.0210 (0.0313)	0.0117 (0.0221)	-0.0267 (0.0310)	0.0023 (0.0253)	0.0016 (0.0168)	0.0024 (0.0152)	0.0092 (0.0095)	0.0066 (0.0093)	-0.0513* (0.0286)
Ger	-0.0266 (0.0257)	-0.0183 (0.0267)	-0.0193 (0.0152)	0.0099 (0.0135)	0.0161 (0.0150)	0.0131*** (0.0006)	0.0054*** (0.0008)	0.0074* (0.0011)	0.0044*** (0.0008)	0.0047* (0.0023)	-0.0041*** (0.0019)	-0.0147** (0.0051)	-0.0116*** (0.0032)	-0.00663 (0.0039)
Ita	-0.0148 (0.0080)	-0.0146 (0.0118)	-0.0136 (0.0085)	-0.0043 (0.0121)	0.0519* (0.0200)	0.0264 (0.0253)	0.0112* (0.0041)	0.0126*** (0.0029)	0.0003 (0.0191)	-0.0442* (0.0158)	-0.0496* (0.0208)	0.0074 (0.0162)	0.0004 (0.0062)	-0.0013 (0.0064)
Jap	0.0114*** (0.0029)	-0.0017 (0.0048)	-0.0006 (0.0061)	-0.0107 (0.0088)	0.0358** (0.0120)	0.0218 (0.0160)	-0.0588** (0.0225)	-0.0283 (0.0245)	-0.0576** (0.0175)	-0.0474*** (0.0137)	-0.0104 (0.0089)	-0.0183* (0.0077)	0.0070 (0.0047)	0.0082** (0.0027)
Neth	-0.0067 (0.0042)	0.0079 (0.0060)	0.0169 (0.0141)	0.0208 (0.0150)	0.0137 (0.0236)	0.0345 (0.0434)	0.1070* (0.0456)	0.0059 (0.0430)	0.0073 (0.0218)	0.0004 (0.0209)	-0.0425 (0.0221)	-0.0217 (0.0158)	-0.0035 (0.0083)	0.0055 (0.0048)
Spa	0.0094* (0.0040)	-0.0119 (0.0094)	-0.0063 (0.0117)	-0.0090 (0.0190)	0.0065* (0.0025)	0.0079** (0.0022)	-0.0129** (0.0034)	-0.0132 (0.0341)	-0.0081 (0.0188)	0.0088 (0.0245)	0.0044 (0.0140)	-0.0058 (0.0174)	0.0013 (0.0083)	0.0113 (0.0054)
Swe	-0.0038 (0.0069)	-0.0074 (0.0059)	0.0024 (0.0089)	-0.0073 (0.0152)	-0.0129 (0.0180)	0.0021 (0.0224)	0.0947* (0.0393)	0.0089 (0.0442)	-0.0288 (0.0350)	-0.0048 (0.0194)	-0.0174 (0.0128)	-0.0196* (0.0093)	-0.0162 (0.0088)	-0.0100 (0.0064)
Switz	-0.0041 (0.0034)	-0.0214** (0.0071)	-0.0044 (0.0113)	0.0177 (0.0161)	0.0000 (0.0264)	-0.00381 (0.00256)	-0.00507 (0.00275)	0.0101* (0.0038)	0.0077 (0.0202)	-0.0185 (0.0171)	-0.0046 (0.0030)	-0.0155 (0.0131)	0.0139 (0.0071)	0.0121** (0.0042)
UK	0.0046* (0.0021)	0.0051** (0.0032)	0.0042 (0.0047)	0.0015 (0.0060)	0.0045 (0.0066)	-0.0219** (0.0103)	-0.0067 (0.0157)	0.0176 (0.0121)	0.0033 (0.0099)	-0.0015 (0.0082)	0.0025 (0.0071)	0.0007 (0.0056)	-0.0089** (0.0039)	-0.0053** (0.0023)
US	0.0011 (0.0010)	0.0017 (0.0009)	0.0018 (0.0018)	0.0007 (0.0008)	0.0047*** (0.0008)	0.0055*** (0.0011)	0.0151*** (0.0015)	0.0163*** (0.0014)	0.0089*** (0.0011)	0.0032*** (0.0009)	-0.0001 (0.0011)	-0.0101*** (0.0014)	-0.0106*** (0.0012)	-0.0235*** (0.0018)

Note: We analyse the impact of open banking announcements by utilising an EGARCH model, where the mean equation is specified as $r_{MSCI,j,t} = \alpha_0 + \beta_1 r_{MSCI,j,t-1} + \beta_2 RBM_{j,t} + \beta_3 dOB_{j,t} + \beta X + \varepsilon_t$ where $r_{MSCI,j,t}$ and $r_{MSCI,j,t-1}$ capture returns and lagged returns of the banking MSCI index respectively, X is a vector of control variables including the VIX, gold, and oil prices respectively, $RBM_{j,t}$ represents the returns of the benchmark index, and β_3 the coefficient on $dOB_{j,t}$ quantifies the impact of open banking announcements in country j on the returns of the MSCI banking index in country j . ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively, while standard errors are presented in parentheses.

Table 8
Summary statistics of estimated effects on national banking indices abnormal returns owing to open banking adoption, separated by group.

Group	Statistic	[t ₀ ,+1]	[t ₀ ,+2]	[t ₀ ,+3]	[t ₀ ,+5]	[t ₀ ,+10]	[t ₀ ,+20]	[t ₀ ,+60]
Separated by market financing dependence 1996–2003								
Above median	Mean	-0.0069	-0.0042	-0.0142	-0.0074	-0.0098	0.0070	-0.0057
Above median	P25	-0.0233	-0.0060	-0.0353	-0.0088	-0.0174	0.0006	-0.0053
Above median	P75	0.0073	0.0039	0.0039	0.0039	0.0041	0.0069	0.0075
Below median	Mean	0.0104	-0.0064	-0.0091	-0.0129	-0.0168	-0.0073	-0.0078
Below median	P25	0.0074	-0.0210	-0.0197	-0.0159	-0.0207	-0.0134	-0.0168
Below median	P75	0.0170	0.0075	-0.0006	-0.0024	-0.0125	-0.0046	0.0004
Separated down by legal system origin								
English	Mean	0.0120	-0.0078	-0.0102	-0.0065	-0.0153	-0.0113	-0.0156
French	Mean	-0.0029	0.0070	-0.0084	-0.0145	-0.0095	0.0086	-0.0061
German	Mean	-0.0036	-0.0152	-0.0204	-0.0064	-0.0162	0.0031	0.0046
Scandinavian	Mean	0.0089	-0.0288	-0.0048	-0.0174	-0.0196	-0.0162	-0.0100
Separated down by open banking regime type								
Market	Mean	0.0132	0.0083	-0.0076	-0.0024	-0.0128	0.0016	-0.0057
Regulatory	Mean	0.0005	-0.0079	-0.0121	-0.0118	-0.0138	-0.0011	-0.0071

Note: In the analysis reported under ‘separated by market financing dependence 1996–2003’, we used the estimated effects of open banking on abnormal returns reported in Table 7 to calculate the mean and the 25th and 75th percentile effects for two groups of countries: those whose market to bank financing ratio was above the sample median and those whose market to bank financing ratio was below the sample median (see Table 1). In the analysis reported under ‘separated by legal system origin’, we used the abnormal returns reported in Table 7 to calculate the mean for countries by legal origin (we do not calculate percentiles owing to small group membership); legal system origin is based on the classification in Porta et al. (1998). In the analysis reported under ‘separated by open banking regime type’, we used the abnormal returns reported in Table 7 to calculate the mean for countries by open banking regime type (we do not calculate percentiles owing to small group membership); open banking regime type is based on the classification in Table 2.

regime, Switzerland, the initial stock market reaction to the announcement of open banking was also positive (+1.1%). The subdued reaction in the UK, which is perhaps surprising given the importance of the banking sector to the UK economy, may be influenced by external factors such as Brexit, which has likely overshadowed the open banking narrative with broader economic and political uncertainties. This highlights how external geopolitical and economic factors can significantly modulate the market’s response to regulatory changes within the financial sector.

Aggarwal and Goodell (2016) suggest countries, where firms use relatively more stock market finance than bank finance, are most likely to be those with a high trust and strong disclosure environment and legal frameworks adept at resolving conflict. Owing to those attributes, these countries might be where open banking is better received. Table 8 separates the sample into

Table 9
European open banking announcement influence on international banking indices.

Window	Aus	Can	Jap	Swi	UK	US
[-60, -1]	0.0012 (0.0022)	0.0010 (0.0021)	0.0008 (0.002)	0.0006 (0.002)	0.0003 (0.0072)	0.0027 (0.0031)
[-20, -1]	0.0044 (0.0034)	0.0040 (0.0032)	-0.0004 (0.002)	0.0015 (0.0031)	0.0021 (0.002)	0.0073 (0.0049)
[-10, -1]	0.0045 (0.0049)	0.0042 (0.0046)	-0.0042 (0.0044)	0.0007 (0.0044)	-0.0001 (0.0029)	-0.0038 (0.0069)
[-5, -1]	0.0074 (0.0064)	0.0069 (0.006)	-0.0017 (0.0057)	0.0026 (0.0057)	0.0006 (0.0037)	0.0011 (0.009)
[-3, -1]	0.0073 (0.0084)	0.0100 (0.0079)	-0.0005 (0.0076)	0.0010 (0.0076)	0.0037 (0.0049)	0.0009 (0.0119)
[-2, -1]	0.0029 (0.0119)	0.0087 (0.0112)	0.0027 (0.0107)	0.0015 (0.0107)	0.0046 (0.007)	-0.1110 (0.0168)
[-1, t_0]	0.0041*** (0.0017)	-0.0014 (0.0016)	0.0026* (0.0015)	0.0059 (0.0055)	-0.0071*** (0.001)	-0.0165*** (0.0024)
$[t_0, +1]$	0.0073*** (0.0021)	-0.0115*** (0.0016)	-0.0075*** (0.0015)	-0.0047*** (0.0015)	-0.0091*** (0.0024)	-0.0180*** (0.0017)
$[t_0, +2]$	0.0010*** (0.0015)	-0.0069*** (0.0011)	-0.0009 (0.0011)	-0.0025*** (0.0089)	0.0007 (0.0039)	-0.0093*** (0.0012)
$[t_0, +3]$	0.0068*** (0.001)	-0.0024*** (0.0008)	-0.0035*** (0.0008)	-0.0021*** (0.0008)	0.0015 (0.0012)	-0.0045*** (0.0008)
$[t_0, +5]$	0.0022*** (0.0009)	-0.0009 (0.0009)	0.0013 (0.0012)	-0.0013 (0.0008)	0.0001 (0.0005)	-0.0056*** (0.0013)
$[t_0, +10]$	0.0030*** (0.0007)	0.0004 (0.0007)	-0.0080*** (0.0009)	-0.0009 (0.0006)	0.0007* (0.0004)	-0.0064*** (0.0010)
$[t_0, +20]$	0.0008 (0.0005)	-0.0013*** (0.0005)	-0.0059*** (0.0016)	-0.0004*** (0.0004)	0.0003 (0.0003)	-0.0058*** (0.0007)
$[t_0, +60]$	0.0008* (0.0004)	-0.0002 (0.0004)	0.0001 (0.0004)	-0.0017*** (0.0014)	-0.0001 (0.0003)	-0.0015*** (0.0006)

Note: we analyse the impact of open banking announcement in country k on abnormal returns in bank stocks in country j utilising an egarch model, where the mean equation is specified as $r_{msci_{j,t}} = \alpha_0 + \beta_1 r_{msci_{j,t-1}} + \beta_2 r_{bm_{j,t}} + \beta_3 d_{ob_{k,t}} + \beta x + \varepsilon_t$. $r_{msci_{j,t}}$ and $r_{msci_{j,t-1}}$ capture returns and lagged returns of the banking msci index respectively, x is a vector of control variables including the vix, gold, and oil prices respectively, $r_{bm_{j,t}}$ represents the returns of the benchmark index, and β_3 the coefficient on $d_{ob_{k,t}}$ quantifies the impact of open banking announcements in country k on the returns of the msci banking index in country j . ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively, while standard errors are presented in parentheses.

Table 10
United states open banking announcement influence on international banking indices.

Window	Aus	Bel	Can	Fra	Ger	Ita	Jap	Neth	Spa	Swed	Swi	UK
[-1, t_0]	0.0019 (0.0017)	-0.0047*** (0.0020)	-0.0058*** (0.0021)	0.0000 (0.0021)	-0.0042 (0.0026)	0.0053 (0.0022)	0.0039 (0.0015)	0.0010 (0.0055)	0.0039*** (0.0015)	0.0091 (0.0126)	-0.0114*** (0.0015)	-0.0045*** (0.0010)
$[t_0, +1]$	0.0027 (0.0021)	-0.0106*** (0.0020)	-0.0094*** (0.0016)	0.0020 (0.0026)	0.0014 (0.0022)	-0.0146*** (0.0015)	-0.0100*** (0.0015)	-0.0045 (0.0055)	0.0015 (0.0126)	-0.0166*** (0.0015)	-0.0029*** (0.0010)	-0.0068*** (0.0024)
$[t_0, +3]$	-0.0047*** (0.0010)	-0.0091*** (0.0011)	-0.0118*** (0.0008)	-0.0063*** (0.0028)	-0.0020 (0.0013)	-0.0039*** (0.0011)	-0.0087*** (0.0008)	-0.0127*** (0.0008)	-0.0046 (0.0063)	-0.0053*** (0.0007)	-0.0012*** (0.0005)	-0.0089*** (0.0012)

Note: We analyse the impact of open banking announcement in country k on abnormal returns in bank stocks in country j utilising an EGARCH model, where the mean equation is specified as $r_{MSCI_{j,t}} = \alpha_0 + \beta_1 r_{MSCI_{j,t-1}} + \beta_2 r_{RBM_{j,t}} + \beta_3 d_{OB_{k,t}} + \beta X + \varepsilon_t$. $r_{MSCI_{j,t}}$ and $r_{MSCI_{j,t-1}}$ capture returns and lagged returns of the banking MSCI index respectively, X is a vector of control variables including the VIX, gold, and oil prices respectively, $RBM_{j,t}$ represents the returns of the benchmark index, and β_3 the coefficient on $d_{OB_{k,t}}$ quantifies the impact of open banking announcements in country k on the returns of the MSCI banking index in country j . ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively, while standard errors are presented in parentheses. ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively, while standard errors are presented in parentheses.

countries above and below the sample median regarding the ratio to market to bank finance for the period between 1996 and 2003. The results in Table 8 suggest a dichotomy between the two groups in narrow windows around the announcement, with the mean abnormal return of countries with a relatively high market financing ratio being 1.04% in the window spanning the day of the announcement and the day after, whereas the mean abnormal return for countries below the median on that measure is -0.69%. Ergungor (2004) noted that countries with a legal system of English origin (a common law legal system as opposed to a civil law legal system) are better at resolving conflict owing to its flexibility. Table 8 reports the mean abnormal return from open banking for countries with different legal systems. Countries with a common law/English-originated legal system tend to have a higher average abnormal return in the narrowest window around the announcement date but perform worse when abnormal returns are assessed in longer windows. This suggests that the trust and disclosure differences, rather than legal system differences, might play more of a role in the differences observed between the low and high-market financing groups. Finally, we focus on mean returns by open banking regime type. Particularly in narrow windows around the announcement, we observe that investors better receive market-led approaches. The mean return in countries which adopted market-led open banking regimes was +1.32% in the window of the day of the announcement and the day after, compared with +0.05% in countries that imposed the open banking regime via regulatory standards. It should be noted that the results from the proceeding analysis should be interpreted as suggestive rather than definitive as our sample is small and, therefore, the membership of many of the groups is low.

4.2.1. Understanding the contagion effects of international open banking announcements

It is plausible that the announcement of open banking in one country might impact bank returns in other countries, given the interconnectedness of the global financial system. Tables 9 and 10 provide estimates of the effects of the open banking announcement

Table 11
Capitalisation-based msci banking indices response to international open banking announcements.

Fund	[-60,-1]	[-20,-1]	[-10,-1]	[-5,-1]	[-1, t ₀]	[t ₀ ,+1]	[t ₀ ,+2]	[t ₀ ,+3]	[t ₀ ,+5]	[t ₀ ,+10]	[t ₀ ,+20]	[t ₀ ,+60]
<i>MSCI All Country</i>												
Large Cap Banks	-0.0016 (0.0035)	-0.0023 (0.0054)	-0.0036 (0.0076)	-0.0026 (0.0100)	0.0020 (0.0053)	-0.0106** (0.0053)	-0.0106*** (0.0037)	-0.0102*** (0.0026)	-0.0056*** (0.0020)	-0.0001 (0.0015)	0.0004 (0.0011)	-0.0022*** (0.0007)
Mid Cap Banks	-0.0020 (0.0041)	-0.0030 (0.0063)	-0.0088 (0.0089)	-0.0076 (0.0116)	-0.0044 (0.0061)	-0.0154*** (0.0061)	-0.0252*** (0.0043)	-0.0169*** (0.0031)	-0.0062*** (0.0013)	0.0016 (0.0018)	-0.0009 (0.0013)	-0.0014* (0.0008)
Small Cap Banks	-0.0010 (0.0046)	-0.0016 (0.0071)	-0.0107 (0.0101)	-0.0096 (0.0132)	0.0011 (0.0070)	-0.0191*** (0.0070)	-0.0332*** (0.0049)	-0.0218*** (0.0035)	-0.0054** (0.0026)	0.0018 (0.0020)	-0.0029** (0.0014)	-0.0020** (0.0009)
<i>MSCI World</i>												
Large Cap Banks	-0.0012 (0.0052)	-0.0005 (0.0081)	-0.0043 (0.0114)	0.0004 (0.0149)	0.0011 (0.0079)	-0.0135* (0.0078)	-0.0187*** (0.0056)	-0.0167*** (0.0039)	-0.0079*** (0.0030)	0.0015 (0.0023)	0.0002 (0.0016)	-0.0025*** (0.0010)
Mid Cap Banks	-0.0001 (0.0057)	-0.0003 (0.0088)	-0.0099 (0.0124)	-0.0070 (0.0163)	0.0011 (0.0086)	-0.0217*** (0.0086)	-0.0353*** (0.0061)	-0.0264*** (0.0043)	-0.0009 (0.0033)	0.0082*** (0.0025)	0.0000 (0.0018)	-0.0026*** (0.0011)
Small Cap Banks	-0.0010 (0.0049)	-0.0016 (0.0076)	-0.0112 (0.0107)	-0.0100 (0.0140)	0.0131* (0.0074)	-0.0194*** (0.0074)	-0.0341*** (0.0052)	-0.0227*** (0.0037)	-0.0051* (0.0028)	0.0018 (0.0021)	-0.0031** (0.0015)	-0.0020** (0.0010)

Note: We analyse the impact of open banking announcements on abnormal returns in bank stocks of market capitalisation size category s by utilising an EGARCH model, where the mean equation is specified as $r_{MSCI_{s,t}} = a_0 + \beta_1 r_{MSCI_{s,t-1}} + \beta_2 RW_t + \beta_3 d_{OB_t} + \beta X + \epsilon_t$ where $r_{MSCI_{s,t}}$ is the daily return of the banking index for banks of market capitalisation size category s , $r_{MSCI_{s,t-1}}$ captures lagged returns, X is a vector of control variables including the VIX, gold, and oil prices respectively, RW_t represents the returns of the world benchmark index, and β_3 the coefficient on d_{OB_t} quantifies the impact of open banking announcements on the returns of the specified MSCI banking index. ***, **, and * represent the significance at the 1%, 5%, and 10% levels, respectively, while standard errors are presented in parentheses.

in both Europe and the United States on the country-level banking returns of another country in our sample, respectively.¹² All other countries were considered; however, only Europe and the United States generated significant influence upon the other analysed countries.¹³ Again the estimates are the β_3 coefficient estimates from Eq. (3).

The impact of the announcement of open banking in the US reverberates across global financial markets, eliciting significant cross-border effects. Notably, US-led announcements evoke immediate negative reactions in several countries, including Australia, Canada, Japan, the UK, and the broader European banking sector, excluding Germany. Once open banking was announced in the US, it was likely to spur many new competitors to traditional banking, mainly due to the US possessing a large shadow banking sector (see Table 1). The fear might be that these new competitors pick up their product offerings and take them to other countries where open banking is already in place, such as Australia, Canada, Japan and the UK. The absence of a pronounced response in Germany can perhaps be attributed to the relationship-based nature of banking in Germany.¹⁴

4.3. The influence of open banking announcements as separated by bank size

Finally, the varied responses, by bank size, of the MSCI Banking sub-indices to international open banking announcements are presented in Table 11.¹⁵ The immediate market reactions often reflect the direct impact of open banking announcements, which typically aim to increase transparency and competition. Such announcements can unsettle markets due to uncertainties around compliance costs and disrupt traditional banking models. Smaller banks might show more significant negative reactions in the short term due to perceived challenges in meeting new regulations with limited resources. Larger banks, with more extensive resources and established compliance mechanisms, might navigate the initial turbulence of regulatory changes more smoothly than smaller banks. This is evident from the differential impacts observed in Table 11. Initially, large-cap banks show a less pronounced negative impact than small and mid-cap banks, which might struggle with the operational demands of implementing regulatory changes. While over the medium to long term, as markets digest the implications of open banking, the initial negative impacts often give way to stabilisation, and there is very little difference in average abnormal return between banks in different market capitalisation when the impacts are looked at over a longer window post the announcement.

¹² Table 10 considers a subset of the effects of all the non-European open banking announcements; however, as the United States was the only source of contagion, only those results are considered. The table focuses on the effects of open banking in the very narrow windows around the announcement date. The complete set of results surrounding the effects of all the non-European open banking announcements are omitted for the brevity of presentation but are available from the authors upon request.

¹³ More specifically, we found that open banking announcements in Australia and Canada have no impact on banking returns in other countries. One plausible reason for the global markets' indifference could be the regional specificity of these regulatory changes. Markets outside Australia and Canada may perceive these changes as irrelevant to their banking structures or regulatory environments, particularly if there is little financial interconnection or dependency between these markets. We also found that announcements in Japan, Switzerland, and the United Kingdom do not impact banking returns in other countries. The muted response of Japan and Switzerland can, perhaps, be explained by the fact that a small percentage of banks in these countries are foreign-owned (particularly in Japan).

¹⁴ Investors in German banks appear to be less concerned about potential competition from US fintech corporations as they know German banking customers are more loyal to domestic firms that they know or trust ((Koch et al., 2016) notes the importance of relationships in the German banking sector).

¹⁵ These results are generated estimating Eq. (4).

5. Associated discussion, policy implications and directions for future research

5.1. Discussion

This research explores the dynamics of open banking's introduction across various global jurisdictions, emphasising its dual nature as both a regulatory framework and a technological innovation. This duality has led to markedly different regulatory approaches across countries, with stringent mandates governing banks' activities in the European Union and the United Kingdom, contrasting sharply with the more market-driven approach in the United States, where banks play a significant role in developing API-based offerings. Such disparity underscores crucial questions regarding the overall benefits of open banking to the banking sector.

Specifically, open banking aims to enhance consumer control over financial data and stimulate competition and innovation within the banking sector. However, the empirical findings from the study reveal a complex dynamic relationship. While open banking ostensibly offers numerous advantages, such as facilitating easier customer transitions between banks and fostering cooperation with third-party providers, these benefits are not uniformly distributed. Traditional banks, particularly smaller institutions and those in markets with fewer competitors may perceive these changes as threats to their established business models. The study's analysis of bank share returns across G12 countries underscores the initial negative impact of open banking announcements, which tends to dissipate over time as the markets adjust to the new regulatory landscape. The variance in the reaction of bank stocks to open banking announcements across different countries is particularly telling. This research highlights significant market sensitivity to these announcements, suggesting that open banking is a pivotal informational event that reshapes investor expectations and market valuations of banks. This sensitivity is more pronounced in countries with more conservative financial systems or those less prepared to integrate such sweeping reforms. Over time, as the initial uncertainty and risk aversion dissipate, the perception of open banking shifts towards a more positive outlook, quantifying its potential to catalyse sector-wide improvements.

Moreover, results indicate a heterogeneous impact within the examined countries, noting that the responses of bank stocks are not uniform. This dispersion in stock returns is influenced by factors such as bank size, with smaller banks initially experiencing more negative impacts. Regulatory environments play a pivotal role in shaping these reactions. In regions where regulations are introduced suddenly and with strict mandates, the response tends to be sharply negative initially, primarily due to the uncertainty and perceived burden of compliance costs associated with these regulations. Banks, especially smaller ones, may face substantial challenges adapting to these changes, leading to investor apprehension about future profitability and operational efficiency. Additionally, the level of technological preparedness and infrastructure within a market significantly influences how open banking announcements are received. Markets with advanced digital banking technologies and infrastructures, such as the US, will likely see these announcements as opportunities for innovation and market expansion. Conversely, in countries with less developed digital infrastructure, introducing open banking can be seen as a particularly daunting overhaul, requiring significant investment and leading to negative market reactions due to perceived risks and costs.

The broader economic context and financial sector stability influence how open banking announcements are perceived. In economically stable countries with strong financial sectors, such announcements are often seen as a progressive step towards enhancing financial services and competitiveness. However, in countries where the economy is struggling, or the financial sector is unstable, introducing open banking might be viewed as an additional burden rather than an opportunity, compounding existing challenges and leading to more adverse reactions from the market.

5.2. Policy implications

Further, this research presents several distinct insights with associated policy and regulatory implications. It particularly emphasises the positive outcomes observed in the US and highlights areas for strategic international cooperation. Firstly, the overall positive reaction of US bank stocks to open banking announcements underscores the benefit of ensuring that the market is well-prepared and receptive to technological innovations. This readiness involves the technological infrastructure and the regulatory and operational frameworks that support these innovations. A critical factor in the US approach was the active involvement of banks in developing the regulatory framework for open banking. This collaborative approach helped align the open banking regulations with the banks' operational capabilities and strategic interests, ensuring that regulation would be less burdensome due to the bank's position as facilitators of such growth and innovation. Consequently, from a banking sector point of view, there is a strong argument for involving banks and other financial service providers in the regulatory design process for other jurisdictions. This inclusion can ensure that the operational details of open banking, such as data-sharing mechanisms, are practical and beneficial for all parties involved. Furthermore, such collaboration can enhance the sector's understanding and preparedness for the changes, smoothing the transition and fostering a more positive market reception. Having the industry actively involved in the regulatory design process is not without its risks. Existing banks are incentivised to ensure the costs of complying with the regime are as low as possible. This could mean banks push for fewer safeguards on data sharing but at the expense of consumer privacy and security. There is a further risk that the banking sector will advocate for a regulatory design that protects the competitive interests of existing banks at the expense of potential new entrants and consumers. Specifically, banks could push for limited or complex mechanisms for data portability, making it harder for consumers to transfer their financial data to competitors or fintechs. Banks, for example, might advocate for stringent technical requirements, such as those around APIs, that could be prohibitively difficult for smaller fintech companies to implement.

Moreover, our findings indicate that smaller banks experience more significant negative impacts immediately following open banking announcements. This suggests a need for targeted support to these institutions, potentially through specific regulatory guidelines that address their unique challenges or through direct assistance programs to help them upgrade their technological capabilities and operational frameworks. By supporting smaller banks in their transition to open banking, regulators can help mitigate the initial adverse impacts and ensure a more level playing field in the financial services sector.

The second major implication of our research relates to the international ramifications of open banking regulations. Results indicate the existence of spillover effects where regulatory announcements in the US and Europe impacted bank stocks in other countries within the G12. This interconnection underscores the importance of international cooperation and communication among financial regulators. As open banking frameworks continue to evolve globally, regulatory bodies could better share information and coordinate their approaches where possible. Such collaboration could help prepare other nations for potential market impacts from abroad and align regulatory standards to minimise disruptions in the global financial market. Additionally, international regulatory cooperation could foster a more integrated and robust global financial system capable of supporting innovative banking practices while maintaining stability and security. Broadly, such policy lessons from this research advocate for a proactive, inclusive, and cooperative approach to developing and implementing open banking regulations.

5.3. Directions for future research

Several directions exist for future research that can further develop and significantly contribute to our understanding of open banking's broader global implications. This research identified notable heterogeneity in the immediate reaction to open banking announcements across different countries, suggesting that factors beyond bank size influence these varied responses. More specifically, the research underscores that individual bank attributes such as reputation with existing and potential customers, historical regulatory compliance, technological advancements, and competitive dynamics with non-bank entities could play crucial roles in how different banks react to open banking (Sun and Yang, 2023; Chronopoulos et al., 2023). Analysing these factors could provide a more nuanced understanding of why some banks are better positioned to capitalise on open banking while others face more substantial challenges. Future research could systematically assess these attributes to determine their relative influence on banks' market performance post-open banking announcement. Further consideration could also be provided to corporate merger and acquisition activity (M&A) surrounding open banking to better understand the implementation and investment in fintech projects or the strategic acquisitions of fintech companies in efforts to align with or precede forthcoming regulatory announcements. Research could also examine the impact on the prices of assets that might be affected by open banking other than bank share prices, such as CBDCs and cryptocurrencies.

Furthermore, the study's focus on economically advanced G12 countries raises the question of whether similar effects would be observed in smaller or less economically developed nations, furthering our understanding of the effectiveness and reception of open banking initiatives. This could help tailor open banking policies to better fit different regions' economic circumstances. Additionally, the role of media attention and its impact on bank returns highlighted in the study indicates that specific events or narratives might sway investor sentiment and market behaviours significantly. Investigating whether certain media coverage or specific narratives have disproportionate impacts could inform better communication strategies around open banking policies. This research could extend to other sectors beyond banking to see if the contagion effects generated during the introduction of open banking announcements influence the broader market ecosystem, potentially affecting companies' stock prices in technology, retail, or consumer services sectors, which could increasingly integrate financial services. Further, given that we have identified spillover effects from major economies like the US and Europe, this suggests that open banking regulations in one country can affect financial markets globally. A deeper investigation into these spillover effects could provide insights into the interconnectedness of global financial markets and help regulatory bodies better coordinate international policy efforts. Lastly, the relationship between market perceptions of open banking and the actual impacts on bank profitability and operations remains of central interest. While initial perceptions may be influenced by market sentiment and media narratives, the actual long-term effects on bank lending, profitability, market concentration, and customer behaviour are crucial for evaluating the true impact of open banking.

6. Concluding comments

This study has provided an in-depth analysis of the impacts of open banking across G12 countries, uncovering significant variations in market responses and bank stock performance. Our findings reveal that open banking typically induces a negative initial reaction in bank stocks attributed to the uncertainties and perceived operational challenges posed by new regulatory demands. However, this trend tends to reverse over time as the potential benefits of open banking, such as enhanced competition and improved consumer services, become more apparent and are more broadly assimilated by the market. By augmenting the traditional event study methodology with Google Trend and newspaper coverage data, our analysis shows that public and media interest in open banking affects the abnormal returns for some banks. Our augmented approach can be applied when assessing the effects of any alternative regulation on abnormal returns if the researcher thinks any effects might not just occur on or around the regulation announcement date.

Significantly, the research highlights that the effects of open banking are not uniform across all regions or bank sizes. Smaller banks and those in less competitive or technologically advanced markets experience greater initial declines in stock values, which may be linked to the higher relative costs and complexities of implementing required changes. Conversely, banks in countries with advanced digital infrastructures and competitive banking sectors, such as the US, may gain from the transition due to their ability to leverage new opportunities for innovation and market expansion more effectively. The nuanced reactions across different banking systems underscore the critical role of tailored implementation strategies that consider local market conditions and technological readiness.

CRediT authorship contribution statement

Erdinc Akyildirim: Writing – original draft, Investigation, Formal analysis. **Shaen Corbet:** Writing – original draft, Investigation, Data curation. **Abhishek Mukherjee:** Writing – original draft, Investigation, Data curation, Conceptualization. **Michael Ryan:** Writing – original draft, Investigation, Formal analysis, Data curation, Conceptualization.

Declaration of competing interest

The authors declare the following financial interests/personal relationships which may be considered as potential competing interests: We confirm that this manuscript is original, has not been published before and is not currently being considered for publication elsewhere. We confirm that all authors have approved the manuscript for submission and agree to the corresponding author's statement on their behalf.

Data availability

Data will be made available on request.

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