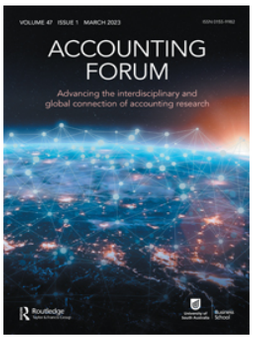

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IFRS 9 implementation and bank risk

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ABSTRACT

In this paper, we investigate the impact of IFRS 9 – *Financial instruments* on bank risk. Using a sample of 666 banks across 61 countries for the period 2016–2019, we find a decrease in bank risk following the implementation of IFRS 9. This implies that the forward-looking loan loss provisioning, mandated under IFRS 9, facilitates a reduction in bank risk. We find this effect to be more pronounced for riskier banks, suggesting that the implementation of IFRS 9 is a sign of effective regulation for banks rather than a manifestation of regulatory overreach. We also find the effect to be greater for banks in countries with stronger accounting regulatory enforcement and high banking supervision intensity. Overall, our results, which are robust to different estimation techniques, including multi-level hierarchical regressions and entropy balancing estimations, show that increased transparency and timely recognition under IFRS 9 reduce bank risk.

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1. Introduction

The efficiency and effectiveness of the market's monitoring of banks depend largely on timely, consistent and reliable availability of information about banks' performance and risk exposures (Stephanou, 2010). The International Financial Reporting Standard 9 (IFRS 9) aims to provide more information about banks' performance and risk exposure due to the recognition of expected credit losses for forward-looking provisions. However, the forward-looking provisions under IFRS 9 can be a double-edged sword with embedded significant risks of unintended consequences (Giner & Mora, 2019), making their impact on bank risk unclear.

On the one hand, forward-looking provisions can provide more information to the market, reflecting a bank's risk management abilities. Such detailed disclosures will provide valuable information on the risk management of banks, which will enhance monitoring by investors. Further, the increase in transparency gives investors direct power to discipline banks by demanding higher returns (Flannery & Thakor, 2006; Hovakimian & Kane, 2000), whilst an increase in discretion will facilitate the prediction of future losses and mitigate the pro-cyclicality of banks (Bushman & Williams, 2012).

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On the other hand, the subjectivity and forecast allowed in forward-looking provisions under IFRS 9 increase management discretion. This could stifle the market's monitoring of banks, leading to an increase in bank risk (Albrahimi, 2019; Bushman & Williams, 2012). The complexities associated with increased discretionary provisions can discourage market participants in checking bank behaviour because forward-looking provisions can create opacity in financial reporting (Wall & Koch, 2000). Moreover, large loan provisions could signal to the market a bank's good management of loans and its ability to withstand any economic downturn, which could motivate banks to take on more risk (Beatty & Liao, 2011; Bouvatier & Lepetit, 2012; Bushman & Williams, 2012; Elliott et al., 1991; Liu et al., 1997).

Our study investigates these two competing views on the implications of the implementation of IFRS 9 for bank risk. We use a sample of 666 banks across 61 countries spanning the period 2016–2019. Following DeFond et al. (2015), we use a relatively short sample period because IFRS 9 is a recent standard that became effective on 1st January 2018. This period also allows for an equal two-year pre (2016–2017) and post (2018–2019) implementation analysis. We focus on banks because existing commentary on IFRS shows that IFRS 9 significantly affects banks' financial statements more than other firms (Albrahimi, 2019; Deloitte, 2019; Gomaa et al., 2019; KPMG, 2016). It is also believed that the change in the accounting standard was the result of pressure from bank prudential bodies and information asymmetry problems specific to banks (Giner & Mora, 2019; Zeff, 2012). In line with prior studies that examine the impact of IFRS on other firm-level outcomes (e.g. DeFond et al., 2015), we employ a research design that compares bank risk in IFRS countries following the implementation of IFRS 9 with bank risk in non-IFRS countries. This approach ensures that we control for changes in non-IFRS factors that may affect bank risk-taking. In robustness checks, we perform alternative estimations such as a multi-level hierarchical regression since we use both bank-level and country-level variables.

Consistent with the view that expected loan loss provisioning enhances timely recognition of losses and increases transparency, we find a reduction in bank risk following the implementation of IFRS 9. Although IFRS 9 increases loan impairments, the detailed projections like the lifetime expected credit loss provide timely and valuable information which enhances the disciplining abilities of market participants. Such detailed information boost investors' confidence in the risk management and financial stability of the bank. Furthermore, we argue that our results showing the reduction in bank risk under IFRS 9 demonstrate the significant influence of bank regulators in the development of the standard. Cohen and Edwards (2017) claim that bank regulators and supervisors were the foremost critics of IAS 39, which focused on backward-looking provisions that led to high risk-taking in bank lending. Hence, bank regulators championed the forward-looking provision under IFRS 9 to reduce bank risk. In sum, our findings suggest that although there is high discretion under IFRS 9, forward-looking provisions can help reduce bank risk, thereby strengthening the financial stability of the banking industry and the economy as a whole.

Our study contributes to the literature and practice in several ways. Firstly, we provide evidence to support the theoretical analysis by Giner and Mora (2019), Gomaa et al. (2019) and Novotny-Farkas (2016) on the expected impact of IFRS 9 in the banking sector. Empirically, we join a small but growing strand of literature

that examines the implications of the expected credit loss model, mandated by IFRS 9, for firm-level outcomes (Albrahimi, 2019; Dong & Oberson, 2021; Kim et al., 2020). Kim et al. (2020) examine the impact of the expected credit loss on the timeliness of loan loss provisions whilst Albrahimi (2019) extends this analysis to look at potential consequences for market discipline, in terms of the market sensitivity to leverage risk. The closest of the three to our study, Dong and Oberson (2021), uses a sample of European banks to examine how optional capital transition arrangements set out by the Basel committee on bank supervision affects risk. We, however, focus on the mandatory adoption of IFRS 9 using a global sample to investigate how bank risk may have changed post implementation. Thus, we extend the literature on forward-looking loan provisions and bank risk by providing evidence that the expected credit loss under IFRS 9 provides relevant information that improves the market discipline of bank risk.

Secondly, we demonstrate that the effect of IFRS 9 on bank risk is more pronounced for risker banks, suggesting that the implementation of IFRS 9 is a manifestation of effective accounting regulation, rather than regulatory overreach. This distinction is important because regulation targeted at relatively safer banks could have dire economic consequences, including a decrease in investment and a reduction in shareholder value (Allen et al., 2012). Thus, our findings provide further clarity on the effect of IFRS 9 by considering the ex-ante risk levels of banks.

Thirdly, we add to the literature that examines the effects of discretionary accounting on banks' economic behaviour (Beatty & Liao, 2011; Bouvatier & Lepetit, 2012; Bushman & Williams, 2012; Giner & Mora, 2019). Gomaa et al. (2019) claim that the forward-looking provisions increases reserves but also increase earnings management. Bouvatier and Lepetit (2012) find discretionary accounting, such as forward-looking provisions, to mitigate the pro-cyclicality of loan provisions. However, Beatty and Liao (2011) opine that the effect of forward-looking provisions on pro-cyclicality is subject to the change in bank behaviour following the change in accounting standard. Our study, therefore, complements this stream of research by examining whether the implementation of IFRS 9, a standard with high discretion, affects bank risk. Thirdly, we also contribute to the effect of changes in accounting standards on banks' behaviour, an area that has attracted less attention due to the complexities of the banking industry (Beatty & Liao, 2014).

From a policy perspective, our study provides first-hand evidence to bank regulators and standard-setting bodies, like the International Accounting Standards Board (IASB), on the importance of accounting standards in influencing bank risk. Further, we contribute to the policy debates on the economic consequences of forward-looking provisions by showing that IFRS 9 provides valuable information for the market to discipline bank risk-taking behaviour. As with many banking regulations, any changes that tighten banks' risk exposure negatively affect their lending activities (Allen et al., 2012; Ertan, 2021). Thus, the changes from incurred credit loss to expected credit loss can cause banks to reduce their lending, leading to unexpected economic cost. However, a reduction in lending also suggests an improvement in the quality of loans granted which could reduce bank risk exposure.

The rest of the paper proceeds as follows: We provide a brief overview of IFRS 9 in Section 2 and review prior literature in Section 3. In Section 4, we describe our data

and sample and set out our research design in Section 5. We present the results of our empirical analysis in Section 6 and conduct robustness checks in Section 7. Section 8 concludes.

2. A brief overview of IFRS 9 – financial instruments

There are both academic and professional commentaries about IFRS 9 and how it differs from its predecessor, IAS 39 (Deloitte, 2013, 2016, 2019; Ernst and Young, 2014; KPMG, 2016; Novotny-Farkas, 2016). Hence, we provide a brief overview, focusing on how the requirements contained in the standard could affect bank risk.

A key difference between IAS 39 and IFRS 9 is the recognition of provisions. Under IAS 39, provisions are made based on the incurred loss model, whereas in IFRS 9, provisions are based on the expected loss model in three stages depending on a significant increase in credit risk. IAS 39 requires that a financial asset or group of financial assets, including loans and advances, is impaired if only there is objective evidence because of one or more events that occurred after the initial recognition of the asset (Deloitte, 2016). Thus, provisions are made based on the actual or complete certainty of an event that causes impairment.

According to Gebhardt (2016), the underlying principle of loss provisions under IFRS 9 is that provisions are set up for an increase in expected credit losses because the expected credit losses over the maturity of the debt instrument are reflected in a credit risk premium included in the interest rate at the loan contracting stage. Therefore, there are three stages under which the expected credit loss will increase for which provision will be made. Credit loss is the discounted amount of the differences between all contractual cash flows and the expected cash flows.

Stage 1 financial assets include all assets for which the expected credit loss does not change significantly. Also, firms have to recognise the 12-month expected credit loss, which is a portion of the lifetime expected credit loss of the asset in the first reporting date (Albrahimi, 2019). All debt instruments, including loans and advances immediately after origination, are allocated to Stage 1 as long as the risk of a default occurring has not changed significantly compared to the date of initial recognition (IFRS 9.5.5.9). Nevertheless, IFRS 9 only indicates default without any explicit definition, giving management more discretion. The standard states that preparers of accounts should use a default definition that is consistent with the definition used for internal credit risk management purposes. However, there is a rebuttable presumption that default does not occur later than when a financial asset is 90 days past due (IFRS 9, B5.5.37). The standard also gives presumptive signs of a significant increase of credit risk on a financial asset when contractual payments are more than 30 days past due after the initial recognition (IFRS 9.5.5.11).

When the credit risk of financial assets increases significantly, they should be moved to Stage 2, where impairment is set up to reflect the assets' lifetime expected credit loss. Financial assets with significantly high credit risk, considered as credit-impaired assets due to successive defaults, are allocated to Stage 3. Like Stage 2, loan loss allowances in Stage 3 are estimated based on the asset's lifetime expected credit loss. However, the lifetime expected credit loss in Stage 3 would be higher than in Stage 2 due to the high probability of default in Stage 3.

The main difference between IAS 39 and IFRS 9 is much clearer when the assets are moved to Stage 2 and 3 because, at Stage 1, it is less likely that the expected losses will be significantly different from those captured in interest rates as a credit risk premium (Novotny-Farkas, 2016).

An example of how the implementation of IFRS 9 changes the provisions on a bank's credit losses compared to IAS 39 is as follows. The COVID-19 pandemic has had a significant impact on the aviation sector, where some firms are winding up with high expectations of additional firms folding up in the next few years. Therefore, bank loans to aviation professionals and firms are likely to be affected by both incurred losses and expected losses. Under IAS 39, banks are required to account for only the loss which has occurred in the current year (firms that have close or those who have lost jobs). However, IFRS 9 requires banks to account for all possible credit losses that the bank could estimate from the effect of COVID 19 both in the current year and future years. Thus, loan loss provisions on the aviation sector under IFRS 9 will include both incurred losses and expected losses, which will be larger than those provided for under IAS 39. Such a large provision will trigger a reduction in the regulatory capital and retained earnings of the banks and subsequent reduction or non-payment of dividends. Therefore, given the expected loss from COVID 19, banks can be cautious by reducing their overall investments, loans and advances exposure (taking less risk), leading to a further reduction in profits. Moreover, banks can use the insights from expected loss estimation to design more robust investments, loans and advances to increase their performance that will cover up expected losses due to COVID 19.

3. Literature review

The financial reporting environment, including presentation and disclosures, is a significant determinant of firms' risk-taking behaviour (Bleck & Liu, 2007; Hutton et al., 2009; Jin & Myers, 2006). More specifically, accounting standards influence bank behaviour through the impact financial statements have on bank supervision and also via quantitative regulatory requirements such as minimum capital ratios (Barth & Landsman, 2010). The Federal Deposit Insurance Corporation (FDIC) suggests that without accounting standards and financial statements, it will be difficult to evaluate the safety and soundness of banks to kerb excessive risk-taking by banks (FDIC 199). Further, Beatty and Liao (2014) argue that changes in accounting standards provide significant incentives for banks to change their economic behaviour because regulatory capital is calculated on accounting numbers.

Generally, empirical studies on the consequences of IFRS at the firm level show that as a single set of high-quality global standards, IFRS improve disclosure, comparability and transparency in financial reporting (Byard et al., 2011; Daske et al., 2008; DeFond et al., 2011; Tan et al., 2011). Such an increase in transparency enables capital providers to monitor the risk-taking by firms (DeFond et al., 2015; Hutton et al., 2009; Jin & Myers, 2006). Theoretically, Bleck and Liu (2007) posit that mark-to-market accounting, which is a principle of IFRS, provides early warnings to capital providers which is further consistent with analysts persistently seeking fair value information from global banks (Bischof et al., 2014). Therefore, the fair valuation and forward-looking requirements of IFRS 9 could offer earlier warnings to market participants on banks' risk-taking

behaviour. Giner and Mora (2019) suggest that the provision of risk information on loans increases market discipline on banks. Novotny-Farkas (2016), therefore, argues that earlier and high recognition of loan losses through the expected credit loss will decrease earnings and capital, and hence reduce the bank's ability to engage in any risky investment.

The expected credit loss provisions under IFRS 9 are in line with bank regulators' preference ofensuring financial stability (Giner & Mora, 2019). According to Cohen and Edwards (2017), forward-looking provisions put banks in a better position to support economic crises because early loss recognition speeds up the cleaning up of the balance sheet. The balance sheet clean-ups will reduce capital, which could dampen any future lending (Cohen & Scatigna, 2016; Gambacorta & Shin, 2018). Deloitte (2013) indicates that the increase in disclosure around IFRS 9 reduces the uncertainty over loan valuations, making it easier for banks to take only relevant risks. Further, the Deloitte analysis suggests that the estimation of expected credit loss could help banks in making lending decisions. Information such as the nature, likelihood and timing of risks required to estimate the expected credit losses provide valuable information to banks in the assessment of investment either in loans or taking capital from the market. Furthermore, the detailed disclosure under IFRS 9 includes information on the quality and creditworthiness of loans, which reduce information asymmetry arising from agency problem between bankers and their customers (Giner & Mora, 2019).

However, and as earlier mentioned, forward-looking provisions in financial reporting could be a double-edged sword (Bushman, 2016; Bushman & Landsman, 2010; Bushman & Williams, 2012; Wall & Koch, 2000). On the one hand, high discretion and flexibility can allow managers to incorporate more information about future expected losses and risk exposure, making accounting information timeliness (Kim et al., 2020). The shift to expected credit loss can improve loan loss recognition timeliness, especially in riskier banks (Kim et al., 2020). On the other hand, high discretion and flexibility can lead to opportunistic financial reporting and a decrease in transparency, causing potential unintended negative consequences (Wall & Koch, 2000). Indeed, Novotny-Farkas (2016) argues that given the high minimum capital requirement and large loan loss provisions, management will have more incentives to delay recognition of losses and manipulate earnings under IFRS 9. Such deterioration in transparency could exacerbate the difficulties of investors disciplining risk-taking by banks. Similarly, Bushman (2016) also suggests that capital inadequacy due to earlier and large loan loss provisioning combined with less transparency can increase banks' incentive for risk-taking and risk-shifting.

Using a sample of 27 countries, Bushman and Williams (2012) demonstrate that depending on managers' discretion, forward-looking loan provisions such as the expected credit loss can either positively or negatively affect firms' behaviour. They argue that opportunistic managers can use expected credit loss to manipulate earnings and decrease transparency, circumventing any check on risk-taking. However, the forward-looking provision could be used to properly manage risk-taking behaviour if the model is meant for timely recognition of losses. In Spain, Novotny-Farkas (2016) reports that the forward-looking loan provisions, also known as the collective impairment, made loan loss provisioning less transparent. As such, banks were

looking healthy when they were actually in financial distress leading to the crash in the banking sector in Spain (Bloomberg, 2012). Gebhardt and Novotny-Farkas (2011) argue that mandatory adoption of IFRS improves the accounting quality of banks due to the recognition of only incurred losses under IAS 39, implying that the removal of incurred losses with expected losses as replacement is likely to impair the accounting quality of banks.

The noise and bias in estimates introduce measurement errors in accounting information, which impair market participants' ability to evaluate the performance and risk exposure of the firm (Ball, 2006; Plantin et al., 2008). The volatility of fair valuation and forward-looking provisions can caution banks in investing in risky investments. Nonetheless, the same fair valuation and forward-looking provisions can induce risky investment due to the amplification of potential investment gains, especially when the information contains errors (DeFond et al., 2015; Li, 2017).

Furthermore, although IFRS 9 and its associated standard, IFRS 7, will result in more detailed disclosures, the widening scope of managerial judgment in IFRS 9 increases managerial discretion on what to present to investors. In the end, managers are more likely to disclose what will influence investors and market participants to stick with the bank. Craig Nichols et al. (2009) argue that bank managers can advance their information advantage over the market participant by smoothing earnings that are opportunistic or align with capital providers. For example, a delay in moving assets from Stage 1 to Stage 2 for expected credit loss recognition under IFRS 9 could result in a "too little too late" situation for investors and regulators (Novotny-Farkas, 2016). The subjectivity offered under IFRS 9 does not only deter transparency, but also impedes comparability, especially in the case of IFRS 9, where there is no requirement to disclose back-testing, which could provide information on inputs, assumptions and techniques used in estimating the provisions (IASB, 2013). The complex decision process for calculating impairment, coupled with high discretion, could lead to different loan loss provisions for identical assets in identical circumstances. Using the case study of Greek government bonds, Gebhardt (2016) demonstrate that the complex impairment calculation and managerial discretion offered under IFRS 9 could lead to delay and low provisions compared to the fair value losses. Albrahimi (2019) reports that IFRS 9 decrease the market discipline over risk-taking of banks because of the decrease in the sensitivity of leverage to changes in risk.

Using a sample of US banks, Beatty and Liao (2011) find that expected loss provisions increase lending while delayed loss provisions reduce lending because banks using the latter approach are likely to face more significant capital inadequacy and replenishment of capital during times of crisis. Elliott et al. (1991) also suggest that market participants react negatively to loans written off but see earlier loan loss provision as a good signal of a bank's management of loans. They argue that loan write-ups reduce the capital adequacy ratio compared to loan provisions, which increases the capital adequacy. The market may also respond positively to high provisions because such provisions indicate that the banks are less pro-cyclical and resistant to economic downturns (Beatty & Liao, 2011; Bouvatier & Lepetit, 2012; Bushman & Williams, 2012; Liu et al., 1997). In a study of European banks, Dong and Oberson (2021) found that the adoption of IFRS 9 reduces bank exposure to systematic through the implementation of capital transitional arrangement set out by the Basel Committee on Banking and Supervision.

Following the discussion above, we argue that the implementation of IFRS 9 will significantly impact banks' risk. However, given the two competing views that we articulate, it could increase or decrease bank risk. Consistent with the expectation of bank regulators, the forward-looking provision can provide more timely and consistent information for the market to discipline banks on excessive risk-taking. On the contrary, though unintended, the complexity and discretionary process of estimating the forward-looking provision could increase the opaqueness in financial reporting credit, thereby incentivising management to present information that aligns with shareholders' interest for more risk-taking. Quality high provision under the expected credit loss can also signal to the market about the banks' good management of loan portfolios, attracting more capital from the market.

4. Sample and data

We compile our sample by relying on López-Espinosa et al. (2021), who provide comprehensive information on the implementation of IFRS 9 by countries worldwide.[1] Our sample spans the period 2016–2019. In the spirit of DeFond et al. (2015), we focus on a relatively short window of two years before the adoption of IFRS 9 (2016 and 2017) and two years after the adoption of IFRS 9 (2018 and 2019) to reduce the impact of confounding factors. We then obtain financial statement information for all available banks on our list of countries from the Orbis Bank Focus database by Bureau Van Dijk. We obtain stock return data from Datastream. We also collect bank-level governance data from Boardex and country-level data from the World Development Indicators of the World Bank Indicators. Combining all our data sets yields a total of 1978 bank year observations for 666 banks across 61 countries. The 61 countries are made up of 46 countries that implement IFRS 9 and 15 countries than do not implement IFRS 9 during our sample period. Table 1 shows the number of observations by country in both IFRS 9 and non-IFRS 9 adopting countries. The highest number of bank year observations for the bank IFRS adopting countries comes from the UK, with 47 observations constituting about 6% of the total observations of the IFRS adopting countries. For non-IFRS countries, the largest number of observations comes from the United States, constituting about 74% of the observations from non-IFRS adopting countries.

5. Research design

5.1. Measures of bank risk

Given that we aim to examine the effect of IFRS 9 on bank risk from a capital market perspective, we adopt market-based measures of bank risk. We use two market-based measures of bank risk in our analysis, consistent with the literature. These are Total Risk and Systematic Risk. Total Risk captures the market's view of the inherent risk in banks' assets, liabilities ad off balance sheet items and also reflects the overall variability of banks' stock returns (Pathan, 2009) whilst systematic risk reflects a risk factor that helps to determine investors' expected returns. Our use of market-based measures of

[1]The list can be obtained from the Internet Appendix of the paper (Appendix OE).

Table 1. Sample distribution.

IFRS 9						NON IFRS 9	
Australia	32	Hungary	3	Philippines	19	Argentina	5
Austria	17	Ireland	10	Poland	25	Bangladesh	3
Bahrain	8	Italy	39	Portugal	6	Brazil	18
Belgium	5	Jordan	6	Qatar	12	Chile	9
Canada	42	Kenya	4	Romania	3	India	108
China	53	Kuwait	6	Russia	12	Indonesia	22
Colombia	3	Lebanon	6	Saudi Arabia	22	Israel	14
Cyprus	7	Lithuania	3	Singapore	10	Japan	41
Czech Republic	3	Malaysia	25	South Africa	21	Mexico	6
Denmark	32	Malta	3	Spain	26	Pakistan	14
Egypt	4	Mauritius	3	Sri Lanka	7	Switzerland	42
Finland	11	Netherlands	16	Sweden	18	Thailand	22
France	33	Nigeria	21	Turkey	25	Togo	3
Germany	33	Norway	15	United Arab Emirates	41	United States	892
Greece	12	Oman	7	United Kingdom	47	Vietnam	3
Hong Kong	20						
776						1202	

This table presents distribution of the sample by country for both IFRS 9 and non IFRS 9 implementing countries.

risk is further motivated by the fact that accounting-based measures of risk are likely to be mechanically affected by the adoption of IFRS 9. We measure Total Risk as the standard deviation of daily stock returns of each bank for each fiscal year (Dong & Oberson, 2021). This is computed as follows:

$$Total\ Risk = \sqrt{\frac{1}{n}\sum_{t-1}^{N}(R_{it} - \bar{R}_i)^2} \tag{1}$$

Where R_{it} is the return on day t for bank i and $\bar{R}_i$ is the average return of bank I for each year.

We measure Systematic Risk as the beta from a market model regression of the daily returns of each bank in each year against the corresponding daily returns of a market portfolio. Following Iannotta et al. (2019) and Dong and Oberson (2021), we use the Morgan Stanley Capital International (MSCI) world index as the market portfolio. We, therefore, determine Systematic Risk for each bank for each fiscal year by estimating the following model:

$$R_{it} = \alpha_0 + \beta_i MSCI_t + \varepsilon_{it} \tag{2}$$

Where R_{it} is the return on day t for bank i and β is our estimate of Systematic Risk for each bank.

5.2. IFRS 9 adoption

We capture the adoption of IFRS 9 using an indicator variable that takes the value of 1 if a bank is domiciled in a country that implements IFRS 9. It takes the value of 0 for banks in countries that do implement IFRS or those that implemented IFRS 9 after the end of our sample period, i.e. after 2019. We capture the period following the implementation of IFRS 9 using another indicator variable Post, which takes the value of 1 for the years 2018 and 2019 and 0 for the years prior, i.e. 2016 and 2017.

5.3. Control variables

We control for several bank financial characteristics in line with previous studies (e.g. Dong & Oberson, 2021). We include the size of the bank (Bank Size), which we compute as the log of total assets, ROA which we calculate as the ratio of net income to total assets. We also control for the variability of bank profitability by including the standard deviation of ROA over the preceding three years for each year. We further control for regulator capital by including banks' Tier 1 capital ratio. We also control for two bank-level governance variables as prior studies show that corporate governance characteristics influence the risk-of firms in general (e.g. John et al., 2008) and banks in particular (Berger et al., 2014; Laeven & Levine, 2009; Pathan, 2009; Srivastav & Hagendorff, 2016). Specifically, we include the proportion of independent directors (Board Independence) as structures that may constrain the risk-taking behaviour of bank executives and also improve monitoring (Minton et al., 2014). We also include a dummy variable that captures whether the CEO of the bank also doubles as its Chairman (CEO Duality) (Erkens et al., 2012). Finally, we control for country-level factors that capture the characteristics of the economy in which banks operate. Specifically, we follow Dong and Oberson (2021) include and the annual rate of growth of GDP (GDP Growth).

5.4. Summary statistics and correlations

Table 2 provides summary statistics of all variables. In panel A, we present statistics for the full sample. The mean (median) value of Total Risk is 1.7% (1.5%) and that of Systematic Risk is 0.81 (0.77). Whilst the mean (median) values for Systematic Risk are closer to those reported in studies like Dong and Oberson (2021), those for Total Risk are much lower. This is because, unlike Dong and Oberson (2021), we do not multiply our standard deviation by the square root of 250. When we do in unreported analysis, we obtain a Total Risk mean value of 0.26 compared to theirs of 0.35. Furthermore, our main results do not change with the use of the annualised standard deviation figure. The mean (median) values of other variables are generally consistent with most previous studies. We also provide disaggregated mean values for banks in IFRS countries and those in non-IFRS countries. As can be seen from the table, we observe statistically significant differences between mean values for systematic risk. However, our main

Table 2. Summary statistics.

	Full Sample						IFRS 9	NON IFRS 9	Diff
	N	Mean	SD	Median	Min	Max	Mean	Mean	
Total Risk	1978	0.017	0.006	0.015	0.005	0.051	0.017	0.017	0.000
Systematic Risk	1978	0.811	0.566	0.773	−0.306	2.090	0.594	0.952	−0.358***
Size	1978	16.939	2.019	16.708	11.701	22.177	17.818	16.372	1.446***
ROA	1978	0.010	0.010	0.009	−0.045	0.078	0.011	0.009	0.002***
SD ROA	1978	0.003	0.005	0.002	0.000	0.051	0.004	0.002	0.001***
Tier 1 Capital	1978	0.144	0.044	0.132	0.068	0.339	0.158	0.136	0.022***
Board Independence	1978	0.836	0.135	0.875	0.231	1.000	0.824	0.844	−0.020***
CEO Duality	1978	0.201	0.401	0.000	0.000	1.000	0.068	0.286	−0.218***
GDP Growth	1978	0.027	0.018	0.022	−0.037	0.083	0.027	0.027	0.000

This table presents summary statistics of variables used in the analysis. It shows summary statistics for the full sample and mean values for IFRS9 and non IFRS 9 sub-samples.

analysis will provide more clarity on whether risk has decreased in the post IFRS 9 period for banks in countries that implement IFRS 9 and those that do not.

In Table 3, we present the correlations of our variables. Generally, we do not observe high correlations among our variables, notably the control variables. Thus, multi-collinearity does not pose a challenge for our analysis.

5.5. Empirical testing

For our baseline regression, we develop a difference in difference set up by estimating the following equation.

$$Bank\ Risk_{it} = \beta_0 + \beta_1 Post_{it} \times\ IFRS\ 9 + \ \beta_j(Control_{it}) + Bank\ Fixed\ Effects + Year\ Fixed\ Effects + \varepsilon_{it} \quad (3)$$

Our main variable of interest is the interaction term between Post and IFRS 9. IFRS 9 is a dummy that takes 1 for banks in countries implementing IFRS 9 and zero, otherwise. This interaction term captures the incremental change in bank risk for banks in IFRS 9 countries (treatment group) relative to non-IFRS 9-adopting counties (control group). Given that we include bank fixed effects in our regressions, we exclude the standard-alone variables of the interaction term as these are absorbed by the fixed effects. All variables in equation (3) are defined in Appendix 1.

6. Results

6.1. IFRS 9 and bank risk

In Table 4, we present results from estimating equation (3). Our variable of interest here is the interaction term, Post x IFRS9. In column 1 of the table, we present results for Total Risk as the dependent variable and present those for Systematic Risk in column 2. For both columns, we include bank and year fixed effects. Across both columns of the table, the coefficient of the interaction term, Post x IFRS9, is negative and statistically significant at the 5% and 1% levels for Total Risk and Systematic Risk respectively. This suggests that following the implementation of IFRS 9, banks in IFRS 9-adopting countries experienced a decrease in risk relative to their non-bank IFRS 9 counterparts.

The results are consistent with the view that IFRS 9 enhances the reduction of risk through forward-looking loan loss provisioning. Compared to the incurred loss approach under IAS, 39, the expected credit loss approach under IFRS 9 provides timely recognition of losses and early warnings that the market can use to promote disciplinary pressure on bank risk-taking. These disciplinary pressures on banks' risk-taking lead to a decrease in leverage in response to increased risk. Further, the forward-looking provisions require more disclosure, increasing the transparency of banks' risk management on loans. Awareness of future losses cautions the banks in the disbursement of loans, resulting in a decrease in lending. Overall, our results are consistent with practitioners and bank regulators' view that IFRS 9 ensures the financial stability of banks by exerting disciplinary pressure on risk-taking (Deloitte, 2016, 2019; KPMG, 2016). Similarly, our results align with findings of Bushman and Williams (2012) that forward-looking provisions discipline banks' risk-taking. On the contrary, Albrahimi (2019) document a reduction in market discipline

Table 3. Correlations.

		1	2	3	4	5	6	7	8
1	Total Risk								
2	Systematic Risk	0.146***							
3	Size	−0.0512**	0.131***						
4	ROA	−0.219***	−0.0604***	−0.137***					
5	SD ROA	0.327***	−0.0948***	−0.134***	0.115***				
6	Tier 1 Capital	−0.0887***	−0.130***	−0.0593***	0.314***	0.0709***			
7	Board Independence	−0.188***	0.121***	−0.123***	−0.00545	−0.0907***	−0.0751***		
8	CEO Duality	−0.0812***	0.227***	−0.0472**	0.0406*	−0.0699***	−0.0632***	−0.00425	
9	GDP Growth	0.0162	−0.278***	0.120***	−0.0671***	−0.0132	−0.151***	−0.135***	−0.0837***

This table presents correlations among variables used in the study. All variables are defined in Appendix 1. ***, ** and * denote statistical significance at the1%, 5% and 10% levels respectively.

Table 4. Baseline regression.

	(1) Total Risk	(2) Systematic Risk
Post x IFRS 9	−0.0008**	−0.2837***
	(−2.13)	(−10.71)
Size	0.0002	0.1283**
	(0.21)	(2.42)
ROA	−0.1873***	−2.6263
	(−5.40)	(−0.47)
SD ROA	−0.0058	−1.8021
	(−0.09)	(−0.35)
Tier 1 Capital	−0.0042	−0.9661
	(−0.43)	(−1.49)
Board Independence	−0.0011	−0.3196
	(−0.32)	(−1.29)
CEO Duality	−0.0005	−0.0684
	(−1.33)	(−1.41)
GDP Growth	−0.0361***	−4.8957***
	(−2.75)	(−5.58)
Constant	0.0187	−0.7262
	(0.99)	(−0.79)
Bank Fixed Effects	Yes	Yes
Year Effect	Yes	Yes
N	1978	1978
Adjusted R^2	0.189	0.278

This table presents regression results for the impact of the post IFRS 9 implementation period on bank risk for banks in IFRS 9 adopting countries relative to non-IFRS 9 adopting countries. The dependent variables are Total Risk and Systematic. Total Risk is the standard deviation of daily returns of each bank for each year. Systematic Risk is the beta from a market model regression of the daily return on each bank on the corresponding returns on the MSCI index. Our independent variable of interest is the interaction term, POST x IFRS which captures the post IFRS 9 implementation period for banks in IFRS 9 adopting countries. All other variables are defined in Appendix 1. Standard errors are clustered at the bank level. *T-statistics* are in parenthesis. ***, *** and * denote statistical significance at the 1%, 5% and 10% levels respectively.

following the implementation of IFRS 9. Their results are likely to be driven by the use of US firms as the only control sample and quarterly data. Quarterly reporting is not mandatory in most countries, including UK (since 2014), and quarterly data does not account for intertemporal variation in firm's fiscal year. Therefore, our results are likely to differ from those of Albrahimi (2019) due to methodological design.

With regards to our control variables, co-efficient estimates of Size are positive and statistically significant for Systematic Risk at the 1% level. This relationship is generally consistent with those reported in Dong and Oberson (2021). Intuitively, ROA has a negative and statistically significant effect on Total Risk. Overall, control variables have the expected signs.

6.2. Cross-sectional analysis: safer vs riskier banks

We next examine whether the results from our baseline regression vary in the cross-section. Specifically, we test whether and to what extent the reported negative relationship between IFRS 9 and our market risk measures is dependent on the level of banks' risk exposure prior to the implementation of IFRS 9. This distinction is important because of the implications that the implementation of IFRS 9 may have for the regulation of banks. Amel-Zadeh and Barth (2021) argue that regulation of banks is deemed effective if it reduces risk for riskier banks. For safer banks, risk reduction could amount to regulatory overreach, making such interventions counterproductive.

To assess the riskiness of banks, we compute the Z-Score for each bank in line with previous literature (Danisman & Demirel, 2019; Mourouzidou-Damtsa et al., 2019). We compute this as the return on assets plus capital to asset ratio scaled by the standard deviation of return on assets over the past three years. This measure captures the distance away from insolvency with a higher figure implying a greater distance from insolvency, and by implication, a lower probability of insolvency. For ease of interpretation, we use the inverse value such that a higher value indicates higher risk. We then classify banks as safer if their Z-Score values prior to the implementation of IFRS 9 is below the sample median for the pre-implementation period and riskier if their Z-Score values prior to the implementation of IFRS 9 is above the sample median value during the pre-implementation period. Thus, we focus on the riskiness of banks prior to the implementation of IFRS 9. This process yields 140 and 115 treated banks classified as safer and riskier respectively. It also yields 206 and 188 control banks that are classified as safer and riskier respectively. Our pre-IFRS 9 implementation period for classifying banks as safer or riskier extends to the years before the start of the sample period, i.e. 5 years. Hence, due to missing values of Z-Score for some of these years, the total number of banks for this analysis adds up to 649.

We then re-estimate our regression for each sub-sample. If the negative effect of IFRS 9 on Total Risk and Systematic Risk is a manifestation of effective regulation, we expect to see negative and statistically significant coefficients of our variable of interest, Post x IFRS 9, for banks in the riskier category and an insignificant or positive coefficient for the banks in the safer category. Table 5 presents the results of this analysis. Columns 1 and 2 present the results for the safer sub-sample whilst columns 3 and 4 present results for the riskier sub-sample. As can be seen from Columns 3 and 4 of the table, co-efficient estimates of our variable of interest are negative and statistically significant for both Total Risk and Systematic Risk. This shows that our documented negative relationship between IFRS 9 and bank risk is more pronounced for riskier banks. We find these results to be intuitive because we do not see risk reduction for the safer banks. On the contrary, the results in Column 2 imply that any regulatory overreach for safer banks would rather result in an increased market risk for safer banks.

6.3. The role of regulatory enforcement

Prior studies on the consequences of IFRS argue that the effectiveness of IFRS in increasing transparency, and hence being beneficial, depends significantly on the regulatory environment (Ahmed et al., 2013; Bova & Pereira, 2012; Cai et al., 2014; Daske et al., 2013; Houqe & Monem, 2016; Mantzari et al., 2017). Due to the large discretionary nature and subjective estimates requirements of IFRS, some scholars claim that it leads to opacity of financial statements and an increase in the information advantage of management in weak regulatory environments (Ahmed et al., 2013; Ball, 2006; Bova & Pereira, 2012; Chand & White, 2007; Daske et al., 2008; Hopper et al., 2017; Mantzari et al., 2017). Thus, the ability of IFRS 9 to contribute to reducing bank risk is limited to countries with strong institutional quality. On the contrary, as a high-quality standard, IFRS could serve as an additional layer of quality regulation on existing institutions; hence the impact of IFRS 9 on bank risk could be stronger in a weak regulatory environment (Cai et al., 2014; Houqe & Monem, 2016).

Table 5. Safer vs riskier banks.

	Safer Banks		Riskier Banks	
	(1) Total Risk	(2) Systematic Risk	(3) Total Risk	(4) Systematic Risk
Post x IFRS 9	−0.0003	0.1456***	−0.0018**	−0.4355***
	(−0.79)	(3.49)	(−2.35)	(−9.33)
Size	−0.0011	0.3116***	0.0015	0.2477***
	(−0.68)	(3.42)	(0.94)	(3.06)
ROA	−0.1974***	4.4715	−0.1740***	−1.8286
	(−4.04)	(0.58)	(−3.84)	(−0.50)
SD ROA	0.0328	−1.7709	−0.0399	−2.6062
	(0.34)	(−0.35)	(−0.51)	(−0.36)
Tier 1 Capital	−0.0104	−0.8720	0.0016	−1.8710**
	(−0.89)	(−0.90)	(0.10)	(−1.97)
Board Independence	−0.0058	−0.1363	0.0031	−0.3403
	(−1.27)	(−0.55)	(0.66)	(−0.78)
CEO Duality	−0.0007	−0.0348	−0.0003	−0.0681
	(−1.57)	(−0.66)	(−0.42)	(−1.00)
GDP Growth	−0.0348**	−1.5237	−0.0377*	−6.5479***
	(−2.30)	(−1.40)	(−1.70)	(−4.76)
Constant	0.0443	−4.2821***	−0.0040	−2.4263*
	(1.59)	(−2.61)	(−0.15)	(−1.69)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
N	1097	1097	814	814
Adjusted R^2	0.212	0.282	0.193	0.167

This table presents regression results for the impact of the post IFRS 9 implementation period on bank risk for safer and riskier banks. Safer banks are defined as banks with below median inverse Z-Score and riskier banks are defined as banks with above median Z-Score prior to IFRS 9 implementation. The dependent variables are Total Risk and Systematic. Total Risk is the standard deviation of daily returns of each bank for each year. Systematic Risk is the beta from a market model regression of the daily return on each bank on the corresponding returns on the MSCI index. Our independent variable of interest is the interaction term, POST x IFRS which captures the post IFRS 9 implementation period for banks in IFRS 9 adopting countries. All other variables are defined in Appendix 1. Standard errors are clustered at the bank level. *T-statistics* are in parenthesis. ***, *** and * denote statistical significance at the 1%, 5% and 10% levels respectively.

Following these competing arguments, we next examine whether our results are moderated by the strength of regulatory enforcement in terms of both accounting standards and banking supervision. To examine the role of accounting regulatory enforcement, we rely on the index created by Brown et al. (2014). Compared to other broad measures of enforcement that look at the quality of legal institutions, this measure focuses explicitly on accounting compliance and is drawn from extensive surveys undertaken by the International Federation of Accountants. It is based on 51 countries for the period 2002, 2005 and 2008. We partition countries into weak and strong enforcement quality based on whether the score for each country is below or above the sample median. To examine the role of banking supervision, we follow López-Espinosa et al. (2021) and create an index using the 2019 edition of the Bank Regulation and Supervision Survey by the World Bank. We adopt the seven questions identified by López-Espinosa et al. (2021) as most reflecting the supervisory powers of regulators in terms of key issues such as accounting and auditing (see Appendix 2). We assign a value of 1 if the answer to any of the seven questions is yes, and 0 otherwise. We then sum the values across all seven items for each country to obtain an index that ranges from 0 to 7. Like López-Espinosa et al. (2021), we split countries in to low and high banking supervision based on whether the index value for each country is below or above the sample median.

Table 6 presents the results of our tests of the role of regulatory enforcement. Panel A presents the results relating to accounting enforcement. As can be seen from the table, co-efficient estimates of our variable of interest, Post x IFRS 9, are larger and statistically significant for the strong enforcement sub-sample (columns 3 & 4). This suggests that the effect of IFRS 9 on bank risk is greater when accounting enforcement is stronger. In Panel B, we present the results relating to banking supervision intensity. The co-efficient estimates of Post x IFRS 9 is insignificant for Total risk and weakly significant for systematic risk in the low banking supervision intensity sub-sample. However, they are highly significant for banks in countries with high banking supervision intensity as can be seen in columns 3 and 4 of Panel B. Overall, the results in Table 6 support the view that the regulatory environment plays a vital role in the capital markets effects of IFRS 9 implementation and more specifically, the effectiveness is achieved when the quality of regulatory enforcement is stronger.

7. Robustness checks

In this section, we present a set of analyses to check the robustness of our main results.

Table 6. The role of regulatory enforcement.

Panel A: Enforcement of Accounting Standards				
	Weak		Strong	
	(1) Total Risk	(2) Systematic Risk	(3) Total Risk	(4) Systematic Risk
Post x IFRS9	−0.0001	−0.3385	−0.0007**	−0.7219***
	(−0.12)	(−1.09)	(−2.11)	(−16.20)
Constant	0.0708*	0.0904	0.0123	−14.5767***
	(1.85)	(0.05)	(0.77)	(−10.05)
Controls	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
N	910	910	906	906
Adjusted R^2	0.291	0.233	0.164	0.424
Panel B: Banking supervision intensity				
	Low		High	
	(1) Total Risk	(2) Systematic Risk	(3) Total Risk	(4) Systematic Risk
Post x IFRS9	−0.0003	−0.2526*	−0.1354***	−0.4782***
	(−0.66)	(−1.82)	(−3.98)	(−4.15)
Constant	0.0153	−2.4882**	0.1153	23.5768***
	(0.77)	(−2.49)	(1.51)	(3.66)
Controls	Yes	Yes	Yes	Yes
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
N	958	958	911	911
Adjusted R^2	0.189	0.332	0.500	0.249

This table presents regression results for the impact of IFRS 9 implementation per on bank risk, based on the quality of regulatory enforcement. Panel A presents results with respect the enforcement of accounting standards and Panel B presents results with respect the enforcement of banking supervision. The dependent variables are Total Risk and Systematic. Total Risk is the standard deviation of daily returns of each bank for each year. Systematic Risk is the beta from a market model regression of the daily return on each bank on the corresponding returns on the MSCI index. Our independent variable of interest is the interaction term, POST x IFRS 9, which captures the post IFRS 9 implementation period for banks in IFRS 9 adopting countries. All other variables are defined in Appendix 1. Standard errors are clustered at the bank level. *T-statistics* are in parenthesis. ***, *** and * denote statistical significance at the 1%, 5% and 10% levels respectively.

7.1. Excluding UK and US

As noted from our sample distribution in Table 1, the UK has the highest number of observations in the IFRS 9 adopting countries. Similarly, the US has a disproportionately larger number of observations in not only the non-IFRS 9 sample, but the entire sample. Therefore, one may argue that our findings are mainly driven by the inclusion of these two countries, especially the US. We directly address this concern by first excluding only the US and then excluding both the US and the UK in our estimation of equation (3). The results are presented in Table 7. We continue to find qualitatively similar results in terms of the impact of IFRS 9 on bank risk suggesting that our conclusions are not driven by the larger weighting of the UK and US in the sample.

7.2. Alternative measure of risk

So far, our analysis has been based on market measures of risk. Despite our explanations above for using market measures of risk, one may still argue that it is necessary to also examine whether IFRS 9 has an impact on bank risk behaviour which may also be a catalyst for any capital market implications, as market measures of risk do not directly capture risk-taking behaviour by banks. To address this concern, we regress our Z-Score measure on implementation of IFRS 9, it reflects risk-taking behaviour by

Table 7. Excluding US and UK.

	No US		No US and UK	
	(1) Total Risk	(2) Systematic Risk	(3) Total Risk	(4) Systematic Risk
Post x IFRS 9	−0.0004	−0.2769***	−0.0004	−0.2659***
	(−0.72)	(−9.99)	(−0.75)	(−9.51)
Size	−0.0013	0.0784	−0.0016	0.0506
	(−0.68)	(0.94)	(−0.78)	(0.57)
ROA	−0.2189***	4.1089	−0.1879***	−2.9458
	(−5.51)	(0.84)	(−3.50)	(−1.07)
SD ROA	−0.0021	−1.0165	−0.0641	−4.7224
	(−0.03)	(−0.18)	(−0.71)	(−0.57)
Tier 1 Capital	0.0068	−1.0694	0.0111	−0.9315
	(0.54)	(−1.38)	(0.83)	(−1.20)
Board Independence	−0.0008	−0.5175*	−0.0002	−0.4090
	(−0.18)	(−1.83)	(−0.04)	(−1.49)
CEO Duality	−0.0015	−0.1932***	−0.0015	−0.1740***
	(−1.11)	(−3.20)	(−1.16)	(−2.75)
GDP Growth	−0.0461***	−3.4741***	−0.0520***	−3.3106***
	(−3.31)	(−3.77)	(−3.68)	(−3.75)
Constant	0.0464	−0.0766	0.0508	0.3606
	(1.33)	(−0.05)	(1.36)	(0.23)
Bank Fixed Effects	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
N	1086	1086	1039	1039
Adjusted R^2	0.226	0.180	0.197	0.180

This table presents regression results for the impact of the post IFRS 9 implementation period on bank risk for banks in IFRS 9 adopting countries relative to non-IFRS 9 adopting countries where we exclude the US (Columns 1 & 2) and both the US and UK (Columns 3 & 4). The dependent variables are Total Risk and Systematic. Total Risk is the standard deviation of daily returns of each bank for each year. Systematic Risk is the beta from a market model regression of the daily return on each bank on the corresponding returns on the MSCI index. Our independent variable of interest is the interaction term, POST x IFRS which captures the post IFRS 9 implementation period for banks in IFRS 9 adopting countries. All other variables are defined in Appendix 1. Standard errors are clustered at the bank level. *T-statistics* are in parenthesis. ***, *** and * denote statistical significance at the 1%, 5% and 10% levels respectively.

banks. As mentioned earlier, we compute this as the return on assets plus capital to asset ratio scaled by the standard deviation of return on assets. We however use the standard deviation of return on asset for the period prior to the implementation of IFRS 9 to avoid any overlaps. Again, for ease of interpretation, we use the inverse value such that a higher figure denotes high risk-taking. Also, and in line with Danisman and Demirel (2019), we take the natural log of this measure to reduce the effect of extreme values. We then present the results from this analysis in Table 8. As can be seen from the table, our variable of interest remains negative and statistically significant. This allows us to conclude that the implementation of IFRS 9 also influences bank risk taking behaviour.

7.3. Alternative estimation methods

To further strengthen the robustness our results, we also employ two alternative estimation methods. Firstly, given that we combine country-level and firm-level data, country-level variables can be spurious, especially when there are large differences in the number of banks each country contributes to the overall sample. To address this concern, we follow Mourouzidou-Damtsa et al. (2019) and use a multi-level hierarchical model to re-estimate equation (2). This approach splits the variance from the bank and country-level variables and applies appropriate weights that consider the number of banks in each country. We present the results of this estimation in Columns 1 and 2 of Table 9. As can be seen from the table, the interaction term, Post x IFRS9 continues to be negative and significant across all columns, confirming our earlier finding that

Table 8. Alternative measure of risk.

	(1) Z Score
Post x IFRS 9	−0.1734***
	(−3.19)
Size	−0.1528
	(−1.30)
ROA	−5.3832*
	(−1.85)
SD ROA	169.1101***
	(4.86)
Tier 1 Capital	−2.1113
	(−1.64)
Board Independence	0.0226
	(0.05)
CEO Duality	0.1676*
	(1.72)
GDP Growth	−4.6905***
	(−2.87)
Constant	−1.6638
	(−0.81)
Bank Fixed Effects	Yes
Year Effect	Yes
N	1983
Adjusted R^2	0.354

This table presents regression results for the impact of the post IFRS 9 implementation period on bank risk for banks in IFRS 9 adopting countries relative to non-IFRS 9 adopting countries using an alternative measure of risk. Our independent variable of interest is the interaction term, POST x IFRS which captures the post IFRS 9 implementation period for banks in IFRS 9 adopting countries. All other variables are defined in Appendix 1. Standard errors are clustered at the bank level. Standard errors are clustered at the bank level. *T-statistics* are in parenthesis. ***, *** and * denote statistical significance at the 1%, 5% and 10% levels respectively.

banks in IFRS adopting countries experience lower risks compared to those in non-bank IFRS countries following the implementation of IFRS 9.

Secondly, to address issues of endogeneity, we apply an entropy balancing estimation technique. This allows us to address any concerns that banks in our treatment group could be inherently different from those in the control group. This approach enhances comparability of the treatment and control groups by assigning a reweighting of the moments of the covariates of firms in the control group to make them equal to the moments of the treated group (Hainmueller, 2012; Hainmueller & Xu, 2013). For our analysis, and consistent with other previous studies (e.g. Boasiako et al., 2022), we balance the first three moments (i.e. mean, variance and skewness) of the covariates of both treated and control groups. Unlike other matching methods like Propensity Score Matching (PSM), the entropy balancing approach enhances balance quality and reduces potentially tedious balance checks since covariate moments are automatically balanced by an algorithm (Hainmueller, 2012). We present our results for this analysis in Columns 3 and 4 of Table 9. Again, we observe that results in terms of the main variable of interest remain qualitatively similar to those from our baseline regressions.

Table 9. Alternative estimation methods.

	Multi-level hierarchical model		Entropy balancing	
	(1) Total Risk	(2) Systematic Risk	(1) Total Risk	(2) Systematic Risk
Post x IFRS9	−0.0008**	−0.1990***	−0.001**	−0.315***
	(−2.08)	(−5.84)	(−2.53)	(−7.73)
Post	−0.0002	−0.0448	−0.000	−0.182***
	(−1.04)	(−1.63)	(−0.86)	(−5.57)
IFRS 9	0.0016***	−0.1509***	0.001***	−0.010
	(2.77)	(−3.37)	(0.2.61)	(−0.27)
Controls	Yes	Yes	Yes	Yes
Year Effect	Yes	Yes	Yes	Yes
N	1978	1978	1978	1978
Average/Adjusted R^2	0.175	0.181	0.267	0.377

This table presents regression results for the impact of the post IFRS 9 implementation period on bank risk for banks in IFRS 9 adopting countries relative to non-IFRS 9 adopting countries using alternative estimation techniques. Columns 1 and 2 present results from a multi-level hierarchical regression model whilst Columns 3 and 4 present the results from an entropy balancing estimation model. The dependent variables in both models are Total Risk and Systematic. Total Risk is the standard deviation of daily returns of each bank for each year. Systematic Risk is the beta from a market model regression of the daily return on each bank on the corresponding returns on the MSCI index. Our independent variable of interest is the interaction term, POST x IFRS which captures the post IFRS 9 implementation period for banks in IFRS 9 adopting countries. All other variables are defined in Appendix 1. Standard errors are clustered at the bank level. T-statistics are in parenthesis. ***, *** and * denote statistical significance at the 1%, 5% and 10% levels respectively.

8. Conclusion

In this paper, we examine the effect of IFRS 9: *Financial Instruments* on bank risk behaviour. IFRS 9 requires the estimation of impairment based on the expected credit loss of the financial assets and not the incurred loss, which relies on the happening of an actual event as it was in IAS 39. As such, the implementation of IFRS 9 leads to an increase in provisions of financial assets and loan loss provisions for banks, which can affect the market perception of the risk-taking of banks. We use a sample of 666 banks across 61 countries for the period 2016–2019 and employ a battery of estimation techniques. Our findings suggest that the implementation of IFRS 9 is associated with a reduction in market risk measures in

banks domiciled in IFRS 9 adopting countries relative to banks in non-IFRS 9 adopting countries. This impact is, however, more pronounced for banks in countries with stronger accounting regulatory enforcement and banks in countries with high banking supervision intensity. We also show that the effect of IFRS 9 on bank risk is a manifestation of effective regulation rather than regulatory overreach as the relationship that we document between IFRS 9 and bank risk is mainly present for banks with higher risk prior to the implementation of IFRS 9. We argue that the forward-looking provision under the new standard, compared with the incurred provision of its predecessor IAS 39, provides quality information on the nature, likelihood and timing of risks that enhance lending decisions. Arguably, estimations of the expected credit loss give the bank a grip of the future; hence IFRS 9 is more likely to ensure financial stability, which is consistent with the objective of bank regulators, the promoters of the standard (Giner & Mora, 2019).

Our findings complement prior studies on the relevance of financial reporting standards in the banking sector. This current study also adds to the debate on how a shift from more conservative provisioning to more forward-looking provisioning affects bank risk. Our results suggest that the forward-looking measurement provides more timely information to enhance market discipline of bank risk. However, we caution that our study provides initial evidence and is more exploratory in nature due to the newness of IFRS 9.

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Appendices

Appendix 1: variable definitions

This table presents the definitions of variables used in the study.

Variable	Definition	Source
Total Risk	Standard deviation of daily returns of each bank for each year.	Authors' calculation
Systematic Risk	Beta from a market model regression of the daily return on each bank on the corresponding returns on the MSCI index	Authors' calculation
IFRS9	An indicator variable which takes the value of 1 for banks domiciled in a country adopting IFRS 9 and zero otherwise.	Bank Regulations and Supervision data
POST	An indicator variable which takes the value of 1 for period after the implementation of IFRS 9 (2018 and 2019) and zero for the 2 years before the implementation of IFRS 9 (2016 and 2017)	Authors' calculation
Size	The log of total assets of a bank	Orbis Bank Focus
Tier 1	The ratio of bank capital to risk-weighted assets	Orbis Bank Focus
ROA	Ratio of net income to total assets	Orbis Bank Focus
SD ROA	Standard deviation of ROA over the last 3 years	Authors' calculation
Board Independence	The ratio of independent directors to total number of board members	Boardex
CEO Duality	A dummy variable which takes the value of 1 if the Bank CEO also doubles as the chair of the board.	Boardex
GDP Growth	Annual rate of growth of GDP	World Bank

Appendix 2: construction of banking supervision intensity

This appendix presents the data items from the 2019 World Bank's Bank Regulation and Supervision Survey as adapted from López-Espinosa et al. (2021). A score for each question equals 1 for a Yes answer and 0 otherwise. The index is then computed as the sum of scores.

Question Item	Possible Scores
Does the banking supervisor have the right to meet with the external auditors and discuss their report without the approval of the bank (choose the most appropriate option)?	0, 1
In cases where the supervisor identifies that the bank has received an inadequate audit, does the supervisor have the power to take actions against the external auditor?	0, 1
Do supervisors require banks to publicly disclose all fines and settlements resulting from noncompliance with regulations?	0, 1
Does the supervisory agency have the power to require banks to constitute provisions to cover actual or potential losses?	0, 1
Does the supervisory agency have the power to require banks to reduce or suspend dividends to shareholders?	0, 1
Does the supervisory agency have the power to require banks to reduce or suspend bonuses and other remuneration of bank directors and managers?	0, 1
Are bank regulators/supervisors required to make public formal enforcement actions, which include cease and desist orders and written agreements between a bank regulatory/supervisory body and a banking organization?	0, 1