

EVALUATING THE IMPACT OF IFRS 9 ON BANK RISK:

Comparing emerging markets and developing economies with
advanced countries

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Master Thesis

Master Program in Accounting, Valuation and Financial Management

Stockholm School of Economics

2024

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Abstract

This thesis examines the impact of the International Financial Reporting Standard 9 (IFRS 9) on bank risk, particularly focusing on the differences in its effects between advanced countries and Emerging Markets and Developing Economies (EMDEs). Utilizing a dataset spanning from 2013 to 2022, which includes 797 banks across 54 countries, this study incorporates Difference-in-Difference (DiD) and Triple Difference (DDD) regression models. We find, in line with prior research that IFRS 9 reduces bank risk in advanced economies. However the impact in EMDEs is less straightforward, not leading to similar risk reduction. This suggests that IFRS 9's effectiveness is contingent on the economic and institutional context of the implementing country. These results underline the necessity for considering local conditions in the global standard-setting process to ensure the intended outcomes of financial regulations are achieved across diverse economic settings.

Keywords: IFRS 9, Bank Risk, Emerging markets and developing economies, market discipline

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1 Introduction

At the beginning of 2018, banks in over 180 jurisdictions across the world began applying a new standard for the accounting of financial instruments. The International Accounting Standards Board (IASB) issued IFRS 9 to replace the predecessor IAS 39 (International Accounting Standards Board (IASB), 2009). The standard change came after a long period of criticisms of the preceding standard and the decisive moment were the criticism from bank regulators and other stakeholders following the 2008 financial crisis (Barth & Landsman, 2010; Curry, 2013; Dugan, 2009; Wellink, 2011). They argued that the prevailing accounting standard for financial instruments was pro-cyclical and contributed to exacerbating the crisis. Part of the pro-cyclicality was due to recognizing loan loss provisions "too little, too late" as a result of the incurred credit loss model (ICL-model), which was the model for impairments under IAS 39 (Wellink, 2011). Thus, critics called for including a more comprehensive set of credit relevant information, including information which is forward looking (Curry, 2013; Dugan, 2009; Wellink, 2011). This resulted in the introduction of the expected credit loss model (ECL-model) as the model for impairments in IFRS 9. With the new standard, the IASB wanted to address the issues raised during the financial crisis and to decrease the complexity of the standard and create better understanding for the financial statements among its users (International Accounting Standards Board (IASB), 2009; IFRS, 2014).

Part of the process of introducing a new accounting standard is evaluating the impact of the standard after its implementation. The IASB conducts a post implementation review (PIR) to assess whether the standard works as intended and to provide stakeholders with an opportunity to comment on and give recommendations for further improvements on the standard (IFRS, 2024b). Depending on the outcome of the PIR-process, the IASB may take action in the standard setting process. Currently, the IASB is conducting a PIR of the impairment requirements of IFRS 9. As a part of this process, the standard setters gather information from practitioners as well as academic research into the new standard to determine what impact the standard has had (IFRS, 2024b). Hence, it is important that the academic research fairly reflects the effect which IFRS 9-implementation has and what determines this effect, in order for the standard setting bodies to make more informed decisions on whether further action is needed in the development of a new standard.

In their literature review of IFRS 9 research, Awuye and Taylor (2024) concludes that the effect of IFRS 9 depends on context such as economic settings, institutional context and corporate governance structures. However, when considering in what settings IFRS 9 has been previously studied, much of the literature is focused solely or mainly on banks in advanced countries. Awuye and Taylor (2024) identifies that limited focus has been allocated towards the implementation and effects of IFRS 9 in emerging markets and developing economies. There is no strict method or definition for the classification of countries based on economic development (Nielsen, 2011). Different international institutions conduct their own categorization. This thesis will use the classification done by the International Monetary Fund (IMF). They classify

41 countries as advanced and the remaining as “emerging markets and developing economies” (EMDEs). Although there is no strict definition, challenges such as poverty, life expectancy, weaker institutions and corruption are some challenges which are more prevalent in EMDEs (The Economist, 2018; Olken & Pande, 2012; United Nations, 2015). This will inform the context in which the bank as well as other entities operates.

In 2011, the Emerging Economies Group was created at the direction of the IFRS Foundation Trustees (IFRS, 2024a). The objective of the group is to engage emerging economies in the development of the IFRS-standards. In their upcoming meeting, the post implementation review of IFRS 9 impairments is on the agenda. With the gap in literature regarding the effect of IFRS 9 in EMDEs, there is value in exploring the effect of the new standard in this setting further. Therefore, our study aims to answer the following research question:

Does the impact of IFRS 9 post-implementation on bank risk vary between banks in emerging and developing economies and those in advanced countries?

Multiple studies have found that implementing the IFRS framework or individual IFRS standards have different effects in advanced compared to EMDEs (Gordon, Loeb, & Zhu, 2012; Houqe, 2016; Outa, Ozili, & Eisenberg, 2017; Viana, Lourenço, & Paulo, 2023; Zori, 2021). In some instances, the beneficial implication of IFRS-implementation is only observed within one kind of economy. For example, adopting IFRS has led to increases in FDI inflows in EMDEs but a similar significant effect has not been observed in advanced economies (Gordon et al., 2012). In other cases, although the effect is present in both advanced and EMDEs, the strength of the effect is larger in advanced countries due to the institutional weaknesses of EMDEs. For instance, while IFRS increases value relevance in all economies it does so more in advanced economies than EMDEs (Outa et al., 2017).

The ECL-model, introduced in IFRS 9, addresses bank risk through decreasing the information asymmetry between management and the market regarding risk, as well as by mitigating procyclical lending (Beatty & Liao, 2011, 2021; López-Espinosa, Ormazabal, & Sakasai, 2021). The new impairment model improves the informativeness of the financial statements on the bank’s exposures and risk management by incorporating forward-looking information. With this improved transparency and access to timely information for the market, their ability to discipline the banks for any excessive risk taking is improved (Stephanou, 2010). However, the IASB introduced more discretion into the new standard compared to its predecessor in order to incorporate this relevant credit information (Frykström & Li, 2018). This has led to a discussion of whether the standard could increase the risk in banks by creating more opaque financial statements because increased managerial discretion introduces additional risk for manipulation and opportunistic behavior (Bushman & Williams, 2012; Frykström & Li, 2018; Gordon et al., 2012).

In their empirical study Kyiu and Tawiah (2023) concludes that implementing IFRS 9 has re-

duced risk in banks. However, this result should not be taken as a given to be applicable across advanced and EMDEs alike. As previously mentioned, past literature has shown the effect of IFRS is not uniform across advanced and EMDEs countries (Gordon et al., 2012; Houqe, 2016; Outa et al., 2017; Viana et al., 2023; Zori, 2021). Additionally, the result of Kyiu and Tawiah (2023) is dependent on the context in which the bank operates within. It is important to ensure that IFRS 9 achieves its goal of creating a standard which does not contribute to financial instability in both advanced countries as well as EMDEs. Financial stability is a contributing factor towards economic growth, which in turn has important role in reducing poverty and contributing to improving the quality of life in EMDEs by providing opportunities for employment and education (Department for international development, 2008; The World Bank, 2024).

This study is based on data from 797 banks in 54 countries between the years 2013 to 2022. This sample includes 3202 bank-year observations from advanced countries, which comes from 421 banks in 22 countries. For the EMDEs, there are 2753 bank year observations from 376 number of banks in 22 countries. In total we have 5999 bank-year observations in our sample. We first perform a difference-in-difference regression to study the effect of implementing IFRS 9 on bank risk, using non IFRS-adopting countries as a control group. Two different dependent variables are used to estimate bank risk; total risk which is defined as the standard deviation in stock price and systematic risk, which is the stock's beta. Compared to the previous conducted study into the effect of IFRS 9 on bank risk, we extend to include observations covering ten rather than four years (Kyiu & Tawiah, 2023). With a different sample compared to the original study, our results confirm the previous research that implementing IFRS 9 reduces bank risk. However, we then further extend the research by considering the effect of IFRS 9 on bank risk in advanced economies compared to EMDEs. This is done by splitting the full sample into an advanced country sample and an EMDEs sample, as well as a triple difference regression. From these analyses, we can conclude that IFRS 9-implementation decreases total risk in both advanced countries and EMDEs. However, we cannot conclude that there is a difference in the effects. For systematic risk we observe that implementing IFRS 9 affects EMDEs and advanced countries differently. These findings show the importance of conducting evaluations of accounting standards in EMDEs and that standard setters, such as IASB, must be aware of the differences between different contexts in order to create accounting standards with their intended outcomes across jurisdictions.

2 Literature Review

First the literature review will outline the background to IFRS 9 and describe the changes in the standard which is in the scope of this thesis. Continuing this section, the relationship between IFRS 9 and bank risk will be established as understood by the current research. Next, research on how economic development plays a role in the implementation of IFRS 9 and its effect on bank risk is presented. Lastly, the hypotheses will be introduced and motivated.

2.1 Regulatory Change: Background to IFRS 9

In 2014 the IASB issued IFRS 9 and the accounting standard became effective on January 1, 2018. It replaced IAS 39 as the standard for the accounting of financial instruments for companies which had to adhere to the IFRS accounting standards (International Accounting Standards Board (IASB), 2009). There was already large criticism against IAS 39 when the European Union adopted the International Financial Reporting Standards (IFRS) in the early 2000s. Then stakeholders had issues with the complexity of the standard and debated the benefits of fair value accounting (Hargreaves, 2005). However, it was the criticism following the 2008 financial crisis which led to the development of IFRS 9. In 2009, the G20 leaders called for accounting standard setters "...to work urgently with supervisors and regulators to improve standards on valuation and provisioning" (G20, 2009). The issues with IAS 39 were also raised by The Basel Committee, representatives of bank supervisory bodies as well as in research (Barth & Landsman, 2010; Curry, 2013; Dugan, 2009; Wellink, 2011).

Among other criticism against IAS 39, these critics argue that the model for impairment of financial instruments made loan loss provisioning pro-cyclical, meaning they magnified the economic cycle (Barth & Landsman, 2010; Curry, 2013; Dugan, 2009; Wellink, 2011). The ICL-model in IAS 39 required there to be objective evidence of an incurred loss. Therefore, losses had to be probable and reasonably estimated, which critics argued would result in delayed recognition of loan losses and at inadequate levels. The model thus failed to reflect the underlying credit environment. Therefore, there were calls for incorporating a range of credit relevant, forward-looking information into the loan loss provisioning (Curry, 2013; Dugan, 2009; Wellink, 2011). Additionally, it was suggested to improve disclosure requirements when changing the impairment model, as to prevent earnings management. With greater transparency into what assumptions were made and how the provisioning incorporated different credit relevant information, it would be easier for financial statement users to understand and compare entities (Wellink, 2011).

In July, 2018, the IASB communicated their intent to replace IAS 39 and that the new standard was to address the criticism raised during the financial crisis (International Accounting Standards Board (IASB), 2009). In their statement, they also express the goal of decreasing the complexity of the accounting of financial instruments to improve the understanding for investors and other financial statement users. Relevant to the scope of this study is the change in

impairment models, from the ICL-model in IAS 39 to the ECL-model in IFRS 9. However, in the new standard were also changes to classification and measurement of financial instruments as well as hedge accounting (IFRS, 2014).

Expected credit loss is the difference between the contractual payments and the expected payments for a financial instrument, discounted by the effective interest rate (Limani & Meta, 2017). Thus rather than capturing losses that are already evident, the ECL-model intends to capture the losses which are expected. According to the standard, the expected credit losses have to reflect the expected outcome based on different future scenarios (Frykström & Li, 2018). Thus, the model needs different forward looking information relevant to the credit risk in determining the provisions. This may include data on the macroeconomic environment such as economic growth, interest rates and unemployment rate (Frykström & Li, 2018). Because provisions are recognized before the loss is incurred, the provisions should be more timely under the ECL-model than the ICL-model.

In IFRS 9, the ECL-model allocates financial instruments into one of three stages; performing, under-performing and impaired financial instruments. What stage they are assigned to depends on the changes in credit quality of the instrument. At initial recognition, financial instruments are assigned to the first stage where provisions are made for the 12-month expected credit losses. When there has been a significant increase in the credit risk since initial recognition, the financial instrument is reallocated into the second stage and when there is objective evidence of impairment, the financial instrument is moved to the third stage. In both the second and third stage lifetime expected credit losses are recognized. However, how interest revenue is measured differs between the last two stages (PwC, 2014).

With the new standard comes increased managerial judgment (Frykström & Li, 2018). The process of determining what stage the financial instrument belongs to requires much managerial judgement, as bank management has to make an assessment of whether there has been a "significant increase in credit risk" (Basel Committee on Banking Supervision, 2015). The determination requires a range of credit relevant and forward looking information. The Basel Committee on Banking Supervision (2015) comments that this process requires strong governance, systems and controls as well as place large demands on the data, analytics and experience. Similar sentiment comes from economists at Riksbanken, the Swedish central bank, that the new impairment model increased modeling requirements in order to incorporate all the forward looking information into the loan loss provisioning (Frykström & Li, 2018). Similarly, they argue that due to the standard, financial institutions will need to enhance their systems, quantitative models, data and governance.

2.2 IFRS 9 Influence on Bank Risk

With the introduction of the ECL-model in IFRS 9, standard setters intended to mitigate the pro-cyclicality of loan loss provisions and thereby enhance financial stability (IFRS, 2014).

According to previous literature, mechanisms of the new impairment model could contribute to reducing bank risk. The ECL-model is more informative of banks' exposure and risk management, which allows for better market discipline. Additionally, the new standard may promote more proactive risk management and prudent lending. However, past literature has also identified potential adverse effects of the ECL-model which could exacerbate bank risk instead. This mainly comes from increased managerial discretion which could impair the transparency and comparability of the financial statements.

Implementing IFRS 9 has reduced the information asymmetry regarding banks' exposures and risk management. This reduction can be explained by the detailed disclosures on the quality and creditworthiness of the loans (Giner & Mora, 2019). Additionally, the information asymmetry is also affected by the new type of provisioning under the new impairment model. In their study of systemically important banks López-Espinosa et al. (2021) find that ECL-provisions are more predictive of bank risk than ICL-provisions. The improved informational value of the provisions for bank risk is explained by the inclusion of non-defaulted loans, which are not provisioned for under the ICL-model. These findings are consistent with the findings of Beatty and Liao (2021) suggesting that there are constraints on the ICL-model preventing provisions from incorporating all available information on future losses.

What information regarding a bank's exposures and risk management is available to market participants is a key component to their ability to enact market discipline (Stephanou, 2010). Market discipline is the mechanism in which market participants monitor and discipline banks for excessive risk taking. Since IFRS 9 reduces the information asymmetry, the market should be better equipped in disciplining the banks following the implementation of the new standard. Consequently, this indicates a reduction in bank risk under IFRS 9 accounting. Additionally, research into the effect of the regulatory environment on stock prices has shown that more transparent firms experience less fluctuations in stock prices than less transparent firms (Hutton, Marcus, & Tehranian, 2009; Jin & Myers, 2006). Thus, also supporting that increased transparency in the financial statements decreases risk from a market perspective.

In addition to influencing risk taking behavior through market discipline, the ECL-model also affects risk through a bank's lending practices. The ECL-model improves the timeliness of the loan loss provisions as recognition of provisions incorporates forward looking information rather than requiring an incurred loss (Kim, Ng, Wang, & Wu, 2021). Improvements in the timeliness of provisions have been observed to be more prominent among banks with greater risk. Improvements in the timeliness of loan loss recognition matters for the bank's lending practices, as Beatty and Liao (2011) find that it impacts the lending growth under recessions. Companies with more timely recognition lend more than their counterparts in recessions, as they are less concerned about capital adequacy when they do not require as large provisions. Thus, the implementation of the ECL-model can reduce bank risk by mitigating pro cyclical lending. This is consistent with other literature concluding that the reduction in capital, which occurs when making provisions, dampens lending (Cohen & Scatigna, 2016; Gambacorta &

Shin, 2018).

Central to the ECL-model as designed in IFRS 9 is the management discretion it allows, as described in previous section. Banks have to determine the point in time where financial instruments are reassigned to the next stage of the impairment model, as well as how to model different information and scenarios to determine the size of the provisions. With management discretion companies are able to incorporate all credit relevant, forward-looking information into the provisioning, which could decrease bank risk through market discipline. However, with this management discretion there is an ability for earnings management or other opportunistic and manipulative behavior which may cause unintended consequences (Bushman, 2016; Bushman & Williams, 2012; Gomaa, Kanagaretnam, Mestelman, & Shehata, 2019; Wall & Koch, 2000). Discretion which allows management to smooth earnings will dampen market discipline by decreasing the transparency of the financial statements (Bushman & Williams, 2012). Additionally, an experimental study by Gomaa et al. (2019) suggests that forward looking provisions, such as the ECL-model in IFRS 9, would increase earnings management. Also, Bushman (2016) argues that capital inadequacy combined with impaired market discipline due to opacity in the financial statements create incentives for risk taking behavior.

Hence, how implementing IFRS 9 impacts the information asymmetry towards the market is not unambiguous. The mechanism that enables increased transparency of the bank's risk management, is the same mechanism which allows for earnings management and opportunistic behavior which creates opaque financial reporting. What effect the new standard has on information asymmetry is important for bank risk, as it contributes to the market participants' abilities to discipline the banks for excessive risk taking.

In an empirical study, Kyiu and Tawiah (2023) investigates the effects of adopting the IFRS 9 standard on bank risk using a sample of 666 banks across 61 countries during the period from 2016 to 2019. They find that implementing IFRS 9 with the ECL-model leads to a reduction in bank risk. This effect is more pronounced in riskier banks and in countries with stronger accounting enforcement and higher banking supervision intensity. These findings suggest that IFRS 9 enhances financial stability by improving the timeliness and transparency of financial reporting, which reduces the banks' risk taking behaviors. Additionally, Kund and Rugilo (2023) investigated the standard's effect on bank resilience in Europe; utilizing stress tests as the basis for their analysis. Key findings suggest that while IFRS 9 may reduce the volatility of impairments (mitigating the "cliff-effect"), it introduces a "front-loading" effect that could initially lower banks' capital levels, potentially affecting their resilience negatively in the short term. This thesis intends to build upon this literature of empirical post IFRS 9 implementation evaluations by extending the time horizon before and after the implementation. Furthermore, the thesis intends to extend the literature on how IFRS 9 influences financial stability by adding the consideration of economic development of the country in which the bank resides.

2.3 Implementing IFRS 9 in EMDEs

In their literature review of IFRS 9 research, Awuye and Taylor (2024) find that the standard's impact is not uniformly felt but is impacted by corporate governance structures, economic settings and institutional context. This is congruent with Kyiu and Tawiah (2023) study on the impact of IFRS 9 on bank risk. They find that the strength in the reduction in bank risk is dependent on the riskiness of the bank and on the regulatory environment in which the bank operates. Therefore, there could be more insights to be found regarding the effects of implementing IFRS 9 by exploring how the implementation in advanced economies compared to that in EMDEs. The current empirical research on IFRS 9's impact on financial stability is either solely focused on advanced countries or has a sample dominated by advanced country banks (Kund & Rugilo, 2023; Kyiu & Tawiah, 2023; López-Espinosa et al., 2021).

As previously explained, there is no universal categorization of countries based on their economic development. International institutions such as the International Monetary Fund (IMF), The World Bank and The United Nations (UN) all have their own manner of classifying economies based on their economic development (Nielsen, 2011). The World Bank classifies economies into four groups based on income (GNI per capita). These groups are low, lower-middle, upper-middle and high income where the first two are referenced as the "developing world" (Khokharumar & Serajuddin, 2015). The IMF categorizes 41 countries as advanced economies and the remaining countries are classified as "emerging markets and developing economies". However, this classification is not based on any strict criteria, but has evolved over time (International Monetary Fund, 2023). The United Nations Development Program (UNDP) classifies countries based on the Human Development Index (HDI), which incorporates health, education and income indicators (Nielsen, 2011). Developed countries are those in the top quartile of HDI. As previously stated, this thesis uses the country classification made by the IMF.

Although there is no strict definition for the classification, as previously mentioned, there are some challenges which are more prevalent in EMDEs compared to advanced economies (The Economist, 2018; Department for international development, 2008; Olken & Pande, 2012; United Nations, 2015). These include a lower per capita income, standard of living and life expectancy. Additionally, EMDEs have larger issues with education systems, infrastructure such as transportation and communication and less stable political systems with weaker rule of law and higher rates of corruption. However, it should be noted that the IMF classifies 155 countries as EMDEs (International Monetary Fund, 2023). Therefore, there will be diversity within these groups in regards to these challenges.

In their research, Kyiu and Tawiah (2023) found that how implementing IFRS 9 influenced bank risk depended on whether the bank was classified as a safe or risky bank. The determination of whether the bank was safer or riskier depended on whether the bank's pre-implementation z-score is above or below the sample median z-score. In banks classified as riskier, implement-

ing IFRS 9 led to a reduction in bank risk. However, for safer banks they found no significant relationship between IFRS 9 implementation and total risk. For their other measure of bank risk, systematic risk, they found a positive relationship between the variables. The authors state that these results suggest that IFRS 9 is an example of effective bank regulation rather than regulatory overreach, as bank risk is not reduced in already safe banks. Reducing the risk in already safe banks would constitute regulatory overreach, as the goal of bank regulators such as the Basel Committee is not to completely eradicate risk in the banking sector (Amel-Zadeh & Barth, 2021).

There are many ways to measure risk and financial stability and soundness and where the ratio of non-performing loans is one which is more well known (The World Bank, 2024). The NPL-ratio is the ratio of non-performing loans to gross loans and is known as a measure of asset quality. The measure should reflect the risk the bank take in their lending and their ability to assess the creditworthiness of their clients (European Central Bank, 2021). Beck, Jakubik, and Piloiu (2015) and Kuzucu (2019) have observed higher NPL-ratios in EMDEs compared to advanced economies between the years 2000 and 2015. These findings suggest that the bank risk is higher in EMDEs compared to advanced economies. The NPL-ratio is influenced by bank level factors, macroeconomic factors as well as institutional factors. Some factors which contribute to a higher NPL-ratio are competition and stability in the banking system as a whole (Ozili, 2019). Additionally, bad institutional quality which is characterized by corruption, government instability and lack in creditor protection increases the level of non performing loans (Lambsdorff, Schramm, & Taube, 2004). With the NPL-ratios indicating higher financial instability in banks in EMDEs, implementing IFRS 9 should lead to a higher decrease in bank risk in these countries compared to advanced countries, all else equal.

However, all else is not equal between advanced and EMDEs countries. Thus, it cannot be assumed that the introduction of IFRS 9 would serve as a piece of effective bank regulation which would strengthen a weak regulatory environment (Cai, Rahman, & Courtenay, 2014; Houque, 2016). What also matters for the effect which IFRS 9 has on bank risk is the strength of the regulatory environment. Kyiu and Tawiah (2023) find that IFRS 9 reduced the bank risk in both weak and strong regulatory environments. However, there is a larger reduction in risk following the IFRS 9 implementation in countries with stronger accounting enforcement and where bank supervision is high. This is consistent with previous research finding that the effectiveness of IFRS in increasing transparency depends on the regulatory environment (Ahmed, Chalmers, & Khlif, 2013; Bova & Pereira, 2012; Cai et al., 2014; Daske, Hail, Leuz, & Verdi, 2013; Houque, 2016; Mantzari, Sigalas, & Hines, 2017). Thus, because EMDEs have a weaker regulatory environment than their advanced counterparts, the reduction in bank risk following the IFRS 9 implementation should be lower in EMDEs.

Although it should be noted that the sample used by Kyiu and Tawiah (2023) is dominated by advanced country bank observations. Since income smoothing through loan loss provisions are more prominent in EMDEs countries (Fonseca & Gonzalez, 2008), there is a probability

that IFRS 9 may have not have a risk reducing effect in developing countries as that kind of managerial discretion increases opacity in financial statements and hinders market discipline (Bushman & Williams, 2012).

2.4 Hypothesis Development

2.4.1 The Effect of IFRS 9 on Bank Risk

As presented in section 2.2, there is tension regarding how the mechanisms of IFRS 9 influences the risk in banks. Implementing the ECL-model may influence safer lending practices and provide the market with more informative and transparent financial statements by which market participants can discipline banks for excessive risk taking. However, the same mechanisms may allow for managerial judgment and opportunistic behavior that could create opacity in the financial statements and hinder market discipline and thereby increase bank risk. The empirical studies testing the effect of IFRS 9-implementation on bank risk has shown that the standard has a risk reducing effect in banks (Kyi & Tawiah, 2023). However, as the standard became effective on January 1, 2018 this study and other studies on the effect of IFRS 9 implementation on financial stability (Kund and Rugilo (2023); López-Espinosa et al. (2021)) has been limited to two to three years prior to and after the standard implementation. This thesis intends to extend the research by testing the effect of IFRS 9 on bank risk across countries over a time horizon of five years prior to and after the standard change. Different from the previous studies is that the sample is not dominated by advanced countries but a balance of EMDEs and advanced. Here we expect that IFRS 9, similarly to previous research will have a risk reducing effect in banks.

H1: Banks in IFRS 9 implementing countries experience decreases in total and systematic risk following the adoption, compared to banks in non-IFRS 9 countries.

2.4.2 The Effect of IFRS 9 on Bank Risk in Advanced Economies and EMDEs Markets and Developing Economies

In previous literature, the impact of IFRS 9 has shown to depend on the context in which it's applied. As previously noted, the literature on IFRS 9 and financial stability is either solely focused on advanced economies or uses a sample where observations are dominated by those from an advanced economies. Banks operating in EMDEs markets and developing economies face a different context than those in advanced economies due to many challenges which are more prominent in EMDEs. Therefore, exploring the difference IFRS 9 has on the bank risk in these two different kinds of economies will fill this unexplored gap in the literature. The effect which IFRS 9 has on bank risk is dependent on whether it's a safer or riskier bank as well as on the strength of the institutional environment (Kyi & Tawiah, 2023). As banks in EDMs are riskier and the institutional environment is weaker than that of an advanced economy, we expect IFRS 9 to have a different effect in EMDEs compared to that in advanced economies. Although a larger prominence of earnings management through loan loss provisioning in EMDEs could

point towards the possibility of IFRS 9 increasing bank risk among these countries; the results of Kyiu and Tawiah (2023) that there is risk reduction when implementing IFRS 9 in countries with weaker institutional environment indicate that IFRS 9 reduces bank risk in EMDEs, but to a lower degree than in advanced economies. Thus, the hypothesis is as follows:

H2: The effect of implementing IFRS 9 is different for banks within EMDEs compared to banks in Advanced countries.

If there are an effect that is different we believe it to be smaller or in the opposite direction of that effect compared to advanced countries. Thus, we form our third hypothesis that is only activated if there exists a different effect between banks in EMDEs contra advanced countries.

H2.1: The different effect of implementing IFRS 9 for banks in EMDEs compared to banks in advanced countries is smaller or opposite.

3 Sample and Data

This section focuses on outlining the chosen methodology. We provide an overview of our sample and the data collection process as well as a description of all variables.

3.1 Sample

Our sample is compiled by following previous research, Dong and Oberson (2022), López-Espinosa et al. (2021) and Kyiu and Tawiah (2023). These research papers provide extensive details on the implementation of IFRS 9 by countries globally. In contrast to previously mentioned authors, our sample includes observations from 2013-2022, which is six more years than e.g. Kyiu and Tawiah (2023). To be able to compare the time before implementation and the time after we have divided the sample focusing on the year of adoption, 2018. This has been executed by employing a dummy variable which takes the value one for the years 2018-2022 and zero for 2013-2017. This results in our sample including five years prior to the adoption of IFRS 9 and five years after.

We then collect financial information for all publicly available banks per country from the Orbis Bank Focus database by Bureau Van Dijk. The associated daily stock return data is collected from Refinitiv Eikon Datastream. Unlike Kyiu and Tawiah (2023), we do not collect bank-level governance data from BoardEx since we are limited by the available resources at Stockholm School of Economics, i.e we do not have access to this database. However, instead we use governance data for the country level instead of the bank level. To further extend the research on the effect of the implementation of IFRS 9 beyond the scope of existing literature, we include whether the country the bank operates in, is an advanced country or EMDE. The observations are divided into EMDEs or Advanced countries based on the definition by the International Monetary Fund, as previously noted. Countries which have not been classified by the IMF are excluded from the sample. Additionally, countries which do not have a domestic stock market are excluded as the thesis measures risk based on a stock market perspective in line with Kyiu and Tawiah (2023).

Compiling all our data we construct a dataset of in total 5999 observations across 797 banks in 54 different countries for our period of interest, 2013-2022. We then construct a dummy variable separating our observations into IFRS and non IFRS countries which yields, 40 and 14 countries respectively. Similar categorization is done for advanced versus EMDEs as we construct a dummy variable. This step yields 22 advanced countries and 22 countries classified as EMDEs in our dataset. Table 1 shows the corresponding distribution of our sample, split into IFRS 9 adopting countries versus non-IFRS 9 countries. We can observe that IFRS 9 countries include more banks, nevertheless, the amount of observations in each group does not imply skewness of the sample. Similar for Table 2 we have made the distinction based on the country classification from the IMF, split into EMDEs and Advanced countries. In table 3 we have divided the sample into EMDEs and advanced countries that adopts IFRS 9 and in

table 4 we display to the reader the observations for EMDEs and advanced countries that do not adopt IFRS 9. What should be noted is that United States of America represents 56% of the observations for non-IFRS countries in table 1, 50% of the observations for advanced countries in table 2 and 87% of the observations for advanced countries that do not adopt IFRS 9.

Throughout the process we have applied the process of "winsorizing" our observations. This is the method of trimming our variables for the top and bottom 1%. The reasoning behind this is to reduce the influence of outliers in our model. These outliers can disproportionately affect the results of our difference in difference model. Thus, removing these allows us to obtain a more representative analysis of the models and assists us in preventing the outliers influence which in the end improves the validity and reliability of our models(Kennedy, Lakonishok, & Shaw, 1992).

To address the issue of missing observations we have determined to only include banks with observations for all variables across our chosen time-span. We are aware of survivor-ship bias, which is a form of selection bias that is present when solely the banks that have "survived" (i.e. in our case banks that have not defaulted) are taken into account, while the banks that have declared bankruptcy or in other forms stopped operating during the eleven years included in our study, are left out. This is an issue for researchers across all fields. However, considering our scope and motivation for this paper we believe this selection enhance our analysis of examining what effect IFRS 9 has had on bank-risk during our period of interest.

In total we utilize 5955 observations in our statistical model. We drop 44 singleton observations due to their influence on the statistical significance and inference (Correia, 2015). Our sample is substantially bigger than previous research. (Dong & Oberson, 2022) and (Kyi & Tawiah, 2023) include 383 and 1978 bank year observations respectively, (Dong & Oberson, 2022) examines 101 European banks and (Kyi & Tawiah, 2023) includes 666 banks in 61 countries, worldwide. The sample of (López-Espinosa et al., 2021) covers 1233 firm-year observations for 293 banks in 74 countries during the period 2014-2018. Similarly, the same period is examined by (Kund & Rugilo, 2023) across 15 European countries and includes 43 banks. By including more years post and prior to the adoption while including additional number of banks and countries we hope to capture the effect of IFRS 9 in EMDEs countries.

Table 1: IFRS 9 vs. NON-IFRS 9 countries distribution.

IFRS 9 Countries						Non-IFRS 9 Countries					
Country	Freq.	%	Country	Freq.	%	Country	Freq.	%	Country	Freq.	%
China	281	9.03				United States of America	1,631	56.49			
Norway	216	6.94	United Kingdom	80	2.57	UAE	144	4.63	Indonesia	306	10.60
Italy	147	4.72	Denmark	135	4.34	Philippines	130	4.18	India	122	4.23
Jordan	130	4.18	France	124	3.98	Malaysia	99	3.18	Brazil	121	4.19
Canada	98	3.15	Kuwait	95	3.05	South Africa	90	2.89	Japan	88	3.05
Saudi Arabia	84	2.70	Poland	83	2.67	Australia	69	2.22	Pakistan	162	5.61
Oman	66	2.12	Netherlands	36	1.16	Germany	59	1.90	Mexico	38	1.32
Hong Kong	52	1.67	Spain	49	1.57	Morocco	46	1.48	Switzerland	91	3.15
Qatar	54	1.74	Greece	30	0.96	Bahrain	59	1.90	Thailand	102	3.53
Germany	59	1.90	Austria	31	1.00	Kazakhstan	31	1.00	Tunisia	38	1.32
Morocco	46	1.48	Colombia	44	1.41	Sweden	42	1.35	Israel	50	1.73
Lebanon	40	1.29	Belgium	12	0.39	Russia	53	1.60	Vietnam	55	1.91
Singapore	40	1.29	Kenya	32	1.03	Portugal	20	0.64	Chile	35	1.21
Mauritius	24	0.77	Namibia	26	0.84	Malta	21	0.67	Argentina	36	1.25
Total	3,112	100.00				Total	2,887	100.00			

Table 2: Distribution of EMDEs vs. Advanced Countries

EMDEs Countries			Advanced Countries		
Country	Freq.	%	Country	Freq.	%
India	122	4.39	USA	1631	50.67
China	281	10.11	Germany	59	1.83
Pakistan	162	5.83	United Kingdom	80	2.49
Vietnam	55	1.98	France	124	3.85
Jordan	130	4.68	Canada	98	3.04
Indonesia	306	11.01	Italy	147	4.57
Philippines	130	4.68	Australia	69	2.14
UAE	144	5.18	Japan	88	2.73
South Africa	90	3.24	Netherlands	36	1.12
Saudi Arabia	84	3.02	Sweden	42	1.30
Thailand	102	3.67	Switzerland	91	2.83
Malaysia	99	3.56	Norway	216	6.71
Kuwait	95	3.42	Singapore	40	1.24
Nigeria	12	0.43	Spain	49	1.52
Lebanon	40	1.44	Hong Kong	52	1.62
Morocco	46	1.65	Finland	27	0.84
Oman	66	2.37	Belgium	12	0.37
Bahrain	59	2.12	Austria	31	0.96
Ghana	14	0.50	Denmark	135	4.19
Romania	16	0.58	Portugal	20	0.62
Brazil	121	4.35	Ireland	7	0.22
Poland	83	2.99	Greece	30	0.93
Argentina	36	1.29	New Zealand	45	1.39
Bulgaria	29	1.04	Czech Republic	55	1.70
Chile	35	1.26	Israel	50	1.55
Colombia	44	1.58	Slovenia	7	0.22
Mexico	38	1.37	Slovakia	18	0.56
Peru	2	0.07	Estonia	4	0.12
Uganda	19	0.68	Cyprus	16	0.50
Ukraine	7	0.25	Lithuania	10	0.31
Qatar	54	1.94	Malta	21	0.65
Tunisia	38	1.37	Croatia	9	0.28
Total	2780	100	Total	3219	100

Table 3: Distribution of EMDEs and Advanced countries that adopt IFRS 9

EMDEs Countries (IFRS 9 == 1)				Advanced Countries (IFRS 9 == 1)			
Country	Banks	Country	Banks	Country	Banks	Country	Banks
China	281	United Arab Emi- rates	144	Norway	216	Italy	147
Philippines	130	Jordan	130	United Kingdom	80	Canada	98
South Africa	90	Kuwait	95	Germany	59	France	124
Saudi Arabia	84	Poland	83	Australia	69	Spain	49
Malaysia	99	Qatar	54	Netherlands	36	Sweden	42
Morocco	46	Lebanon	40	Belgium	12	Denmark	135
Oman	66	Romania	16	Austria	31	Hong Kong	52
Colombia	44	Kazakhstan	31	Portugal	20	Singapore	40
Bahrain	59	Kenya	32	Cyprus	16	Finland	27
Namibia	26	Bulgaria	29	Greece	30	Ireland	7
Nigeria	12	Ghana	14	Malta	21	Slovakia	18
North Macedonia	21	Rwanda	12	Lithuania	10	Slovenia	7
Papua New Guinea	10	Bosnia & Herz.	21				
Botswana	19	Uganda	19				
Mauritius	24	Montenegro	1				
Zimbabwe	1	Jamaica	2				
Serbia	2	Georgia	3				
Hungary	10	Ukraine	7				
		Tanzania	15				
Total	1,757			Total	1,355		

Table 4: Distribution of EMDEs and Advanced countries that do not adopt IFRS 9.

EMDEs Countries (IFRS == 0)			Advanced Countries (IFRS == 0)		
Country	Banks	%	Country	Banks	%
Indonesia	306	29.91	United States of America	1631	87.50
India	122	11.93	Japan	88	4.72
Pakistan	162	15.84	Switzerland	91	4.88
Brazil	121	11.83	Israel	50	2.68
Thailand	102	9.97	Estonia	4	0.21
Mexico	38	3.71			
Argentina	36	3.52			
Chile	35	3.42			
Tunisia	38	3.71			
Vietnam	55	5.38			
Panama	6	0.59			
Peru	2	0.20			
Total	1023	100.00	Total	1864	100.00

3.2 Research Design

In order to test our hypotheses and answer our research question we construct a model that is inspired by (Dong & Oberson, 2022) and (Kyi & Tawiah, 2023). In the following sections we will characterize our variables and outline our models.

3.2.1 Dependent Variables

For the dependent variable, bank risk, we use two different market based risk measures. These risk measures are Total Risk and Systematic Risk. This allows us to extend our inquiry beyond traditional accounting measures, which are susceptible to distortions following the adoption of IFRS 9. Using these two measures for bank risk is consistent with the research design of Kyi and Tawiah (2023). Following the methodology of Dong and Oberson (2022) and Kyi and Tawiah (2023), we define Total Risk as the standard deviation of the bank's stock return. Total risk reflects the market's perception of risks inherent in bank's assets, liabilities, and off-balance sheet items, showcasing the variability of the bank's stock return. The definition used for Total Risk can be defined with the following equation:

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

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.

The daily returns were collected from Refinitiv Eikon Datastream for all publicly traded banks, utilizing their unique ISIN numbers. The average return is calculated by summing the daily returns and dividing by the amount of observations.

Systematic risk captures the volatility of the bank's stock return compared to the market. Based on prior literature, we measure Systematic Risk through the beta coefficient of a market model regression (Dong & Oberson, 2022; Kyi & Tawiah, 2023):

$$R_{it} = \alpha_0 + \beta_i MSCI_t + \varepsilon_{it} \quad (2)$$

where R_{it} represents the return on day t for bank i , and β estimates the Systematic Risk for each bank annually.

We first gathered monthly observations of the World Index of Morgan Stanley Capital Index (MSCI), re-calculated the daily stock return to monthly format and then proceeded with estimating the Beta-coefficient for each bank and year. This regression yielded values for Beta, hereby Systematic Risk.

3.2.2 Independent variable

To capture the adoption of IFRS 9, we employ a binary variable that assigns 1 to banks in countries that implemented IFRS 9 and 0 otherwise. A 'post' dummy variable indicates years post-2018 (value 1) versus prior years 2012-2017 (value 0). This dummy variable indicates whether the observation occurs before or after the implementation of IFRS 9. Similarly for EMDEs countries, we construct a binary variable indicating 1 if the country is defined as a EMDE by the IMF, and 0 if the country is defined as Advanced. With these dummy variables, we are able to create interaction terms in our regressions, which are the main interest of this study.

3.2.3 Control Variables

The study includes various control variables reflecting financial characteristics of banks. It also includes variables to control for the country level environment, which the banks operate within. Our bank level control variables are: bank size, which is defined as the logarithm of total assets; profitability, which is defined as Return on Assets (ROA); variability of profitability, defined as the standard deviation of ROA and the Tier 1 ratio. ROA is the net income to total asset ratio and the tier 1 ratio is the bank's core equity capital relative to its total risk-weighted assets (RWA). These control variables are in line with the control variables included in Kyiu and Tawiah (2023). This data was collected from Orbis Bank Focus. Since the standard deviation of ROA is retrieved from our own calculation, for transparency reasons, we include the equation below:

$$\text{Standard Deviation of ROA}_{3yr_{i,t}} = \sqrt{\frac{1}{n} \sum_{j=t-2}^t (ROA_{i,j} - \overline{ROA}_{i,t})^2} \quad (3)$$

Where:

- i indexes the bank identified by its ISIN code, t represents the current year, j indexes the year within the interval from $t - 2$ to t ,
- $ROA_{i,j}$ is the Return on Assets for bank i in year j .

- $\overline{ROA}_{i,t}$ is the average ROA for company i from year $t - 2$ to t .
- n is the number of years within the interval, in our case three.

For the control variables that consider country-level characteristics the study includes annual GDP-growth and governance quality. Data for both variables is retrieved from the World Development Indicators. Annual GDP-growth rates is included following Dong and Oberson (2022) and Kyiu and Tawiah (2023). As previously mentioned, we could not include the control variables for bank-level governance like Kyiu and Tawiah (2023), as the data is not available. We chose to instead use a control variable for the country-level governance, hereby called governance quality. Multiple studies have computed this variable taking the average of three legal variables used in La Porta, Lopez-de Silanes, Shleifer, and Vishny (1998) (Chih, Shen, & Kang, 2008; Leuz, Nanda, & Wysocki, 2003; Shen & Chih, 2005). These variables are the efficiency of the judicial system, an assessment of the rule of law and the level of corruption. As the original data source used in La Porta et al. (1998) is not publicly available, these have been replaced by comparable variables from the World Bank. The World bank variables are Government Effectiveness, Rule of Law and Control of Corruption. All variables take on values between -2.5 to $+2.5$, where a positive number indicated better governance and a negative number indicates worse governance. We find country-level governance as a suitable substitute as institutional quality and corruption has shown to impact risk in banks and earnings management (Bermpei, Kalyvas, & Nguyen, 2018; Khan, Bitar, Tarazi, Hassan, & Fraz, 2024; Lourenço, Rathke, Santana, & Branco, 2020; Toader, Onofrei, Popescu, & Andrieş, 2018; Uddin, Chowdhury, Sajib, & Masih, 2020).

3.2.4 Summary Statistics and Correlations

Table 5 provides an overview and summary of all variables. It also includes observations of each variable's mean and the difference between banks in IFRS 9 adopting countries and non-IFRS 9 adopting countries. It also includes the difference between the mean of banks in EMDEs and advanced countries. The mean value of Total Risk is 1.7% which is identical to that of Kyiu and Tawiah (2023). Interestingly that informs us that total risk is quite stationary across time, our variable spans from 2012 until 2022, while Kyiu and Tawiah (2023) spans between 2016-2019. The mean of GDP Growth also exhibit this stationary across time, at 2.7%, it is exact to Kyiu and Tawiah (2023). Return on Asset (ROA), the standard deviation of ROA, Tier 1 Ratio and Size show mean values close to previous studies (Dong & Oberson, 2022; Kyiu & Tawiah, 2023). The mean value of Systematic Risk is lower in our study compared to previous literature. This can be explained by the additional years we include in this paper in contrast to previous studies.

In table 5 we include disaggregated mean values for banks in IFRS 9 and NON-IFRS 9 countries as well as the difference between these two groups of banks. To be consistent with our research question and scope of the paper we have also included disaggregated mean values for banks in EMDEs and advanced countries respectively. Here we also present the difference between them. Controlling for normal distribution we conclude that Total Risk is not normally

distributed. This leads us to use the Welch's t-test to examining the difference between the two subgroups. The results from this tests indicate statistically significant difference in the mean values between EMDEs and advanced countries for all variables except size. Likewise, the Welch t-test also implies statistically significant differences between the subgroups IFRS 9 and NON-IFRS 9 for all variables except systematic risk, as can be seen in table 5. This implies that the significant difference between the subgroups are not randomly generated. Continuing with analyzing Systematic Risk, using the same approach by cause of non-normality, we can observe a statistical significant difference in the means of EMDEs and advanced countries.

Moreover, the correlation matrix, table 6 shows a positive correlation of 0.1964 between our two dependent variables of risk, suggesting a limited relationship in which increases in systematic risk cause increases in total risk. This correlation is not unexpected since the two variables are of the same characteristic, albeit calculated differently they both measure financial risk. Consequently we disregard this correlation since they will not be used in conjunction with each other in our diff-in-diff model. Continuing reflecting on the correlations in table 6, we recognize very weak to weak relationships between our correlations coefficient (Cunningham, 2021). Which implies that multi-collinearity will not affect our analysis (Cunningham, 2021).

Table 5: Summary statistics.

Variable	Full Sample						IFRS 9	NON-IFRS 9	Diff	EMDEs	Advanced	Diff
	N	Mean	SD	Median	Min	Max	Mean	Mean		Mean	Mean	
Total Risk	5999	0.0183	0.0092	0.0161	2.00e-10	0.0683	0.0168	0.0199	0.0031***	0.0188	0.0179	0.0009***
Systematic Risk	5999	0.4130	0.8353	0.3994	-2.7839	3.6059	0.4046	0.4220	0.0174	0.3476	0.4694	0.1218***
Tier 1 Ratio	5999	0.1542	0.0577	0.1418	0.0600	0.7100	0.1612	0.1466	-0.0146***	0.1593	0.1498	0.0095***
ROA	5999	0.0109	0.0127	0.0097	-0.1173	0.1874	0.0114	0.0103	-0.0011***	0.0118	0.0101	0.0017***
SD ROA	5999	0.0034	0.0068	0.0017	0.0001	0.1110	0.0036	0.0030	-0.0006***	0.0039	0.0029	-0.0010***
Size	5999	16.3394	1.9741	16.2811	10.6098	21.1044	16.6692	15.9839	-0.6853***	16.3168	16.3589	-0.0421
GDP Growth	5999	0.0257	0.0317	0.0250	-0.0990	0.0991	0.0264	0.0250	-0.0014*	0.0323	0.0201	0.0122***
Quality	5999	0.7588	0.8334	1.0498	-1.3256	2.1123	0.7141	0.8071	0.0930***	-0.0068	1.4200	-1.4268***

***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Table 6: Correlation matrix.

	1	2	3	4	5	6	7	8
Total Risk	1.0000							
Systematic Risk	0.2483***	1.0000						
Tier 1 Ratio	-0.0763***	-0.0567***	1.0000					
ROA	-0.0624***	0.0228	0.1911***	1.0000				
SD ROA	0.2092***	0.0552***	0.1809***	0.3593***	1.0000			
Size	0.0272	0.1553***	-0.1676***	-0.2104***	-0.1536***	1.0000		
GDP Growth	-0.4051***	-0.2772***	-0.0189	0.0695***	0.0163	-0.0195	1.0000	
Quality	-0.3064***	-0.0709***	0.1360***	0.0762***	-0.0630***	-0.1165***	0.0393**	1.0000

***, ** and * denote statistical significance at the 1%, 5% and 10% levels.

3.3 Parallel Trends

For a difference-in-difference methodology it is vital that the parallel trend assumption hold (Cunningham, 2021). The assumption states that the average outcome for the treatment and control group would have developed in parallel if the treatment did not happen (Roth, Sant’Anna, Bilinski, & Poe, 2023). Another vital and often forgotten assumption required for the parallel trend estimate is the ”no-anticipation” assumption. Which specifies that the treatment, adopting IFRS 9 in our study, has no causal effect before the implementation (Roth et al., 2023). In other words, for the estimation of the DiD model to be accurate there should not exist an ”anticipatory” effect before the implementation. In our study this will not be an occurring problem since a banks modelling and metric model of IFRS 9 was not in effect before and thus not affecting the total risk or systematic risk.

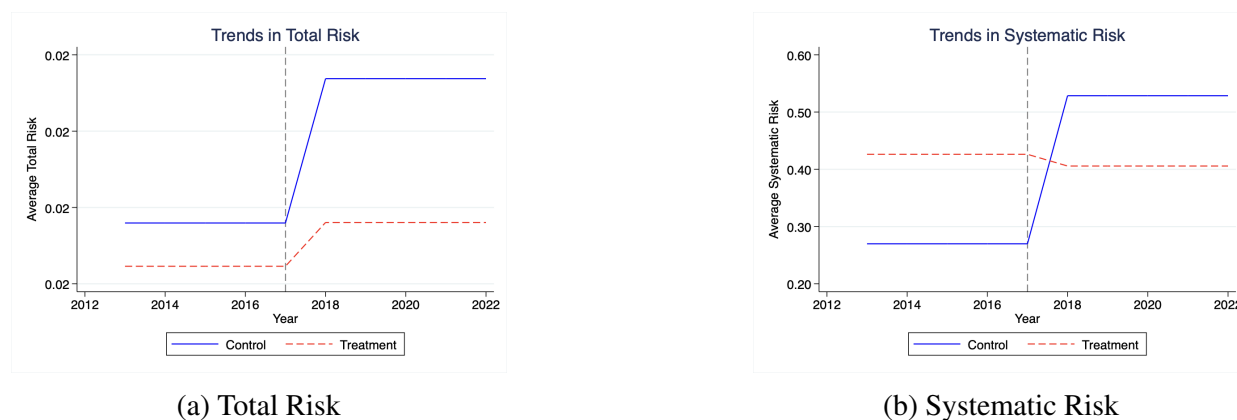


Figure 1: Time-Series of dependent variables

In figure 1 we can visually inspect two graph portraying trends in the model’s dependent variable, Total Risk and Systematic Risk. In graph (a) we can observe parallel trends pre-treatment and clearly see a substantial spike in total risk for the control group compared to the treated group. Implying that the treated group, post implementation, experience a smaller increase in total risk compared to the control group. For systematic risk in graph (b) we observe pre-treatment parallel trends between the treatment and control groups. Inspecting the post-treatment period we discover that the post-IFRS 9 implementation did decrease systematic risk for treated banks, concurrent with an increase of systematic risk for the control group.

3.4 Empirical Testing

As previously mentioned our model is inspired by Dong and Oberson (2022), Kuiu and Tawiah (2023) and López-Espinosa et al. (2021). Our empirical testing consists of constructing a difference in difference regression model. While our main analysis constitutes looking at the difference between implementing IFRS 9 in EMDEs compared to advanced countries, we start by establishing a baseline model where we look at the effect of IFRS 9 on bank risk without making the distinction for economic development. We do this by constructing the interaction term Post x IFRS 9 from our dummy variable which has been presented in previous sections.

Our baseline model follows a an almost identical estimation model as Kyiu and Tawiah (2023) and is estimated as following:

$$\begin{aligned} \text{Bank Risk}_{it} = & \beta_0 + \beta_1 \text{Post}_{it} + \beta_2 \text{IFRS 9}_i + \beta_3 \text{Post} \times \text{IFRS 9} \\ & + \beta_4 \text{Size}_{it} + \beta_5 \text{Tier 1 Capital}_{it} + \beta_6 \text{ROA}_{it} + \beta_7 \text{SD ROA}_{it} \\ & + \beta_8 \text{GDP Growth}_{it} + \beta_9 \text{Government quality}_{it} \\ & + \text{Bank Fixed Effects} + \text{Year Fixed Effects} + \varepsilon_{it} \end{aligned} \quad (4)$$

Where i represents each bank and t the years in our estimation period spanning 2013-2022.

- Post and IFRS 9 are dummy variables.
 - Post, indicates 1 if the observations lies in the period post implementation, which is defined as the years 2018 - 2022.
 - IFRS 9, which takes the value 1 for countries that adopted the IFRS 9 framework in 2018 and 0 otherwise.
- Post x IFRS 9, is our baseline interaction term. The term captures the effect of post implementation for countries that adopted IFRS 9 in 2018.
- Size, Tier 1 Capital, ROA, SD ROA, GDP-Growth and governance quality are our control variables.
 - Size is calculated as the log of each banks total assets
 - Tier 1 Ratio is the ratio of Tier 1 Capital core to it's risk weighted assets (RWA), calculated as following for each bank and each year:

$$\text{Tier 1 Ratio}_{it} = \frac{\text{Tier 1 Capital}_{it}}{\text{RWA}_{it}} \quad (5)$$
 - Return on Asset (ROA) which is calculated using net income.
 - Standard deviation of Return on Asset on the preceding three years, calculated by estimating equation (3)
 - GDP Growth, the annual GDP growth on a country level.
 - Government quality is a measure for government effectiveness, rule of law and control of corruption, .
- Bank and Year Fixed effects are included to account for variability in heterogeneity amongst banks across time.
- ε_{it} , error term.

As the selection of control variables we take inspiration from prior studies where a selection of these variables are used to control for several financial characteristics of banks (Dong & Oberson, 2022; Iannotta, Pennacchi, & Santos, 2019; Kyiu & Tawiah, 2023). We include bank and year fixed effects to control for the variability amongst banks across time. The fit of the control variables to the dependent variables are deemed good, based on our R^2 and adjusted R^2 .

3.5 Split Sample and Difference in Differences in Differences (DDD)

To build on previous studies and address our main research question, we add the dummy variable "EMDEs" as described in previous sections. With this variable, we are able to split our sample based on country classification by the IMF. We are also able to define a triple interaction term $Post \times IFRS\ 9 \times EMDEs$, in order to conduct a difference-in-difference-in-difference (DDD) regression. We will explore both of these distinct methodologies, each with its own advantages and disadvantages, as detailed below.

3.5.1 Split Sample

When splitting a sample into sub-samples, we can assume homogeneity of parameters within each group of countries, EMDEs and advanced. This can lead to a more accurate modeling and interpretation of the coefficients (Jarque, 1987). In this approach we hope to isolate the two different groups and estimating the difference in the effect of IFRS 9 post implementation, separately for each subgroup. One downside of this approach is the data requirement in comparison to simpler models. Sample splitting requires ample data within each group to avoid concerns regarding statistical power and inference (Jarque, 1987). However, as we will show below, we have a substantial sample size of each group. Thus this should not be of concern in our analysis.

In the split sample procedure we are using the dummy variable EMDEs to divide our sample into two subgroups, EMDEs and advanced countries. In the below difference in difference model we only include observations for countries that the IMF defines as being advanced, eventually modifying the subgroup to only include observations for countries classified as EMDEs.

$$\begin{aligned} \text{Bank Risk}_{it} = & \beta_0 + \beta_1 \text{Post}_{it} + \beta_2 \text{IFRS } 9_i + \beta_3 \text{Post} \times \text{IFRS } 9 + \beta_4 \text{Size}_{it} \\ & + \beta_5 \text{Tier 1 Capital}_{it} + \beta_6 \text{ROA}_{it} + \beta_7 \text{SD ROA}_{it} + \beta_8 \text{GDP Growth}_{it} \\ & + \beta_9 \text{Government quality}_{it} + \text{Bank Fixed Effects} + \text{Year Fixed Effects} + \varepsilon_{it} \end{aligned} \quad (6)$$

The definitions of the control variables are identical to that of equation (4).

This specification and sub-group split allows us to isolate each category of countries and examine the effect that the implementation of IFRS 9 had on the bank's risk in these countries. The coefficient of interest is β_3 which capture the effect of our interaction term, Post x IFRS 9.

3.5.2 Difference in Difference in Difference (DDD)

Below is the regression model outline for our DDD estimation.

$$\begin{aligned}
\text{Bank Risk}_{it} = & \beta_0 + \beta_1 \text{Post}_{it} + \beta_2 \text{IFRS } 9_i + \beta_3 \text{EMDEs}_{it} + \beta_4 (\text{Post}_{it} \times \text{IFRS } 9_i) \\
& + \beta_5 (\text{Post}_{it} \times \text{EMDEs}_{it}) + \beta_6 (\text{IFRS } 9_i \times \text{EMDEs}_{it}) \\
& + \beta_7 (\text{Post}_{it} \times \text{IFRS } 9_i \times \text{EMDEs}_{it}) + \beta_8 \text{Size}_{it} + \beta_9 \text{Tier 1 Capital}_{it} \\
& + \beta_{10} \text{ROA}_{it} + \beta_{11} \text{SD ROA}_{it} + \beta_{12} \text{GDP Growth}_{it} \\
& + \beta_{13} + \text{Government quality}_{it} + \text{Bank Fixed Effects} + \text{Year Fixed Effects} + \varepsilon_{it}
\end{aligned} \tag{7}$$

The coefficient of interest is now β_7 , the coefficient that measures the weight of the triple interaction term, $(\text{Post}_{it} \times \text{IFRS } 9_i \times \text{EMDEs}_{it})$. The ordinary least squares (OLS) estimate is estimated as follows:

$$\begin{aligned}
\beta_7 = & [(\text{Bank Risk}_{\text{IFRS, Advanced, Post}} - \text{Bank Risk}_{\text{IFRS, Advanced, Pre}}) \\
& - (\text{Bank Risk}_{\text{IFRS, EMDEs, Post}} - \text{Bank Risk}_{\text{IFRS, EMDEs, Pre}})] \\
& - [(\text{Bank Risk}_{\text{Non-IFRS, Advanced, Post}} - \text{Bank Risk}_{\text{Non-IFRS, Advanced, Pre}}) \\
& - (\text{Bank Risk}_{\text{Non-IFRS, EMDEs, Post}} - \text{Bank Risk}_{\text{Non-IFRS, EMDEs, Pre}})]
\end{aligned} \tag{8}$$

β_7 in equation (8) is called the difference-in-difference-in-difference (DDD) estimate. Moreover the first two rows of equation (8) is the usual difference-in-difference estimate, where we would only focus on IFRS-9 adopting countries using EMDEs countries as a control group (Woolridge, 2010).

According to Bertrand, Duflo, and Mullainathan (2004), the difference in difference approach is a straightforward and intuitive method to compare differences in outcomes before and after an intervention across groups (Bertrand et al., 2004). In comparison to a simple OLS or a multivariate OLS regression the difference in difference method can effectively control for unobserved fixed characteristics that might otherwise confound the analysis (Bertrand et al., 2004). However, the authors also underline potential disadvantages of a difference in difference approach. Such as, serial correlations issues, which a DD approach might overlook. This oversight can lead to underestimated standard errors and overstate the statistical significance of the treatment effects. Another, problem is the core assumption of parallel trends, that in the absence of treatment, the difference between the treated and control groups would remain constant over time. This assumption is critical to a difference in difference methodological approach and often contested. As such, violations of this can severely bias the results.

As discussed by Bertrand et al. (2004), one solution to the limitations in the standard difference-in-difference approach is the triple difference-in-difference (DDD) method. The DDD method extends the DD approach by utilizing a supplementary layer of comparison. In short, it presents a third dimension, in our case the difference between banks in EMDEs and advanced countries,

to compare across. This provides assistance in controlling for changes that might affect the treatment and control groups differently over time, which a standard difference-in-difference model might not account for (Bertrand et al., 2004). This added layer, helps us to further isolate the effect of IFRS 9 from other confounding changes occurring simultaneously, such as the difference between EMDEs and advanced economies.

4 Results

In this section, we will present our results for the empirical models discussed previously. We will initially provide a brief overview of our baseline difference-in-difference regression inspired by Kyiu and Tawiah (2023). This overview will demonstrate to the reader that our data and time-span produce similar results and analysis as found in prior research (Dong & Oberson, 2022; Iannotta et al., 2019; Kund & Rugilo, 2023; Kyiu & Tawiah, 2023; López-Espinosa et al., 2021). Next, diverging from the aforementioned authors, we will show the results from our split sample regressions. These results indicate statistically significant findings for both dependent variables in advanced countries, which we will examine in detail alongside the results for EMDEs countries. Ultimately, we will present the outcomes from our difference-in-difference-in-difference (DDD) model specification. All results from the models will be presented in tables in conjunction to the discussion of them.

4.1 Baseline model

4.1.1 Total Risk

The results from the baseline model inspired by Dong and Oberson (2022) and Kyiu and Tawiah (2023) is presented in table 7 and 8. For each column, one control variable is added to assess the fit of the variables as well as the overall fit of the models. In table 7 we can observe statistically significant estimates for our interaction term's effect on our dependent variable total risk across all specifications. Post x IFRS 9 is consistently negative, indicating a decrease in total risk following the adoption of IFRS 9. A result which is not unexpected, as previous literature has found a similar effect of the post-implementation of IFRS 9 (Dong & Oberson, 2022; Iannotta et al., 2019; Kund & Rugilo, 2023; Kyiu & Tawiah, 2023; López-Espinosa et al., 2021).

Continuing with assessing the effect that the size of the banks have on total risk, we do not observe a statistically significant result, which is in alignment to previous results (Kyiu & Tawiah, 2023). This implies that bank size does not seem to play a major role in influencing total risk post-IFRS 9 implementation. Similarly to the results of Kyiu and Tawiah (2023), our results produces a significant and negative coefficient for return on assets (ROA). This indicates that higher profitability is associated with lower total risk. The standard deviation of ROA, which controls for the volatility in bank profitability, has a positive coefficient. This would imply that more volatile profitability would increase the total risk. However, the coefficient is insignificant, in line with previous research (Kyiu & Tawiah, 2023), which means no conclusions can be made regarding the relationship. Adding the control variable does, however, add to the fit of the model as the adjusted R-squared increases from 0.5738 to 0.5742. Differentiating from previous results, we get a positive and significant coefficient for the Tier 1 ratio rather than a negative and insignificant one.

Table 7: HDFE Linear Regression Results on Total Risk

Dependent Variable: Independent Variables	Total Risk						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post x IFRS 9	-.00228*** (.00032)	-.00229*** (.00032)	-.00235*** (.00032)	-.00228*** (.00032)	-.00227*** (.00032)	-.00256*** (.00033)	-.00185*** (.00033)
Size		-.00006 (.00058)	-.00008 (.00058)	.00007 (.00059)	.00019 (.00060)	.00045 (.00060)	.00048 (.00060)
ROA			-.02826 (.02039)	-.02538 (.02026)	-.02651 (.02027)	-.02669 (.02093)	-.03452* (.02076)
sd ROA				.04364 (.02930)	.04257 (.02934)	.03475 (.02940)	.03803 (.03010)
Tier 1 Ratio						.00404 (.00477)	.00908* (.00470)
GDP Growth						-.00824 (.00580)	-.01227** (.00581)
Quality							-.01389*** (.00105)
Cons	.01905*** (.00012)	.02005* (.00946)	.02070* (.00951)	.01795* (.00965)	.01541 (.00996)	.01145 (.01006)	.02075* (.01007)
Observations	5955	5955	5955	5955	5955	5955	5955
R-squared	.6313	.6313	.6317	.6321	.6322	.6385	.6544
Adj R-squared	.5735	.5734	.5738	.5742	.5742	.5815	.5998
Within R-sq.	.0088	.0088	.0099	.0110	.0114	.0144	.0578
Root MSE	.0060	.0060	.0060	.0060	.0060	.0060	.0058

Note: * p < .10, ** p < .05, *** p < .01. Standard errors in parentheses.

This table presents regression results of the impact of the post IFRS 9 adoption period on total risk for banks in adopting countries vs non-IFRS 9 adopting countries. The results are adjusted for several covariates over multiple models. The dependent variable is total risk, which is the standard deviation of daily returns of each bank for each year (Dong & Oberson, 2022; Kyiu & Tawiah, 2023). As for our independent variable of interest, the interaction term "Post x IFRS 9", which reflects the period following the implementation of IFRS 9 for banks in countries that have adopted IFRS 9. All other variables are defined in chapter 3.4. The standard errors are heteroskedasticity-robust.

Further, GDP Growth has a negative and statistically significant effect on total risk. Suggesting, that as GDP Growth increases, the bank's total risk is reduced. Buch, Eickmeier, and Prieto (2014) discusses the response of bank risk to expansionary monetary shocks in their discussion paper "Macroeconomic factors and micro-level bank risk" (Buch et al., 2014). Using a FAVAR model to examine the reciprocal influences between banks and the macro economy in the United States, they find that that macroeconomic shocks have an important impact on bank risk. One of their main findings suggests that in response to an expansionary shock average bank lending increases and bank risk declines (Buch et al., 2014). This can explain why previous research and our study find this association between increases in GDP Growth and reductions in total risk.

Lastly, for the control variable governance quality there is a negative coefficient which is significant at the 1% level. This suggest that a stronger institutional environment is associated with lower levels of total risk. This is congruent with previous research where stronger institutions and less corruption decreases risk in banks and is associated with increased stability (Bermpei et al., 2018; Khan et al., 2024; Toader et al., 2018; Uddin et al., 2020).

4.1.2 Systematic Risk

Following this result on total risk, table 8 presents our findings from our baseline model for our second dependent variable, systematic risk. Similar to total risk we observe statistically

significant estimates on our interaction term, Post x IFRS 9. Similarly to total risk, the fit of the model generally improves as control variables are added, where the full model has an adjusted R-squared of 0.1985. Our model also displays statistical significance for Size, GDP growth and government quality. Our interaction term and size is statistically significant at the 1% level, while GDP-growth and government quality is significant at the 5% level. The significant variables which are present in the study of Kyiu and Tawiah (2023), are significant in that study as well. The direction of the coefficients for systematic risk is consistent with the direction of the same variables in our regression for total risk. This means that for the variables which are in common with Kyiu and Tawiah (2023), the direction of the coefficients are the same for all except the tier 1 ratio. Systemic risk, estimated by equation (2) for each bank and year, measures a bank's exposure to the market volatility. According to previous research, in conjunction with our own, we find that the post-implementation of IFRS 9 decreases bank's systematic risk. In other words, banks that implemented IFRS 9 in 2018 experienced an increased stability against fluctuations in the market (Dong & Oberson, 2022). This can be seen as a direct effect of the IASB's efforts to simplify the accounting of financial instruments to enhance comprehension for investors and other users of financial statements (International Accounting Standards Board (IASB), 2009).

As stated, with this dependent variable we find size to be statistically significant, which was not the case for total risk. This finding implies that larger banks have a higher exposure to market volatility, i.e systematic risk. The finding supports prior research on determinants of systemic risk (Dong & Oberson, 2022; Kyiu & Tawiah, 2023; Laeven, Ratnovski, & Tong, 2014). Laeven et al. (2014) explains that since the late 90s larger banks have increased in size and, during the same period, also become more embroiled in activities in the market. For our paper this entails that the size of the bank is correlated with higher exposure to the systematic risks that are latent in market, also shown in Dong and Oberson (2022), and Kyiu and Tawiah (2023). The coefficient of GDP growth is negative and likewise significant at the 5% level, indicating that the systematic risk for banks in countries with high GDP growth are lower than for banks in countries with a lower GDP growth. Governance quality has a negative and significant coefficient, indicating that better government quality is associated with lower systematic risk. As commented on in previous section, is this congruent with the previous literature of the relationship of country level governance and bank risk. Concerning ROA, SD of ROA and Tier 1 Ratio we do not observe statistically significant results, implying that higher profitability, increases in variability of profitability and a higher capital adequacy does not necessarily reduce a bank's systematic risk.

4.2 Cross-Country Analysis: Banks in EMDEs versus Advanced Countries

This section provides extensive analysis of the effect of adapting IFRS 9 in different country settings. To extend prior research as well as answering our research question we aim to examine the difference between the effect of post-implementation of IFRS 9 for banks in EMDEs com-

Table 8: HDFE Linear Regression Results on Systematic Risk

Dependent Variable:	Systematic Risk						
Independent Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Post x IFRS 9	-.2752*** (.0458)	-.2625*** (.0463)	-.2701*** (.0467)	-.2630*** (.0466)	-.2620*** (.0466)	-.2675*** (.0468)	-.2547*** (.0472)
Size		.1580** (.0639)	.1574** (.0636)	.1709*** (.0644)	.1813*** (.0653)	.1754*** (.0653)	.1759*** (.0653)
ROA			-3.2541* (1.876)	-2.9380 (1.878)	-3.0155 (1.876)	-2.6638 (1.880)	-2.8047 (1.876)
sd ROA				4.1768 (2.965)	4.0734 (2.965)	3.8125 (2.968)	3.8716 (2.995)
Tier 1 Ratio					.3532 (.437)	.3547 (.437)	.4455 (.442)
GDP Growth						-1.4758** (.599)	-1.5484** (.598)
Quality							-.2501** (.1244)
Cons	.4922*** (.0162)	-2.0939* (1.048)	-2.0463* (1.043)	-2.2873** (1.058)	-2.5102** (1.086)	-2.3785** (1.087)	-2.2109** (1.087)
Observations	5955	5955	5955	5955	5955	5955	5955
R-squared	.3041	.3051	.3058	.3063	.3064	.3072	.3078
Adj R-squared	.1952	.1962	.1968	.1972	.1971	.1979	.1985
Within R-sq.	.0083	.0098	.0106	.0113	.0115	.0126	.0135
Root MSE	.7497	.7493	.7490	.7488	.7488	.7485	.7482

Note: * p < .10, ** p < .05, *** p < .01. Standard errors in parentheses.

This table presents regression results of the impact of the post IFRS 9 adoption period on systematic risk for banks in adopting countries vs non-IFRS 9 adopting countries. The results are adjusted for several covariates over multiple models. The dependant variable is systematic risk, which calculated as the beta from a market model regression using daily return on each bank aggregated to an average monthly observation on the monthly returns of the MSCI World Index (Dong & Oberson, 2022; Kyiu & Tawiah, 2023). As for our independent variable of interest, the interaction term "Post x IFRS 9", which reflects the period following the implementation of IFRS 9 for banks in countries that have adopted IFRS 9. All other variables are defined in chapter 3.4. The standard errors are heteroskedasticity-robust.

pared to banks in advanced economies. To successfully do this we initially begin by analysing the interaction term, Post x IFRS 9, for advanced countries and EMDEs separately, utilizing equation (6) in section 3.5.1. By splitting the sample we hope to isolate the post implementation effect of IFRS 9 in these respective groups. A breakdown of these observations can be inspected in tables 2, 3 and 4. Thereafter we employ a triple difference-in-difference (DDD) regression model to continue analysing the post-implementation effect of IFRS 9 in EMDEs and advanced countries.

4.2.1 Split Sample - Advanced Countries

In table 9 we present our results of the difference-in-difference model with a split sample approach. For this subsection we exclude all observations for countries that are defined as EMDEs by the IMF. Thus yielding a split sample with 3202 bank-year observations across 421 banks spanning from 2013 to 2022 for the advanced economies. Because of the split, the sample size is 54% of the sample size of the baseline model where no splitting of the sample was conducted. However, the sample size is still substantial in size compared to prior literature (Dong & Oberson, 2022; Iannotta et al., 2019; Kund & Rugilo, 2023; Kyiu & Tawiah, 2023; López-Espinosa et al., 2021). Inspecting the results, we see negative and statistically significant estimates at 1% level for our interaction term of both our dependent variables, total risk and systematic risk for banks in advanced countries. These findings suggests that implementing IFRS 9 decreases both total and systematic risk in advanced countries.

Comparing the magnitude of our interaction term estimated by the baseline model (see table 7 and 8), we observe a considerable higher effect on the interaction term in the split sample for systematic risk in advanced economies. Our estimation for the interaction term in the baseline model with the full sample is $-.2547$. However, when excluding EMDEs from our estimation we observe an estimate of $-.5328$. This can imply that the post-implementation effect of IFRS 9 for systematic risk is greater in advanced countries than in EMDEs. In a working paper by the IMF, Copestake, Kirti, and Liu (2023) discuss banks' joint exposure to market and run risk. Their findings include that vulnerability toward the interconnected risks of market fluctuations and banks runs are more prevalent for larger banks in advanced economies (Copestake et al., 2023), than compared to banks in EMDEs markets and developing economies (EMDEs). According to the authors this larger liability in advanced economies is mainly due to lower cash and securities holding and smaller capital buffers (Copestake et al., 2023). Large banks in advanced economies, except for the biggest ones, are more vulnerable because they rely heavily on wholesale funding and have smaller capital buffers. In contrast, in EMDEs and developing economies, it is the smaller banks that face greater risks due to higher funding costs and less stable financial liabilities (Copestake et al., 2023). Thus our results of a greater negative effect on systematic risk for our interaction term in advanced countries, compared to the full sample, have empirically support in prior literature.

Furthermore, for total risk we observe a somewhat lower effect in advanced economies com-

Table 9: Regression Results Summary for Bank Risk in Advanced Countries

Variable	Total Risk	Systematic Risk
Post x IFRS 9	-0.0013*** (0.0004)	-0.5328*** (0.0656)
Size	0.0002 (0.0007)	0.1362 (0.0884)
ROA	-0.0855** (0.0325)	-3.3853 (3.2328)
SD of ROA	0.0928* (0.0440)	1.2370 (4.3575)
Tier 1 Ratio	-0.0044 (0.0063)	-0.2293 (0.7683)
GDP Growth	0.0118 (0.0108)	-2.2658* (1.1893)
Quality	-0.0176*** (0.0021)	0.7193** (0.2674)
Bank Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N Banks	421	421
N	3202	3202
R-squared	0.7285	0.4127
Adj R-squared	0.6856	0.3201

Note: * $p < .10$, ** $p < .05$, *** $p < .01$. Standard errors in parentheses.

This table presents a summary of regression results of the impact of the post IFRS 9 adoption period on total and systematic risk for banks in advanced countries. In this table we only present the results for our coefficients from the full model. Column (1) display the results for total risk, the logarithm of each bank's total assets. Column (2) depicts the estimates on systematic risk which calculated as the beta from a market model regression using daily return on each bank aggregated to an average monthly observation on the monthly returns of the MSCI World Index. As for our independent variable of interest, the interaction term "Post x IFRS 9", which reflects the period following the implementation of IFRS 9 for banks in advanced countries that have adopted IFRS 9. All other variables are defined in chapter 3.4. The standard errors are heteroskedasticity-robust.

pared to the full sample. However, the difference is of a smaller magnitude than for the systematic risk. With a decrease in effect of $-.00055$ from the full sample to the sample of advanced economies, we observe a statistically similar effect of post-implementation of IFRS 9 on total risk. This will further be elaborated below.

The results for advanced countries in table 9 shows a negative effect at 5% statistical significance for ROA and a positive effect at 10% significance for the standard deviation of ROA for total risk. This is interpreted as banks with a higher profitability experience decreases in total risk but a higher volatility of a bank's return on asset is associated with an increase of total risk. Implying that a stable positive profitability decreases risk, while unpredictable ROA increases the risk exposure of banks in advanced countries. Similarly to the full sample, there is a negative and significant result for the GDP-growth for systematic risk; implying that economic growth is associated with a decrease in systematic risk. For both total and systematic risk we observe a statistical significant effect (1% level) of the quality of advanced countries' governance. However at different directions, for total risk the effect indicates that a better governance is associated in decreases of risk. Divergent from this is the quality's effect on systematic risk, where the estimate is indicating that an increase in the quality of governance in advanced countries leads to higher systematic risk.

4.2.2 Split Sample - EMDEs

Next, all observations from countries classified as advanced economies by the IMF are excluded from the full sample. The split sample only including observations for EMDEs yields a final size of 2753 bank-year observations across 376 different banks. The results are presented below in table 10. For total risk, there is a significant and negative result for the interaction term Post x IFRS 9. These results imply that the implementation of IFRS 9 has reduced the total risk in banks operating in EMDEs. However, for the effect on systematic risk we do not observe a statistically significant estimate. Furthermore, the effect of systematic risk is positive indicating that the aftermath of the IFRS 9 implementation in EMDEs would increase the banks systematic risk. However since the effect is not statistically significant, we cannot prove that this relationship exist; meaning that assumption is not valid. Although it is still a result, and in particular when comparing with the baseline model and the split sample results for advanced countries these results leads us to believe that the post-implementation effect of IFRS 9 on systematic risk is driven by advanced countries. We can statistically argue that there is not a significant effect of the post-period adoption of IFRS 9 on systematic risk for these banks. Copestake et al. (2023) as previously mentioned, argues that larger banks are more exposed to risk in advanced countries, while smaller banks in EMDEs are most affected. The primary factors contributing to this are the elevated funding costs, more volatile liabilities, and reduced security holdings observed in smaller banks within EMDEs (Copestake et al., 2023).

As the sample includes observations of banks' daily stock returns we do not include any banks that are not publicly traded, which might lead us to dropping many smaller banks through our

methodology and sample collection. This is not as alarming in our split sample for advanced economies since smaller banks are not as exposed as larger banks. However Copestake et al. (2023) discusses that for EMDEs, smaller banks are more exposed to risk. This indicates that not including publicly traded banks will affect the bank’s risk in the EMDE setting while not as much in advanced countries. Further in table 5, summary statistics, we can see a smaller mean of EMDEs bank size compared to banks in advanced countries, however not statistically significant. Meaning that the observed difference in means is not large enough to explain categorically differences between banks within EMDEs versus advanced countries. The notion of smaller banks being inherently more exposed to risk within EMDEs are also depicted by the direction and statistically significance effect of bank size on systematic risk in table 10. The estimate indicates that a larger size of a bank in EMDEs are associated with an increase in systematic risk. The equivalent estimate in the split sample and baseline result did not produce a statistically significant result of bank size on total risk. Bank size is shown to be statistically significant and have a positive effect on systematic risk in Kyiu and Tawiah (2023) results as well as in Dong and Oberson (2022). As previously discussed, we too find this result in our baseline model.

Table 10: Regression Results Summary for Bank Risk in EMDEs¹

Variable	Total Risk	Systematic Risk
Post x IFRS 9	-0.0014** (0.0006)	0.0623 (0.0757)
Size	-0.0010 (0.0010)	0.2415** (0.0948)
ROA	-0.0180 (0.0269)	-1.5838 (2.5248)
SD of ROA	0.0035 (0.0430)	7.2018 (4.5084)
Tier 1 Ratio	0.0100* (0.0059)	1.1239** (0.5071)
GDP Growth	-0.0308*** (0.0068)	0.3612 (0.7274)
Quality	-0.0078*** (0.0014)	-0.5267*** (0.1715)
Bank Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N Banks	376	376
N	2753	2753
R-squared	0.6359	0.2700
Adj R-squared	0.5756	0.1491

Note: * p < .10, ** p < .05, *** p < .01. Standard errors in parentheses.

This table presents a summary of regression results of the impact of the post IFRS 9 adoption period on total and systematic risk for banks in EMDEs countries. In this table, we only present the results for our coefficients from the full model. Column (1) displays the results for total risk, and Column (2) depicts the estimates on systematic risk. As for our independent variable of interest, the interaction term "Post x IFRS 9", which reflects the period following the implementation of IFRS 9 for banks in EMDEs countries that have adopted IFRS 9. All other variables are defined in chapter 3.4. The standard errors are heteroskedasticity-robust.

For total risk we find a negative association of GDP growth at 1% statistical significance. Implying that within EMDEs higher GDP growth decreases total risk. A result that is existing in previous literature, López-Espinosa et al. (2021) and Kyiu and Tawiah (2023). For tier 1 ratio we find that higher ratios increases systematic risk for banks in EMDEs, at 5% significance, and for total risk the same estimate shows a statistical significance effect at 10% level. Equation (5) is used to calculate the tier 1 ratio. A high ratio implies a low share of risk-weighted assets and a high amount of tier 1 capital or either one. Consequently, it is counterintuitive that a higher tier 1 capital ratio would increase a bank's risk. Through a study of tier 1 capital ratios, Laiola (2015) concluded that more research is needed into the impact of mandated expansion of balance sheet equity on a firm's overall risk level. Laiola (2015) reasoned that it could be argued that a bank's increase in capital reserves might not necessarily reflect a risk-averse attitude (Laiola, 2015). Lastly, governance quality is negative and significant at the 1% level for both total and systematic risk. This suggests that better governance at the country level will decrease both total risk and systematic risk in banks.

4.2.3 Difference-in-difference-in-difference (DDD) model

In the coming section we will present our findings from our difference-in-difference-in-difference (DDD) regression model. This methodology allows us to examine the effect of the IFRS 9 implementation in EMDEs compared to advanced countries without splitting the sample. Instead we utilize a triple interaction term, $Post \times IFRS\ 9 \times EMDEs$, where EMDEs is an added dummy indicating 1 if the countries are EMDEs and 0 for advanced countries. To correctly follow the DDD methodology we include all lower forms of the interaction term. The results of the regression can be found in table 11, where the interaction terms which are included did not get omitted by the fixed effects.

The focus of the DDD-regression is the triple interaction term, which aims to control for variations across a third dimension that could effect the treatment and control group which is not accounted for by our baseline diff-in-diff model (Bertrand et al., 2004). The term captures the effect of post-implementation of IFRS 9 for banks within EMDEs compared to banks within advanced countries on total and systematic risk respectively. For systematic risk we observe a positive and statistically significant effect at the 1% level. Suggesting that after IFRS 9 was adopted in EMDEs, banks experienced increases in systematic risk compared to both the years prior adoption and to advanced countries. This finding does not contradict the results from our split sample models, as these show that implementing IFRS 9 reduces systematic risk in advanced countries while no relationship between IFRS 9-implementation and systematic risk in EMDEs. Meaning, both the DDD and the split sample regressions show that the relationship between IFRS 9-implementation is not the same in advanced countries as it is in EMDEs. The EMDE split sample did not provide us with statistical significant results of systematic risks effect of IFRS 9 on banks in these countries. This can be due to the comparison element of our added dummy variable, EMDEs. Together with our baseline interaction term this controls

Table 11: Regression Results Summary for DDD model

Variable	Total Risk	Systematic Risk
Post x IFRS 9	-0.0019*** (0.0004)	-0.5032*** (0.0624)
Post x EMDEs	0.0004 (0.0006)	-0.5738*** (0.0822)
Post x IFRS 9 x EMDEs	-0.0000 (0.0007)	0.5933*** (0.1003)
Size	0.0005 (0.0006)	0.0949 (0.0651)
ROA	-0.0337 (0.0209)	-3.5897* (1.9263)
SD of ROA	0.0379 (0.0302)	3.3131 (2.9600)
Tier 1 Ratio	0.0093* (0.0048)	0.7018 (0.4430)
GDP Growth	-0.0116** (0.0059)	-1.9585*** (0.6039)
Quality	-0.0143*** (0.0011)	0.1651 (0.1336)
Bank Fixed Effects	Yes	Yes
Year Fixed Effects	Yes	Yes
N Banks	797	797
N	5955	5955
R-squared	0.6545	0.3166
Adj R-squared	0.5997	0.2084

Note: * $p < .10$, ** $p < .05$, *** $p < .01$. Standard errors in parentheses.

for economic settings that might affect the treatment and control group differently (Bertrand et al., 2004). For total risk, we observe a statistically insignificant result for the triple interaction term, which implies we cannot show that implementing IFRS 9 has a different effect on bank risk in EMDEs compared to the effect on bank risk in advanced economies. Like the results for the systematic risk, these results are consistent with the split sample regressions. From the split sample regressions it was possible to conclude that IFRS 9-implementation reduced the risk in both advanced countries and EMDEs with comparable magnitude of the coefficients. With the addition of this DDD-regression, it is evident that we cannot conclude that the effect of implementing IFRS 9 on total risk is different between banks in advanced countries and EMDEs.

With background to the Covid-19 pandemic, the world bank group conducted a policy recommendation paper in light of the ECL framework of IFRS 9. Their aim was to analyse the challenges present for banks within EMDEs concerning the IFRS 9 framework (Caruso, D'Hulster, Kliatskova, & Ortiz, 2021). In a survey sent out to supervisory authorities in 184 countries, they received 91 responses, 23 of which came from lower middle-income and low-income countries. Through these surveys they found that banks situated within EMDEs that had adopted IFRS 9 in 2018 extensively used external vendors to build ECL models for them. As well as subsidiaries of internationally active banks made use of their parent companies' already developed functions. The authors does not advocate for this external usage of vendors due to the knowledge-gap between the modellers and the users of the model, understanding key drivers of the ECL-model is important for managers (Caruso et al., 2021). Similarly, if a foreign owned bank within EMDEs use their parent companies' solution might lead to unaccounted consequences, e.g. using information derived from advanced countries where GDP growth usually is lower than similar rates in EMDEs. To best be able to estimate the ECL model, it should be anchored in the local environment (Caruso et al., 2021). As raised in section 1 and 2, the IFRS 9 framework puts emphasis on bank management. The world bank advises that supervisory authorities in EMDEs underline the bank's board role to holding the management accountable and responsible for remodelling and maintaining solid ECL methodology (Caruso et al., 2021). One of their concluding remarks was that there is an overreliance on managerial judgment when modeling risk.

Other observations from table 11 includes statistically significant and negative estimates for GDP growth for both dependent variables. This is consistent with our baseline regression and implies that higher levels of GDP-growth reduces both total and systematic risk. Additionally, for systematic risk we observe a significant effect at 10% level for return on asset. For total risk our model produces statistically significant results for tier 1 ratio at the 1% level and for our independent variable governance quality, at the 1% level. This indicates that the aggregated mean value of rule of law, control of corruption and government effectiveness have a positive effect on total risk for banks. In other words, higher values of these three governance indicators, quality, leads to a reduction in total risk. Regarding the fit of the model, the results are in line with the fit of our baseline model with adjusted R-square of .5955 and .2084 for total risk and systematic risk respectively.

4.2.4 Comparison of results across models

In order to better summarize the results from the split sample regressions and the difference-in-difference-in-difference regression, we have in this section combined the results into a single table for each dependent variable. Table 12 shows the results for total risk. Observing the effect of Post x IFRS 9, we notice significant and negative results across all four models. However, as previously discussed, Post x IFRS 9 x EMDEs is not significant in our DDD-model. The negative and significant estimate for the interaction term in the split sample with EMDEs imply that implementing IFRS 9 reduces total risk for banks in EMDEs compared to banks in EMDEs which have not adopted IFRS. Similar results can be found for advanced countries, where implementing IFRS 9 reduces risk in banks in advanced countries compared to banks in advanced countries that have not adopted IFRS. Thus, compared within EMDE IFRS 9 have similar effect as prior literature as well as in advanced countries (Dong & Oberson, 2022; Kyiu & Tawiah, 2023).

Table 12: Summary of Regression Results on Total Risk Across Various Models

Variable / Model	DiD (1)	Split Advanced (2)	Split EMDEs (3)	DDD (4)
Post x IFRS 9	-0.00185*** (0.00033)	-0.0013*** (0.0004)	-0.0014** (0.0006)	-0.0019*** (0.0004)
Post x IFRS 9 x EMDEs	-	-	-	-0.0000 (0.0007)
Size	0.00048 (0.00060)	0.0002 (0.0007)	-0.0010 (0.0010)	0.0005 (0.0006)
ROA	-0.03452* (0.02076)	-0.0855** (0.0325)	-0.0180 (0.0269)	-0.0337 (0.0209)
SD of ROA	0.03803 (0.03010)	0.0928* (0.0440)	0.0035 (0.0430)	0.0379 (0.0302)
Tier 1 Ratio	0.00908* (0.00470)	-0.0044 (0.0063)	0.0100* (0.0059)	0.0093* (0.0048)
GDP Growth	-0.01227** (0.00581)	0.0118 (0.0108)	-0.0308*** (0.0068)	-0.0116** (0.0059)
Quality	-0.01389*** (0.00105)	-0.0176*** (0.0021)	-0.0078*** (0.0014)	-0.0143*** (0.0011)
Observations	5955	3202	2753	5955
R-squared	0.6544	0.7285	0.6359	0.6545
Adj R-squared	0.5998	0.6856	0.5756	0.5997

Note: * $p < .10$, ** $p < .05$, *** $p < .01$. Standard errors in parentheses.

Our triple interaction term, Post x IFRS 9 x EMDEs, consists of the following three dummy variables: Post, that captures the post-implementation period of IFRS 9, which are the years 2018 to 2022. Secondly, IFRS indicates whether the banks are located in an IFRS 9 adopting country. Lastly, EMDEs is a dummy variable indicating if the banks are located in a country which has been defined as an emerging market or developing economy by the IMF. Thus, the complete triple interaction term in our DDD model, captures the simultaneous effect of banks in the post-implementation period of IFRS 9, in adopting countries which are defined as

EMDEs. The result of no effect and no statistical significance for our triple interaction term for total risk tells us that, compared to banks in advanced countries we cannot see a statistical significant effect of either direction for banks in EMDEs. This can further be inspected by the statistical significant value of Post x IFRS 9 for our DDD model. Thus, we cannot conclude that implementing IFRS 9 has a different effect on total risk in advanced countries compared to EMDEs.

However, when we do not control for quality we observe a statistical significant effect of our triple interaction term. Further, the direction of the effect indicates an increase of total risk, in absence of government quality. Leading us to believe that the quality of governments are significantly different in EMDEs compared to advanced. Thus, we suspect that the effect of our interaction term, would indicate an increase of total risk for banks within EMDEs, if the government quality is different across countries with varying economic environments.

Table 13: Summary of Regression Results on Systematic Risk Across Various Models

Variable / Model	DiD (1)	Split Advanced (2)	Split EMDEs (3)	DDD (4)
Post x IFRS 9	-0.2547*** (0.0472)	-0.5328*** (0.0656)	0.0623 (0.0757)	-0.5032*** (0.0624)
Post x IFRS 9 x EMDEs	-	-	-	0.5933*** (0.0007)
Size	0.1759*** (0.0653)	0.1362 (0.0884)	0.2415** (0.0948)	0.0949 (0.0651)
ROA	-2.8047 (1.876)	-3.3853 (3.2328)	-1.5838 (2.5248)	-3.5897* (1.9263)
SD of ROA	3.8716 (2.995)	1.2370 (4.3575)	7.2018 (4.5084)	3.3131 (2.9600)
Tier 1 Ratio	0.4455 (0.442)	-0.2293 (0.7683)	1.1239** (0.5071)	0.7018 (0.4430)
GDP Growth	-1.5484** (0.598)	-2.2658* (1.1893)	0.3612 (0.7274)	-1.9585*** (0.6039)
Quality	-0.2501** (0.1244)	0.7193** (0.2674)	-0.5267*** (0.1715)	0.1651 (0.1336)
Observations	5955	3202	2753	5955
R-squared	.3078	0.4127	0.2700	0.3166
Adj R-squared	.1985	0.3201	0.1491	0.2084

Note: * $p < .10$, ** $p < .05$, *** $p < .01$. Standard errors in parentheses.

The effect of post IFRS 9-implementation on systematic risk across the four models is portrayed in table 13. We can see a statistical significant effect of post-IFRS 9-implementation across all models except for the split EMDE sample. Indicating that the effect between IFRS 9 adopting EMDE-banks post implementation is not statistically different from non-adopting EMDE-banks. However, for advanced countries (column 2) we can see a statistically significant effect of implementing IFRS 9. Banks in advanced adopting countries see a decrease in systematic risk following the post-period.

In column 4 of table 13, we again observe our result of the DDD model. For our triple interaction term we observe a statistically significant (at 1% level) estimate of an increase in systematic risk for banks in adopting EMDEs, post implementation. Thus, we can argue for a statistical significant increase of systematic risk in banks located in EMDEs, post-implementation, compared to banks in advanced economies. This leads us to formally accept our second hypothesis, that states:

H2: The effect of implementing IFRS 9 is different for banks within EMDEs compared to banks in Advanced countries.

The hypothesis was intentionally constructed as vague in regards to the direction and magnitude of the effect due to the limited prior research into the topic of IFRS 9 in EMDEs. Our motivation for the paper was to explore how the implementation of IFRS 9 differs between banks in advanced economies contra EMDEs, leading us to simultaneously accept our third hypothesis:

H2.1: The different effect of implementing IFRS 9 for banks in EMDEs compared to banks in advanced countries is smaller or opposite.

However, this is only the case for systematic risk and not total risk. This has important implications for supervisory authorities globally. As well as managers for adopting banks within EMDEs, to construct the model on local indicators which has been shown by Caruso et al. (2021) to be vital for banks within EMDEs.

5 Discussion

Firstly, as described in the previous sections, we find similar results in our baseline model to previous literature that implementing IFRS 9 has reduced risk in banks (Dong & Oberson, 2022; Kyiu & Tawiah, 2023). This result is consistent for both measures of bank risk; total risk and systematic risk. This is achieved with a sample that covers a longer time period compared to the original study and has a larger portion of observations from countries classified as EMDEs. As regulators issued the new standard with the intention of contributing to a more stable financial sector, this shows that the standard has the intended effect. However, when taking economic development into account by looking into the effect of implementing IFRS 9 in advanced countries and EMDEs separately, these results do not necessarily hold for all contexts. For total risk, our findings show that IFRS 9 implementation has a negative effect in EMDEs. However, we cannot determine whether this effect is different from the effect IFRS 9 has in advanced economies. Although we cannot make any conclusions regarding the effect of IFRS 9 on systematic risk in EMDEs on a standalone basis, we can conclude that implementing IFRS 9 increases systematic risk when compared to banks in advanced countries.

For advanced countries, our findings suggest that implementing IFRS 9 will reduce both total and systematic risk. Against the background of the previous literature into the mechanics of the ECL-model, we argue that IFRS 9 has increased transparency of the financial statements through the inclusion of credit relevant, forward looking information in the loan loss provisions to a greater degree than any opaqueness created by allowing for more managerial discretion. The reduction in risk following the implementation of the new standard suggest that the market has more information on the bank's risk management which has enabled them to better enact market discipline on the banks for any excessive risk taking. From previous literature, what would contribute to increase in bank risk following the IFRS 9 implementation is the discretion which the standard allows, which can cause opacity in the financial statements. And although we cannot draw any conclusions regarding the role of discretionary accruals or earnings management from our data and models, if it played a more important role than the transparency created from including more credit relevant information, previous research suggests that this would provide a result where IFRS 9-implementation increased the bank risk.

As just described, our results of the baseline model are consistent with the outcome of the original study of Kyiu and Tawiah (2023), which served as inspiration for that model. However, as described, that study only covers the years 2016 to 2019 due to the available data when the study was conducted. As data for more periods now are available, our study have been able to cover ten years, from 2012 to 2022, rather than four years. Although, it should be added that we found similar results for our baseline model when restricting our sample to the same time period as the study of Kyiu and Tawiah (2023). These findings suggests that the relationship does not only hold in the immediate period following the standard change but also as the standard becomes more established. From that it is possible to infer that the bank behavior and financial reporting does not change in an important way that the nature of the relationship

between IFRS 9-implementation and bank risk changes as more years are included. The consistency with previous literature is reasonable, as the standard setters provides implementation guidance after the standard becomes effective. Thus, practitioners should have better information and guidance on how to apply the standard. That would support a continued successful application of the standard where it continues to reduce bank risk rather have any adverse effects. Additionally, the ability to achieve similar results to previous literature with a new and different sample provides robustness to our study.

When introducing the aspect of economic development into our analysis, our results become more dynamic. The risk reduction following IFRS 9 holds true for advanced countries for both total risk and systematic risk, but not for banks in EMDEs. Our findings for systematic risk suggests that implementing IFRS 9 increases risk in banks in EMDEs in comparison to banks in advanced countries. Although, we cannot make any conclusion of its effect in EMDEs on a stand alone basis. Thus, IFRS 9 has a different effect in advanced countries and EMDEs. From this it is reasonable to infer, given the previous literature, that the ECL-model has not improved transparency in the financial statements in the same way the results from advanced countries implies it has there. Thus, these markets cannot improve their ability to enact market discipline if the information asymmetry between management and market participants have not improved. Previous literature would suggest that this is due to increased management discretion which is introduced with the ECL-model, which would allow for opportunistic behavior and earnings management. While we have controlled for governance quality on the country level, we have no control variables for governance at the bank level, like in previous literature and cannot thus comment on the role it may have on systematic risk in banks in EMDEs. What is interesting about the result that we come to different conclusions for our different dependent variables, when the previous study, our baseline model and our advanced sample found a risk reduction for both measures of market risk. This would suggest that the mechanics in how IFRS 9 influences bank risk is different for systematic risk and total risk, and that this difference is unique or more prominent in EMDEs than advanced countries.

That there is a difference in how bank risk works in advanced economies and EMDEs is also evident from what control variables are significant in the respective split samples for advanced economies and EMDEs. Total risk in both advanced countries and EMDEs have a significant, negative relationship with governance quality. The importance of the institutional environment for risk as well as IFRS implementation is well documented. Indicating that good institutions in a country decreases total risk. For systematic risk, governance quality is also the only variable significant for both advanced countries and EMDEs. Where advanced countries and EMDEs differentiate is that for total risk, there is a significant relationship with profitability and the volatility of profitability in advanced countries, while there is a significant relationship with tier 1 ratio and economic growth in EMDEs. Additionally, the direction which the control variables have are not always the same between the two country classifications. Thus, also suggesting differences in how bank risk work in advanced countries and EMDEs. While Tier 1 ratio has a negative coefficient for the advanced country split and a positive for the EMDEs

split, the control variable is only significant for EMDEs. Therefore, we can only conclude that the capital adequacy only impacts EMDEs by increasing risk, but cannot make any conclusion regarding the role of tier 1 ratio in advanced economies. What is interesting, however, is how governance quality has a significant effect in both advanced economies and EMDEs for both dependent variables. What is different about the effect of governance quality between the two types of countries is that better governance quality increases the systematic risk in advanced countries, while it decreases systematic risk in EMDEs and total risk in both advanced countries and EMDEs.

These results are useful for standard setters, bank regulators and other parties interested in facilitating financial stability in EMDEs markets and developing economies. Our findings support previous literature concluding that the IFRS standards impact countries differently, depending on their economic development (Gordon et al., 2012; Houqe, 2016; Outa et al., 2017; Viana et al., 2023; Zori, 2021). If standard setters refrain from engaging in variations in economic and institutional settings of the countries in which the standards are applied, they increase the risk that the standards may have adverse effects in some jurisdictions. If they engage practitioners from a variety of countries to gather information in the standard setting process, they should be better equipped to develop standards that have the intended and a more even effect across jurisdictions.

6 Summary and conclusion

In our study of the effect of implementing IFRS 9 in emerging markets and developing economies as well as advanced economies we can confirm previous literature of the relationship between IFRS 9 and financial stability (Kund & Rugilo, 2023; Kyiu & Tawiah, 2023; López-Espinosa et al., 2021), by concluding that IFRS 9 decreases both total risk and systematic risk. With the new impairment model, there is increased transparency into the risk management of banks which allows them to better enact market discipline. However when incorporating economic development into the analysis, we find that the effect of IFRS 9 does not uniformly felt but has different effects for banks in emerging markets and developing economies compared to banks in advanced countries. Although, this result is different for the different risk measures as we cannot differentiate the effect which the standard has on total risk between the two country classifications. Hence, with our study we contribute to the literature of post-implementation evaluations of IFRS 9 by confirming the effects shown in previous research and by adding how the post implementation effects will depend on context such as economic development. This therefore also adds to the literature showing how accounting standard implementation is contextual and will be different for emerging markets and developing economies compared to the often studied effect in advanced countries (Gordon et al., 2012; Houqe, 2016; Outa et al., 2017; Viana et al., 2023; Zori, 2021).

We propose further examination of the implications of implementing IFRS 9 in EMDEs. Based on our results, IFRS 9 has a contradictory effect for banks within adopting EMDEs. For an intended risk-reducing regulatory accounting standard to have the opposite effect is alarming since, once a country has agreed to implement the standard, the banks are required to adhere to it. This has not only implications for the banks themselves but also for the lenders, which probably will get a higher rate since the banks are trying other ways to reduce risk and keep their liquidity. Due to a faulty implemented accounting standard. As mentioned earlier, we feel strongly that more research is required into the topic and are quite surprised by the academic's inattention to the subject. Six years into the implementation, more and more countries, globally, are adhering to IFRS 9. If our results are empirically repeated and more discussions are held, we might get to the bottom line of this result. Thus, we want to remark the value of continuing the research how how different accounting standards and bank regulation impact different types of countries differently.

Additionally, our results are limited to the effect which IFRS 9 has on listed banks. Therefore, we cannot make any generalizations regarding what effect implementing the standard has on other types of financial institutions or non-financial companies. Hence, we cannot either draw any conclusions regarding the effect of implementing the standard for banks which are not listed. However, looking into the role which IFRS 9-implementation has on banks which are not listed would be another avenue for future research as previous literature indicate that IFRS 9 not only affects risk through market discipline but through less pro-cyclical lending. This would require the use of other risk measures, which could bring additional information to

the literature regarding the effects of IFRS 9 and accounting standards.

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