The Effect of Borrower Transparency on Bank Competition, Risk-taking and Bank Fragility

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Abstract

We show real effects in the banking sector that emanate from financial reporting transparency in the industrial sector. Prior research documents that transparency improves industrial firms' access to arm's-length financing via capital markets. We posit that this diminished reliance on banks increases competition in banks' product markets, and forces them to offset their lost rents by (i) taking on more risk, and (ii) reducing their cost structures. Using mandatory adoption of International Financial Reporting Standards (IFRS) as identifying variation in borrower transparency, we find evidence of increased bank competition, greater bank risk-taking and higher cost efficiency. Additional tests suggest that risk-taking is channeled primarily through non-lending activities, pointing to the beneficial role of diversification in reducing bank fragility. We corroborate this beneficial role by documenting that borrower transparency correlates with higher bank stability (i.e., lower likelihood of a crisis). Overall, we provide novel evidence that financial reporting transparency in the industrial sector strengthens the banking sector.

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"Fundamental economic forces have improved the availability of information in securities markets, making it easier and less costly for business firms to finance their activities by issuing securities rather than going to banks…fundamental forces not limited to the United States have caused a decline in the profitability of traditional banking throughout the world and have created an incentive for banks to expand into new activities and take additional risks"

Franklin R. Edwards and Frederic S. Mishkin,
FRB New York, Economic Policy Review, 1995

1. Introduction

A growing literature finds that financial reporting transparency allows arm's-length investors in debt and equity markets to evaluate and monitor firm performance (e.g., Ball, Kothari, and Robin, 2000; Leuz, Lins and Warnock, 2009). This, in turn, improves firms' access to financial markets in meeting their borrowing needs instead of relying on domestic banks. The benefits of improved capital market access to borrowing firms have been well-documented (e.g., Bushman et al., 2011; DeFond et al., 2011; and Francis et al., 2009).

What has, however, been underexplored is how this shift in financing by industrial firms affects the domestic banking sector. We argue that industrial firms' expanded access to capital markets is a competitive disadvantage to incumbent banks in that it forces domestic banks to compete with these alternate suppliers of financing. In support, we document that higher reporting transparency in the industrial sector increases competition in the banking sector. We then go on to examine how banks respond to this increased competition.

Two sets of theories – the first from the banking literature and the second from the industrial organization literature – inform us about banks' expected reaction to an increase in competition in their product markets. Theories linking bank competition to risk-taking allude to the "franchise value" or "charter value" of banks, which Hellman, Murdock and Stiglitz (2000, p. 149) define as "the discounted stream of future profits for the bank, a value that can only be captured if the bank stays in operation". By reducing banks' charter values (i.e., future

profitability), greater competition lowers banks' incentives to make safe bets and thus fosters greater risk-taking (as the opening quote suggests). Thus, we predict that by increasing banking sector competition, borrower transparency engenders greater bank risk-taking.

A well-established prediction from the industrial organization literature is that competition motivates firms to operate more efficiently, i.e., reduce costs (e.g., Schmidt, 1994; Nickell, 1996). In the context of banks, Jayaratne and Strahan (1998) show that banks' operating costs fall following the dismantling of the barriers to bank competition. Our second prediction is that borrower transparency, by increasing bank competition, spurs bank efficiency (defined as the proportion of costs to revenues).

To test these predictions, we use the mandatory adoption of International Financial Reporting Standards (IFRS) across several countries in 2005 as a source of identifying variation in borrower transparency.[1] Prior studies show that IFRS adoption increases borrower transparency (e.g., Daske et al., 2008; Christensen et al., 2013) and also increases firms' access to equity and debt financing (e.g., DeFond et al., 2011; Naranjo et al., 2013).[2] We use a difference-in-differences design augmented with country and year fixed effects to examine the effect of IFRS adoption (our instrument for borrower transparency) on bank competition and its ensuing effect on bank risk-taking and cost efficiency. Our design hones in on *changes* in outcomes around the narrow event window of mandatory IFRS adoption in 2005 to achieve cleaner identification.

IFRS and bank competition. Following prior banking studies (e.g., Barth, Caprio and Levine, 2004; Demirguc-Kunt, Laeven and Levine, 2004), we use two measures to capture bank

[1] Section 3 presents a detailed discussion of why mandatory IFRS adoption is an ideal setting to examine our research question. We then explicate the limitations of this setting in our context and perform additional analyses to mitigate these concerns.
[2] See Barth and Israel (2013) for a discussion of Christensen et al. (2013).

competition before and after the mandatory IFRS adoption – (i) bank asset concentration defined as the share of bank assets of the five largest banks in total banking system assets, and (ii) net interest margin defined as interest income minus interest expense relative to total assets. Mandatory IFRS adoption significantly increases bank competition. In terms of economic significance, bank asset concentration declines by 9% relative to pre-adoption levels and net interest margin by 15%.[3]

IFRS, risk taking and cost efficiency. Turning to our risk-taking results, we find strong evidence that both of our proxies for risk-taking – overall bank risk and loan portfolio risk -- increase in IFRS adopting countries after adoption as compared to non-adopting countries. These increases are economically meaningful: overall risk-taking increases by 13% more in adopting countries than in non-adopting ones; and loan risk by 38%. We find that higher risk-taking comes from both lending and non-lending activities, but that the influence of the latter dominates.[4] In particular, overall risk-taking rises between the pre and post periods by 25% (15%) in banks that increase (do not increase) non-lending activities.[5] Further, consistent with our second prediction, banks in adopting countries experience improvements in cost efficiency (i.e., lower costs as a ratio of revenues) relative to non-adopting countries. However, these effects are modest at 4%.

Borrower transparency and bank stability. We conclude by examining whether the effects of borrower transparency on bank risk-taking affect bank stability. The impact of bank risk-taking on the stability of the banking system is a subject of on-going research without a

[3] We also replicate prior findings that IFRS adoption leads to more arm's-length financing. To do so, we use cross-border foreign portfolio inflows (*FPI*) and find that IFRS adopting countries experience more *FPI* inflows of both debt and equity as compared to non-adopting countries.

[4] We use the proportion of non-interest revenue to total revenues to capture risk-taking via non-lending activities (following Demirguc-Kunt and Huizinga, 2010). This captures revenues from fees, commissions and trading income.

[5] To verify that banks with more non-lending activities are not also taking on more lending risk, we test for differences in the extent of loan risk across these partitions, and are unable to find any differences.

consensus. For example, Hellman et al. (2000) argue that competition induces excessive bank risk-taking, which in turn increases the likelihood of a financial crisis. Similarly, Keeley (1990) asserts that increased competition caused the higher occurrence of U.S. bank failures since the 1980s. This line of reasoning suggests that banks in countries with higher borrower transparency are more likely to encounter a banking crisis. On the other hand, Boyd and De Nicolo (2005) argue that competition fosters rather than hinders bank stability. They show that greater concentration in the lending market allows banks to charge higher interest rates, thereby making repayment more difficult. This in turn exacerbates borrowers' moral hazard incentives to shift into riskier projects, thereby increasing bank fragility. Similarly, Edwards and Mishkin (1995, pg. 27) reason that "declining profitability could tip the incentives of bank managers toward assuming greater risk in an effort to maintain former profit levels", which suggests greater bank stability. They contend that increasing competition in banks' lending business forces them to enter into non-lending activities such as trading and investments. These activities, while riskier than traditional lending, offer diversification benefits to the bank, thereby reducing bank fragility.

An ideal test of the above opposing predictions would be to examine changes in the magnitude of assets held by failing banks around IFRS adoption (see Subramanian and Yadav, 2012 for such a design around bank deregulation in the U.S.). However, since such data are not available, we use cross-sectional data on prior banking crises from Barth et al. (2004), and examine how country-level variation in borrower transparency correlates with the likelihood of a banking crisis. Controlling for a rich set of determinants used in prior studies, we find that borrower transparency (measured following Bushman et al., 2004) is associated with a lower likelihood of a banking crisis. Moving from the lower quartile (Israel) to the upper quartile (Norway) reduces the likelihood of a banking crisis from 54% to 40%. We also verify that

borrower transparency is not merely capturing financial market development but has an incremental effect beyond other country-level institutional features. These results suggest that industrial sector transparency fosters a more stable banking sector.[6]

Contributions. Our study makes two important and novel contributions. First, we show inter-connectedness between the industrial and banking sectors as a result of financial reporting transparency. While the transmission mechanism in previous research is almost always from the banking sector to the industrial sector, we present evidence of the chain of causality working in the reverse direction, i.e., from the industrial sector to the banking sector. In the process, our analysis broadens the economic consequences of IFRS adoption beyond the previously documented financing benefits to industrial firms. We show that IFRS adoption also promotes the development of the banking sector, an important contributor of economic growth.

Second, we are first to document the role of industrial sector transparency in the efficient functioning of the banking sector. By documenting that shocks to borrower transparency lead to greater competition, risk-taking and cost efficiency, our study provides evidence of causality. This adds to the bank competition-risk-taking literature, an area where Carletti and Hartmann (2003) note "only few of the papers endogenise aspects of industrial organisation in their analysis…the majority of them just compares the equilibriums achievable in different market settings". An important implication of our study is that enhanced transparency of the industrial sector can make the banking sector more efficient and stable – a channel not yet recognized.

[6] Our results based on a cross-country design are consistent with Subramanian and Yadav (2012) who use the deregulation of entry restrictions within the U.S. as a shock to bank competition and also find greater bank stability. Given that this setting has been used (notably by Keeley, 1980) to document greater risk-taking, the overarching message is that risk-taking is not synonymous with bank fragility. Banks can take on more risks but still be less likely to fail. Further, consistent with our results and Boyd and De Nicolo (2005), Subramanian and Yadav (2012) find that less frequent bank failures are due to lower loan rates and greater cost efficiency. Overall, our findings suggest that the economic forces at play are similar between the U.S. and other countries.

Section 2 presents the motivation followed by the hypotheses. Section 3 discusses the pros and cons of using mandatory IFRS adoption as our setting. Section 4 outlines the empirical design and Section 5 describes the results. Section 6 concludes.

2. Motivation and Hypotheses Development

2.1 Financial reporting transparency and competition in the banking sector

The importance of reliable financial reporting in allowing lenders of capital to evaluate and monitor borrowers' performance has been well documented. For example, Ball et al. (2000) show that higher quality (i.e., transparent) financial reporting facilitates firms to borrow from arm's-length capital markets rather than being confined to local sources of capital from banks. A large literature built on this insight documents the benefits of financial reporting transparency to industrial firms, viz., alleviating financing constraints and enabling firms to exploit investment opportunities (e.g., Bushman et al., 2011; Francis et al., 2009; and Biddle et al., 2009).

The enhanced access to capital, while a benefit to borrowing firms, is a significant cost to banks. Before reporting transparency opened alternate financing venues for borrowing firms, banks had monopoly access to these firms' borrowing needs. Banks therefore enjoyed rents in the lending market. By expanding borrowing firms' access to capital markets, financial reporting transparency, we contend, forces banks to compete more fiercely with the additional purveyors of financing. In contrast to the large literature that documents the financing benefits of reporting transparency to borrowing firms, the effect of this transparency on the lending sector, i.e., banks, has been relatively unexplored. We predict financial reporting transparency in the industrial sector increases competition in the banking sector. We examine how banks react to this increased competition in their product markets. To do so, we develop hypotheses drawing from two (related) literatures – the banking literature on risk-taking and the industrial

organization literature on cost efficiency. Our primary hypothesis is stated in the alternative as follows:

H1: Financial reporting transparency in the industrial sector increases competition in the banking sector.

2.2 Borrower transparency and bank risk-taking

The "charter-value" hypothesis predicts that banks will take on more risk when competition intensifies in their product markets (Keeley, 1990; Besanko and Thakor, 1993; Boot and Greenbaum, 1993; Hellman, Murdock and Stiglitz, 2000). The idea is that banks tradeoff the benefits of risk-taking (i.e., more profits) with the costs of doing so (i.e., inability to enjoy future rents due to bank failure). Competition, in this framework, encourages risk-taking because it reduces the stream of future profits (known as the "charter value") that banks can enjoy and as a result diminishes the marginal cost of bank failure. In their review paper, Carletti and Hartmann (2003) state that "theories based on the idea of 'charter value' argue that market power mitigates bank risk taking, since high margins act as a buffer against portfolio risk and increase the cost of bankruptcy". Similarly, Besanko and Thakor (1993) and Boot and Greenbaum (1993) show analytically that increased bank competition induces banks to choose riskier portfolio strategies. The idea is that banks, in the course of relationship-based lending, acquire private information that generates informational rents. As long as banks can appropriate some portion of these rents, they have an incentive to limit their risk exposure so as to preserve the value of the relationship. However, once the industry becomes more competitive, the value of relationship banking decreases and banks respond by taking on more risk (see also Boot and Thakor, 2000).

Keeley (1990) offers evidence consistent with the charter-value hypothesis. He examines whether increased competition in the banking industry brought about by the easing of banking

restrictions influences bank risk-taking. He finds that an increase in bank competition reduces banks' franchise values and that banks respond by taking on more risk. Based on the above studies, we expect the greater bank competition brought about by borrower transparency to increase bank risk-taking. Thus, our second hypothesis (a joint-hypothesis under the premise that borrower transparency intensifies bank competition) is stated in the alternative as follows:

H2: Financial reporting transparency in the industrial sector increases bank competition and in turn encourages bank risk-taking.

2.3 Borrower transparency and cost efficiency

Industrial organization theories predict that firms face pressures to reduce costs and maximize efficiency when operating in a competitive product market. For example, Schmidt (1994) argues that competition raises the probability of bankruptcy and thereby generates strong incentives for managers to avoid this fate by improving efficiency. Similarly, Nickell (1996) argues that competition exerts a downward pressure on costs, reduces slack, and provides incentives for the efficient organization of production. In the banking context, Jayaratne and Strahan (1998) find that the relaxation of barriers impeding bank competition is followed by a sharp increase in bank efficiency (i.e., decreases in banks' operating costs). Based on these studies, we expect borrower transparency to increase cost efficiency (i.e., a lower proportion of costs to revenues) via its effect on bank competition. Thus, our third (joint) hypothesis stated in the alternative form is as follows:

H3: Financial reporting transparency in the industrial sector increases bank competition and thereby improves cost efficiency.

2.4 Mechanisms underlying bank risk-taking

Our next hypothesis examines the underlying mechanisms that drive the relation between borrower transparency and bank risk-taking. Changes in risk-taking can emanate from

the lending channel or non-lending activities (or both). Edwards and Mishkin (1995) argue that banks "can attempt to maintain their traditional lending activity by expanding into new, riskier areas of lending". They point to real-estate loans as one such avenue. Citing the example of U.S. banks in the 1990s, they point out that these banks appear to have maintained their profitability and in particular, their net-interest-margin by taking on greater risk.

The second way that banks can preserve their profit levels is to pursue several fee-based non-lending activities such as derivatives trading and other off-balance-sheet activities that increase bank risk. Demirguc-Kunt and Huizinga (2010) provide evidence that non-lending activities contribute more to bank risk-taking than do lending activities. As theoretical studies do not provide insights into the circumstances under which one channel is expected to dominate the other, we present the influence of these two mechanisms as a non-directional hypothesis. Our fourth hypothesis (stated in the null) is as follows:

H4: Bank risk-taking driven by borrower transparency is unrelated to the mix between lending and non-lending activities.

3 Choice of IFRS as the setting – pros and cons

Our primary research question is to examine how financial reporting transparency in the industrial sector affects competition, risk-taking and cost efficiency in the banking sector. However, doing so in an empirical setting poses several challenges. First, we need to know which bank in our sample lends to which firms. This is hard to do because detailed borrower-level breakdowns of bank loan portfolios are not available. Second, one would need to observe the point in time when each borrower improves its reporting transparency and consequently starts borrowing from equity and debt markets. Third, this increase in borrower transparency should be exogenous to bank characteristics and especially to bank transparency, so that a causal link from the industrial sector to the banking sector can be established. Fourth, this

exogenous change in borrower transparency should affect several borrowers of the bank as idiosyncratic shocks to a single borrower are diversifiable and are unlikely to affect the bank (Diamond and Dybvig, 1983). Finally, the shock should affect a substantial part of the banking sector in order to impact banking sector competition.

Using mandatory IFRS adoption as our setting offers several desirable features. As the decision to adopt IFRS was made at the country-level, it can be regarded as exogenous with respect to an individual firm (or bank). Further, mandatory IFRS adoption was effective from 2005 onwards for all our sample countries (except Singapore where it was effective from 2003), providing a clear event window to observe changes in outcomes. Finally, as IFRS adoption affects all publicly listed firms within the country, it precludes the need to observe individual bank-borrower lending relationships. Further, it is reasonable to assume that this rule change affected a non-trivial proportion of the country's banking sector.

The IFRS setting does however pose certain challenges. First, focusing on *mandatory* IFRS adoption brings in the role of regulation, which is not part of our theoretical framework.[7] In other words, why would industrial firms not provide greater transparency voluntarily, if it is to their benefit? This concern, while valid in most settings, is less of an issue here because prior studies contend that informed lenders such as domestic banks discourage their borrowers from improving transparency because doing so results in these lenders losing their informational rents (e.g., Rajan and Zingales, 1998; Leuz and Oberholzer-Gee, 2006; Leuz and Wysocki, 2008). To verify this supposition, we examine the role of banking sector concentration in our setting, and find that our results are concentrated in countries with *ex ante* concentrated banking sectors – those most likely to deter borrowers from voluntarily becoming transparent. On a related note, we do not focus on *voluntary* IFRS (or IAS) adoptions because individual firm adoptions

[7] We thank the referee for this insightful observation.

are likely to represent only a minuscule proportion of the bank's overall loan portfolio and should therefore not invoke any response in bank behavior.

Second, as banks also adopted IFRS at the same time as industrial firms, our results might be due to greater *bank* transparency rather than borrower transparency. Or perhaps our results are on account of changes in how banks *account for* their activities under IAS 39 rather than any changes in their risk appetite.[8] Our banking sector concentration results (above) help mitigate these concerns, which apply universally to banks in all IFRS adopting countries, and do not predict differential effects based on banking sector concentration. However, to further address these concerns, we restrict our sample to private banks. Since IFRS was mandated for all public firms (and banks), any increases in risk-taking we observe for private banks are unlikely to be driven by banks adopting IFRS. Our results are robust to using private banks and to controlling for voluntary IFRS adoption by these banks.

The third concern is that mandatory IFRS adoption affected only public firms which are already transparent whereas banks generally lend to private firms.[9] While it is true that public firms are more transparent and already have access to arm's-length financing, prior evidence indicates a non-trivial effect of IFRS adoption on the transparency of public firms. For example, Christensen et al. (2013, pg. 162) document an increase of around 20% in stock liquidity for public firms in the EU around IFRS adoption. However, to further assuage this concern, we hand-collect information from Dealscan on German banks' pre-IFRS lending portfolios and classify these banks into two groups – those with high lending concentration in private firms in the pre period versus those with high lending concentration in public firms in the pre-period. We show that our effects are concentrated in the latter group. German banks with high

[8] We thank Cathy Schrand for this insightful observation.
[9] We thank the referee for raising this possibility.

concentration of lending to private firms do not experience any changes in risk-taking after IFRS adoption.

In addition to the above, we perform additional tests to rule out alternative interpretations of our findings. For example, it could be that our results are due to differential time-trends that started prior to the adoption date (which, if true, would violate the parallel-trends assumption). Or that, IFRS adoption was the outcome of elevated risk-taking in the domestic banking sector, or was correlated with other macroeconomic changes happening around this time. We address the endogeneity of IFRS adoption in two ways – first, we examine whether IFRS adoption had an effect prior to adoption (similar to Bertrand and Mullainathan, 2003) and find no evidence of such a "pre-event" effect. This helps rule out reverse causality concerns. Second, we include country-year fixed effects (i.e., year indicators that vary by each country) that fully absorb *all* time-varying, country-specific factors and mitigate concerns about unobservable macroeconomic factors correlated with IFRS adoption. Using across-bank-within-country-year variation, we conclude that our results are unlikely to be confounded by the endogeneity of IFRS adoption.

We address two other possible interpretations. First, increases in borrower transparency around IFRS adoption are due to contemporaneous changes in enforcement rather than the accounting rules *per se*, as posited by Christensen et al. (2013) (see Barth and Israel, 2013 for an opposing view). Results from additional tests indicate that IFRS adoption and concurrent changes in enforcement act as complements in generating our results. Second, given the proximity of IFRS adoption to the recent financial crisis, might our results be driven by the crisis? We find that our results are not only robust to deleting years that overlap with the crisis, but also do not reveal any differences between IFRS adopters and non-adopters in the factors identified by Beltratti and Stulz (2012) as contributing to global banks' poor performance during

the crisis. While these tests suggest that our results might not be driven by the recent crisis, we are circumspect in drawing strong conclusions given the complexity, magnitude and scope of the recent financial crisis.

4 Research design and data

In this section, we describe the empirical proxies, motivate our control variables, present our regression specifications, and follow that with a description of our sample.

3.1. IFRS adoption as the instrument for borrower transparency

We use the mandatory adoption of International Financial Reporting Standards (IFRS) by several countries in 2005 (and Singapore in 2003) as our source of identifying variation in borrower transparency. Prior studies suggest that IFRS adoption increases firm transparency in adopting countries (e.g., Daske et al., 2008; Christensen et al., 2013). This enables industrial firms in these countries to tap overseas investors for their financing needs (e.g., DeFond et al., 2011; Naranjo et al., 2013). Another advantage of this setting is that not all countries adopted IFRS, thereby providing us with a control group against which to benchmark the increases in bank competition, risk-taking and cost efficiency that we might observe in adopting countries.

We obtain data on countries that adopted IFRS from the sources in Daske et al. (2008, pg. 1100-1102). We define two indicators – *IFRS* to denote adopters vs. non-adopters and *POST* to denote the pre vs. post periods. *POST* takes the value of 1 (0) for the three years after (before) IFRS adoption excluding the year of adoption, which is 2005 for all countries except Singapore, which adopted IFRS in 2003.[10]

[10] Our results are robust to excluding Singapore and also to using five years around adoption.

3.2. *Primary outcome variables*

We use two measures of bank-risk taking. The first (*ZSCORE*) captures overall risk-taking while the second (*NPLOANS*) focuses on risk-taking via the loan portfolio.

3.2.1. *Overall risk-taking (ZSCORE)*

We follow prior studies such as Laeven and Levine (2009) and measure bank risk using the *z*-score (*ZSCORE*), which is the inverse measure of the likelihood of insolvency. Thus, lower values of *ZSCORE* indicate greater bank risk. *ZSCORE* is defined as return on assets plus the capital asset ratio divided by the standard deviation of asset returns. This measure captures the distance from insolvency (Roy, 1952), where insolvency is said to occur when losses exceed bank equity (i.e., $E<-\pi$; where E represents equity and π denotes profits). This condition can be restated as Prob ($-ROA<CAR$), where ROA (π/A) is the return on assets and CAR (E/A) is the capital asset ratio (see Laeven and Levine, 2009 for details).[11] Thus, under normally distributed profits, the inverse of the likelihood of insolvency (*ZSCORE*) is expressed as follows:

$$ZSCORE = \frac{ROA + CAR}{\sigma(ROA)} \tag{1}$$

3.2.2. *Loan portfolio risk (NPLOANS)*

Following Berger et al. (2008), we use the ratio of non-performing loans to total loans (*NPLOANS*) to capture loan portfolio risk. It is pertinent to note that *NPLOANS* captures only one component of overall bank risk-taking. Further, many banks do not provide information on non-performing loans, which limits the generalizability of the inferences.

[11] Our results are robust to using return on equity instead of return on assets.

3.2.3. *Cost efficiency (EFFIC)*

We measure cost efficiency (*EFFIC*) as the proportion of overhead costs to total revenues (i.e., interest revenues plus non-interest revenues).

3.3. *Non-lending activities (NONINT)*

We measure the extent of non-lending activities using the proportion of non-interest revenues (*NONINT*). We follow Demirguc-Kunt and Huizinga (2010) and define *NONINT* as the proportion of non-interest revenues to total revenues (interest revenue plus non-interest revenue). Higher values of *NONINT* denote higher reliance on non-lending activities such as the trading book, derivatives-based trading and other off-balance-sheet activities. Demirguc-Kunt and Huizinga (2010) show that non-lending activities contribute more to overall bank risk-taking than do lending activities.

3.4. *Control variables*

Following Laeven and Levine (2007, 2009), we include an array of bank-level and country-level variables as controls. The bank-level variables are revenue growth (*GROWTH*), defined as the annual growth in revenues, total assets of the bank (*LNASSETS*) to control for bank size, liquidity (*LIQUID*), defined as the proportion of liquid assets to liquid liabilities, loan loss provisions (*LLP*) to control for differences in loan quality, whether the bank is public or private (*LISTED*) [12], and market-share of total deposits that the bank holds (*MKTSHARE*).

Laeven and Levine (2009) find that bank risk-taking is positively associated with revenue growth, bank size, liquidity and loan-loss provisions. Thus, we expect a negative (positive) coefficient on *GROWTH*, *LNASSETS*, *LIQUID* and *LLP* in the *ZSCORE* (*NPLOANS*)

[12] Following Laeven and Levine (2007), we use the "Listed" indicator to identify public vs. private banks.

specification. Further, the charter-value hypothesis predicts lower risk-taking in more concentrated banks, i.e., a positive (negative) coefficient on *MKTSHARE* in the *ZSCORE* (*NPLOANS*) specification. Turning to cost efficiency, we predict a negative coefficient on *LNASSETS* and positive coefficients on *LIQUID* and *MKTSHARE* following Demirguc-Kunt, Laeven and Levine (2004) who report a negative association with bank size and a positive association with liquidity and bank concentration. Finally, we make no prediction for the coefficient on *LISTED*.

The country-level variables we include are the level of GDP (*GDP*), annual growth in GDP (*GDPGROWTH*), and annual inflation (*INFL*). In addition to economic development, we also control for differences in financial market development, viz., equity market cap of listed firms as a ratio of GDP (*MKTCAP*), turnover of listed firms scaled by GDP (*TURNOVER*), and the extent of international trade (*TRADE*), defined as the ratio of imports plus exports scaled by GDP. Making ex-ante predictions on the signs of the country-level controls is difficult. Our intent here is to ensure that we are appropriately capturing additional *time-varying* macroeconomic factors that might be correlated with countries' decision to adopt IFRS. Finally, we include year effects that subsume the coefficient on *POST* and country fixed effects that absorb the coefficient on *IFRS*. Following Bertrand et al. (2004), we cluster our standard errors by country annually, but the results are robust, albeit slightly stronger, when we cluster only by country.

3.5. Regression specifications

To examine the effect of IFRS adoption on bank risk-taking and cost efficiency, we estimate the following difference-in-differences specification:

$$
\begin{aligned}
OUTCOME_{i,j,t} = {} & \alpha_j + \mu_t + \lambda_1 IFRS * POST_{i,j,t} + \lambda_2 GROWTH_{i,j,t} + \lambda_3 LNASSETS_{i,j,t} + \lambda_4 LIQUID_{i,j,t} \\
& + \lambda_5 LLP_{i,j,t} + \lambda_6 LISTED_{i,j,t} + \lambda_7 MKTSHARE_{i,j,t} + \lambda_8 GDP_{i,j,t} + \lambda_9 GDPGROWTH_{i,j,t} \\
& + \lambda_{10} INFL_{i,j,t} + \lambda_{11} MKTCAP_{i,j,t} + \lambda_{12} TURNOVER_{i,j,t} + \lambda_{13} TRADE_{i,j,t} + \varepsilon_{i,j,t}
\end{aligned} \tag{2}
$$

where, $OUTCOME_{i,j,t}$ is *ZSCORE*, *NPLOANS* or *EFFIC* measured for bank *i* in country *j* at time *t*; α_j and μ_t represent country and year fixed effects respectively. The coefficient on *IFRS* is subsumed by the country effects, while that on *POST* by the year effects. The coefficient on the interaction term λ_1 identifies the incremental effect of IFRS adoption on bank risk-taking and cost efficiency for adopting countries relative to non-adopting countries. Our hypotheses predict a negative coefficient on λ_1 in the *ZSCORE* and *EFFIC* regressions, and a positive coefficient in the *NPLOANS* specification.

3.6. Sample

Our data are from four sources. Risk-taking and the other accounting data are from Bankscope, a Bureau van Dijk database on international banks. IFRS adoption dates are from Daske et al. (2008). Macroeconomic variables such as *GDP*, *MKTCAP* etc. are from the World Development Indicators (WDI) database of the World Bank. To ensure comparability across countries, we follow Laeven and Levine (2007) and delete banks with total assets of less than US$ 100 million.[13] We also delete banks classified as "Islamic banks" as accounting information of these banks does not match the rest of the sample.

The Bankscope universe comprises of 186,839 bank-year observations, excluding the U.S.[14] Restricting the sample to three years around IFRS adoption leaves us with 108,177

[13] In unreported sensitivity tests, we find that our results are robust to retaining these banks.

[14] We exclude the U.S. because coverage of U.S. banks on Bankscope varies greatly over time. For example, the number of banks covered goes up from 1,200 in 1998 to 5,170 in 2000 to 6,900 in 2003. In contrast, coverage for other countries is fairly stable. For example, Bankscope covers 48 Canadian banks

observations. Deleting Islamic banks and those with assets of less than US$ 100 million shrinks the sample to 90,030 observations. Restricting the sample to the IFRS countries and deleting observations with missing values of the relevant variables reduces the sample down to 43,096. The last step entails merging these data with the WDI database, which results in a final sample of 42,404 bank-year observations for 11,462 unique banks spread across 49 countries over the years 2000 to 2008 (i.e., 2000-2006 for Singapore and 2002-2008 for all other countries). We exclude the year of adoption from the sample (i.e., 2003 for Singapore and 2005 for all the other countries).

Table 1 presents the list of IFRS adopters and non-adopters. Twenty-six countries spread across Europe and Asia adopted IFRS while twenty-three countries in the same regions do not. The three largest adopters in terms of sample size are Germany, Italy and France while Japan, Russia and Brazil are the largest non-adopters. The final sample comprises of 29,800 bank-year observations for adopters and 12,604 for non-adopters.

Table 2 contains descriptive statistics of the main variables. In Panel A, the median bank has a profitability of 0.46% of total assets and holds capital to the tune of around 7% of assets. *ROA* volatility has a median value of 0.216, which is approximately half the bank's annual *ROA*. The capital and profitability of the median bank gives it a cushion of around 34 times its ROA volatility, as shown by the *ZSCORE* (represented in logs). The mean log *ZSCORE* is 3.665, with a minimum of 0.618 and a maximum of 6.808. This means profitability has to fall by 38 standard deviations ($e^{3.665}$-1) in the average bank to wipe out equity while it needs to fall by only 0.8 standard deviations ($e^{0.618}$-1) in the most risky bank. Non-performing loans amount to around 6% of total loans at the average bank, and ranges from a low of 0.3% to a high of 35%. Cost

in 1998, 49 in 2000 and 52 in 2003. Similarly, it covers 1,690 banks in Germany in 1998, 1,631 in 2000 and 1,438 in 2003.

efficiency (*EFFIC*) also shows wide dispersion in the sample. The lowest value is 10% of total revenues, while the highest value is 152%. The average bank has non-interest income that amounts to 24% of total income, as evidenced by the value of *NONINT* and has revenues growing at 0.5% annually. It also has US$ 2.1 billion in total assets and liquid assets that amount to 33% of liquid liabilities. Around 16% of the banks are publicly listed. The overall industry structure is highly dispersed, with the highest market share of any bank not exceeding 11.3%.

Turning to the country-level variables in Panel B, the average country in the sample experiences an annual GDP growth rate of 2% and annual inflation of 3%. The average market cap of listed firms for the sample is 79% of GDP while annual turnover comes in at 113%. Finally, the average sum of imports and exports amount to 60% of GDP. Overall, the sample depicts rich heterogeneity with respect to bank characteristics such as size and profitability; as well as macro-level factors such as economic and financial market development.

5 Results

5.2 IFRS adoption and banking sector competition

We begin our empirical analyses by examining the effect of IFRS adoption on banking sector competition (hypothesis *H1*). Since competition is a difficult construct to capture empirically, we use two measures commonly used in prior banking studies (e.g., Barth, Caprio and Levine, 2004; Demirguc-Kunt, Laeven and Levine, 2004) – an asset-based measure and an income-based measure. We define bank asset concentration (*ASSETCONC*) as the fraction of total banking sector assets held by the five largest banks in the country as our asset-based measure of bank competition. These data are computed annually and made available by the World Bank via its World Development Indicators (WDI) database. We use net interest margin (*INTMARGIN*) as the income-based measure of bank competition and define it as the excess of

interest income over interest expense scaled by total assets. Demirguc-Kunt, Laeven and Levine (2004) find that both measures are positively associated. Higher values of *ASSETCONC* and *INTMARGIN* denote less banking sector competition.

Figure 1 presents univariate evidence. The horizontal axis represents the pre- and the post-adoption periods, while the vertical axis plots the average values of bank competition (*ASSETCONC* in Panel A and *INTMARGIN* in Panel B) that correspond to these periods. We observe a more pronounced decrease in *ASSETCONC* for IFRS adopting countries, as compared to that for non-adopting countries. Turning to *INTMARGIN*, IFRS adopters experience a decline, but the margin increases for non-adopters over the same period. This pattern suggests IFRS adoption increased competition in the banking sector of adopters, but not of non-adopters.

Table 3 presents multivariate evidence with country and year fixed effects. The first two specifications pertain to bank asset concentration (*ASSETCONC*) and the next two to net interest margin (*INTMARGIN*). Consistent with hypothesis *H1*, IFRS adoption increases banking sector competition. In particular, the coefficient on *IFRS*POST* is negative and significant (at the 1% level) in all the specifications, indicating that bank asset concentration and the net interest margin fall (i.e., bank competition increases) for adopters as compared to non-adopters around IFRS adoption. The economic magnitudes based on Model 2 and 4 suggest a 9% decrease in asset concentration and a 15% decrease in net interest margin around IFRS adoption.

5.3 IFRS adoption, bank risk-taking and cost efficiency

As a prelude to testing the risk-taking and cost efficiency hypotheses (*H2* and *H3*), we begin with graphical evidence in Figure 2. The horizontal axis plots the event-years around IFRS adoption and the vertical axes plot the average values of overall risk-taking (in Panel A) and loan portfolio risk (in Panel B) with the solid line indicating the IFRS adopters and the

dashed line the non-adopters. Two clear patterns emerge. First, adopters and non-adopters exhibit a similar trend of decreasing risk-taking in the pre-IFRS adoption period. This provides validity of the parallel-trends assumption of diff-in-diff designs. Second, while non-adopters continue along their trend, adopters depict a discontinuity with a sharp increase in risk-taking in the post-IFRS adoption period. Reassuringly, these effects show up in the year immediately after IFRS adoption for *NPLOANS* (which is an annual measure) and in the second year for *ZSCORE* (which is based on a rolling-window of five annual observations).

These patterns are less striking for the cost efficiency measure. While adopters depict a sharp increase in cost efficiency after IFRS adoption, this increase is observed even in non-adopting countries (Panel C). Panel D plots "residual" cost efficiency where the measure is orthogonalized with respect to the controls and the country fixed effects. Here we see evidence of higher cost efficiency in the post-IFRS adoption period for the adopters, which is not shared by the non-adopters. Overall, the evidence for risk-taking is strong while that for cost efficiency is somewhat weak.

Table 4 presents the statistical counterpart of the above graphical results. Consistent with hypothesis *H2*, IFRS adoption fosters bank risk taking. In particular, the coefficient on *IFRS*POST* is negative and significant in the *ZSCORE* regressions, while it is positive and significant in the *NPLOANS* regression. In terms of economic significance, the coefficient of -0.143 on *IFRS*POST* in Model 1 suggests that risk-taking increases by 13% ($e^{-0.143}$-1) in banks of IFRS countries incrementally to that in banks of non-IFRS countries. Turning to Model 2, comparing the coefficient of 2.547 with the mean pre-period value of 6.60 (not tabulated), indicates that loan risk increases by 38%. Finally, the coefficient of -0.037 in Model 3 indicates a 4% increase in cost efficiency – consistent with hypothesis *H3*.

5.4 Role of lending and non-lending activities

To shed light on how lending versus non-lending activities contribute to the elevated risk-taking (hypothesis *H4*), we split the sample based on whether banks increase their non-lending activities between the pre and post adoption periods. To do so, we compute *NONINT* as the proportion of non-interest revenue to total revenues and define Δ*NONINT* as the percentage change in *NONINT* between the post and pre periods computed for each bank. These tests are therefore restricted to a constant sample of banks (26,920 observations) that operated in both periods.[15] We differentiate between banks with increases in non-lending activities (Δ*NONINT* >0) versus those without (Δ*NONINT* <=0).[16] We assess the contribution of non-lending activities to risk-taking from a regression of *ZSCORE* on *IFRS*POST* within each sub-sample. The results are presented in Models 1 and 2 of Table 5.

The coefficient on *IFRS*POST* remains negative and significant in both sub-samples, but it is larger in the Δ*NONINT*>0 sub-sample (-0.291 versus -0.166). Non-lending activities affect banks' risk more than lending activities. In particular, risk-taking increases by 25% ($e^{-0.291}$-1) in banks with more non-lending activities compared to 15% in those without. Further, these coefficients statistically differ from each other with a *p*-value of 0.071. To rule out the possibility that banks that take on more non-lending activities also simultaneously take on more lending risk, we examine differences in loan risk across the above partitions. These results are presented in Models 3 and 4. The coefficient on *IFRS*POST* is positive and significant in both specifications (1.646 versus 1.467), but not significantly different from one another (*p*. value of 0.661). Overall, these results suggest that banks responds to increased borrower transparency by taking on both lending and non-lending risk, but that the effect of the latter dominates.

[15] We find greater risk-taking even in this constant sample. In particular, the coefficient on *IFRS*POST* remains negative and significant (positive and significant) in the *ZSCORE* (*NPLOANS*) specification.
[16] Results are robust to splitting the sample based on the median.

5.5 Cross-sectional variation: bank entry restrictions

If borrower transparency indeed affects bank competition, then we should expect the effects to be pronounced when the banking sector was less competitive *ex ante*. To test this prediction, we exploit heterogeneity in the extent of restrictions on bank entry across our sample countries. Following Barth et al. (2004), we measure bank entry restrictions based on the number of specific legal requirements for obtaining a license to operate a bank. Barth et al. (2004) show that countries with high bank entry restrictions have concentrated and corrupt banking sectors controlled by fewer incumbents.

In addition to providing cross-sectional variation, this test also speaks to the question of why borrowers might not be willing (or able) to voluntarily increase financial reporting transparency. Rajan and Zingales (1998) posit that informed lenders such as domestic bank prefer that their borrowers remain opaque in order to protect their own informational rents (by reducing access to arm's-length financing). We argue that this effect is more likely to occur in countries with concentrated banking sectors as lenders in these countries can impose their opacity preferences on their borrowers.

To test the above prediction, we split IFRS adopting countries into two groups – those with high bank entry restrictions (*IFRS_HI_REST*) and those with low bank entry restrictions (*IFRS_HI_REST*) and interact each of these indicators with *POST*.[17] Table 6 presents the results. The coefficient on *IFRS_HI_REST*POST* is significant in all the specifications, while that on *IFRS_LO_REST*POST* is insignificant. Further, these two terms are statistically different from each other in every case. Thus, consistent with our expectations, IFRS adoption increases bank

[17] We define high and low based on the median number of bank entry restrictions.

risk-taking and cost efficiency only when the banking sector is less competitive, ex-ante. These results also help address several alternate interpretations, which is what we turn to next.

5.6 Ruling out alternative interpretations

We devote this section to additional tests aimed at ruling out alternative interpretations. First, as banks also adopted IFRS, it could be that our results are driven by greater *bank* transparency stemming from IFRS adoption rather than borrower transparency. Relatedly, as banks adopted IFRS, they reported for investment securities differently under IAS 39. Thus, what we might be observing is not greater risk-taking *per se* but rather banks *reporting* for investment securities differently. Second, countries' decision to adopt IFRS standards is unlikely to be exogenous, and this endogeneity might be confounding our inferences. Third, our inferences could be confounded by the fact that mandatory IFRS adoption affected only public firms, while most of our sample banks were probably lending to private firms. Fourth, it could be that our results are due to the effects of the recent financial crisis rather than IFRS adoption. Finally, our results might be driven by concurrent changes in enforcement rather than the rules as posited by Christensen et al., 2013 (see Barth and Israel, 2013 for a countervailing view).

5.6.1 Bank adoption of IFRS

To address the concern that bank adoption of IFRS could be driving our results, we restrict our sample to private banks. Since IFRS adoption was mandated for publicly traded firms (and banks), evidence of increased risk-taking in private banks would rule out the possibility that our results are driven by the direct effect of IFRS adoption by banks. Further, our data allow us to control for whether the bank chose to voluntarily adopt IFRS or retained its local GAAP (which we denote by an indicator *ACCTSTD*).

Panel A of Table 7 presents these results. The first two specifications present results for *ZSCORE* while the next two pertain to *NPLOANS*. The coefficient on *IFRS*POST* in the *ZSCORE* regressions remains negative and significant and retains its significance even when we control for *ACCTSTD*. Similar results are detected for *NPLOANS*, where the coefficient on *IFRS*POST* remains positive and significant in both specifications. Overall, we conclude that our results are unlikely to be driven by confounding effects of IFRS adoption by banks.

5.6.2 Endogeneity of IFRS adoption

Given that IFRS adoption was not a true natural experiment as countries chose to adopt these standards, it could be that greater risk-taking in the banking sector of IFRS adopters is what led them to adopt these standards. A related concern is that we might be merely picking up ongoing time-trends in risk-taking that might have started even before the IFRS adoption date or that unobservable macroeconomic changes are the true drivers of both IFRS adoption and higher bank risk-taking (the correlated omitted variables concern).

The reverse causality and time-trend arguments make a common prediction – one would see greater risk-taking in IFRS adopting countries relative to their non-adopting counterparts in the years prior to adoption. To investigate this possibility, we follow Bertrand and Mullainathan (2003) and examine the dynamic effects of IFRS adoption. In particular, we create additional indicator variables to denote the two years immediately preceding IFRS adoption ($POST_{-2}$ and $POST_{-1}$) and interact these with *IFRS*. We also decompose the post period into $POST_1$ and $POST_{2+}$ to indicate the year immediately following the adopting year versus all

subsequent years and interact each of these with *IFRS*.[18] The reverse causality and time trend interpretations predict significant coefficients on *IFRS*POST*$_{-2}$ and *IFRS*POST*$_{-1}$.

Panel B1 of Table 7 presents these dynamic effects. The coefficients on *IFRS*POST*$_{-2}$ and *IFRS*POST*$_{-1}$ are insignificant, providing no support for the reverse causality and time-trend interpretations. Further, the coefficient on *IFRS*POST*$_1$ is insignificant in the *ZSCORE* regression but significant in the *NPLOANS* and *EFFIC* regressions. Finally, the coefficient on *IFRS*POST*$_2$ is significant in all the specifications. These results indicate that the higher loan risk and cost efficiency effects are observed in the data from the first year after adoption onwards. In contrast, the overall risk taking effects manifest only from the second year onwards. This is understandable given that the *ZSCORE* measure is based on a rolling-window of five annual observations, while the other two measures are estimated annually.

The sharpness of the above results around IFRS adoption helps alleviate concerns that the effects might be due to unobservable macroeconomic changes correlated with IFRS adoption.[19] However, to adequately address concerns about macroeconomic, omitted factors that differ between IFRS and non-IFRS countries, one needs to include country-year fixed effects (i.e., year indicators that vary by country). These would fully absorb all time-varying, country-specific factors and would adequately control for unobservable macroeconomic factors that might be correlated with IFRS adoption. However, the drawback is that these country-year fixed effects would also absorb the coefficient of interest, i.e., *IFRS*POST*. To identify an (arguably causal) effect of IFRS adoption under this design requires within-country-year variation in the effect of IFRS adoption.

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[18] As we exclude the year of adoption, we do not have a *POST*$_0$ indicator.

[19] It might appear surprising that the effects (e.g., cost efficiency) kick in so rapidly. However, it is pertinent to note that overheads in these environment contain a non-trivial portion of inefficiencies such as managers paying themselves excess compensation and it is conceivable that IFRS adoption clamps down on these inefficiencies (e.g., Demirguc-Kunt, Laeven and Levine, 2004).

To do so, we use bank-level variation in the effect of IFRS adoption by exploiting bank-specific changes in non-lending activities between the pre and post IFRS adoption periods (based on Table 5). In particular, we create an indicator variable *NONINT_INCR* that denotes banks with increases in non-lending activities between the pre and post IFRS periods and interact this with *IFRS*POST* (and also all the other controls). In effect we compare, *within each year and for each country*, increases in risk-taking between banks that increased non-lending activities versus those that did not increase these activities. This design allows us to include country-year fixed effects, thus assuaging concerns about the endogeneity of IFRS adoption. In addition, we include bank fixed effects to control for any time-invariant differences between these two types of banks.

These results are presented in Panel B2 of Table 7. Consistent with our prior results, the coefficient on *NONINT_INCR*IFRS*POST* is negative and significant in the *ZSCORE* specification, providing assurance that our results are unlikely to be confounded by the endogeneity of IFRS adoption. Further, the coefficient on *NONINT_INCR*IFRS*POST* is insignificant in the *NPLOANS* model indicating no difference in loan-based risk between banks that increase non-lending activities and those that do not. The same is the case with cost efficiency, as seen by the insignificant coefficient on *NONINT_INCR*IFRS*POST* in the *EFFIC* specification.

5.6.3 Public firms versus private firms

One limitation of our setting, as discussed previously, is that IFRS adoption applies only to public firms whereas most of our sample banks are presumably lending to private firms. It is difficult to address this concern within our sample as Bankscope does not provide detailed borrower-level breakdown of banks' lending portfolios. To circumvent this obstacle, we turn to

Dealscan that provides data on the international syndicated loan market. A syndicated loan is extended jointly by a group of banks, including one or sometimes a couple of lead banks and several participant banks (see Giannetti and Laeven, 2012 for a detailed discussion). The advantage of Dealscan is that it provides data on the listing status of borrowers (i.e., public versus private firms) and also on which banks these firms borrow from. The disadvantage, of course, is that it covers only a select set of firms and banks within each country.

Since there is no common identifier linking Dealscan with Bankscope, we manually match the common banks using bank names, and therefore conduct this exercise only for Germany. To ensure that we are capturing variation in listing status across firms and not across banks, we restrict our sample to private banks. Our hand-collection gives us a final sample of 252 observations. As our sample is restricted to a single country, we exclude the country-level controls. Further, the effect of IFRS adoption is now captured by *POST* (and not *IFRS*POST*). We split this *POST* variable into two – *POST_PVT* to denote banks that lend to private firms and *POST_PUB* to denote those that lend to public firms. In particular, *POST_PVT* (*POST_PUB*) takes the value of 1 if the bank has an above median concentration of lending to private (public) firms in the pre-IFRS adoption period as computed based on Dealscan.

Panel C of Table 7 presents the results. Models 1, 2 and 3 present results for *ZSCORE* and Model 4 for *EFFIC*.[20] The coefficient on *POST* in Model 1 is negative but insignificant indicating no evidence of higher risk-taking in the entire sample. However, when we distinguish between banks based on the listing status of their borrowers, the results are stark. The coefficient on *POST_PVT* is positive and insignificant (0.179 and *t*-stat of 0.90) while that on *POST_PUB* is negative and highly significant (-0.568 and *t*-stat of -2.29). Further, these results are robust to including bank fixed effects in Model 3 – the coefficient on *POST_PVT* remains

[20] We are unable to examine *NPLOANS* as only 23 observations in this sample provide these data.

positive and insignificant while that on *POST_PUB* remains negative and significant. These results indicate no change in risk-taking around IFRS adoption for banks that lent to private firms in the pre-IFRS period but a strong increase for those that lent to public firms. Finally, the cost efficiency results in Model 4 are weaker. The coefficient on *POST_PUB* is more negative (coefficient of -0.037) than that on *POST_PVT* (-0.013) but these effects are statistically insignificant by themselves.

Overall, these results provide a validity check that our results are indeed stemming from banks that lent to public firms rather than those that lent to private firms (the former category being the ones impacted by IFRS adoption).

5.6.4 Are the results driven by the recent financial crisis?

Given the proximity of the IFRS adoption date to the recent financial crisis, we examine whether our results are driven by the crisis. If this were true, the crisis should have affected IFRS adopters differentially than non-adopters. This is because, any overall effect of the crisis would be subsumed by the year fixed effects and would therefore not bias the coefficient on *IFRS*POST*. To further explore whether the crisis affected IFRS adopting countries differently than non-adopting countries, we perform two tests – first, we exclude 2008 from our sample as it overlaps with the crisis period and find consistent results. Second, we follow Beltratti and Stulz (2012) and look for differences across IFRS adopters and non-adopters in factors that contributed to global banks' poor performance during the recent crisis. Beltratti and Stulz (2012) find that certain features of banks' asset and liability structures could have predicted their performance during the crisis. On the liability side, banks that were highly levered had greater reliance on short-term capital market funding and those with fewer deposits performed worse. On the asset side, banks from countries with greater restrictions on bank activities fared better.

We examine pre-crisis (i.e., year 2006) differences in bank leverage (*LEV*), deposit ratio (*DEPOSITS*), tier 1 capital ratio (*TIER1*) and funding fragility (*FUND_FRAG*), defined following Beltratti and Stulz (2012) as the ratio of money market funding and inter-bank deposits to total funding. On the asset side, we restrict our sample to countries with high restrictions on bank activities (based on data from Barth, et al., 2004) and examine whether IFRS adoption increases risk-taking within this group. These results are presented in Figure 3 and Panel D of Table 7.

Turning to the graphical evidence, there appears to be no systematic difference in any of the crisis factors between IFRS adopters and non-adopters. This is confirmed in the multivariate evidence of Panel D of Table 7. The first panel presents differences in means and medians of the contributing factors across IFRS adopters and non-adopters. As can be seen, adopters and non-adopters do not differ (either economically or statistically) across any of the critical factors that contributed to banks' poor performance during the crisis. Further, even when the sample is restricted to countries with high restrictions on bank activities, we find a significant increase in overall risk-taking and loan risk taking for IFRS adopters relative to non-adopters. These results suggest that the crisis might not be contributing to the effects that we are attributing to IFRS adoption. However, given the complexity of the recent crisis and the various facets of the banking and industrial sectors that it affected, it is difficult to draw definitive conclusions.

5.6.5 Is it IFRS adoption or concurrent changes in enforcement?

A recent study by Christensen et al. (2012) argues that it might be premature to attribute increases in firm transparency around IFRS to mandatory adoption alone. They note that several countries that adopted IFRS also made contemporaneous changes to enforcement and that care needs to be exercised to determine the true cause of the documented effects. To drive home their point, they split IFRS adopters into those in the European Union versus those

outside and show that increases in stock liquidity are concentrated in the former group. This, they argue, shows that IFRS adoption alone is insufficient to generate increases in borrower transparency (see Barth and Israel, 2013 for a counter-argument). While this debate is far from settled, we perform some preliminary tests to better understand the influence of enforcement on our results.

First, we too split IFRS adopters into two groups – those within the EU (denoted by *IFRS_EU*) and those outside (*IFRS_NONEU*). We then replace *IFRS*POST* with *IFRS_EU*POST* and *IFRS_NONEU*POST*. These results are presented in Panel E of Table 7. Similar to Christensen et al., we find that the effect of IFRS adoption on bank risk-taking is stronger within the EU, indicating that IFRS adoption and enforcement appear to act as complements to generate the effects we document. In particular, the coefficient on *IFRS_EU*POST* is more negative in the *ZSCORE* specification and more positive in the *NPLOANS* specification.

Next, to verify whether changes in enforcement alone are sufficient, we modify our control group to include only Japan. This is because Christensen et al. find that Japan (a non-adopter) made changes to enforcement around this period. Thus, by benchmarking our IFRS adopters against Japan, we control for changes in enforcement and allow only IFRS adoption to vary (see Jayaraman, 2012 for a similar design). The caveat here is that the impact of enforcement could differ between the EU and Japan and thus be not comparable. These results are presented in the next two specification of Panel E. The coefficient on *IFRS_EU*POST* remains negative and significant, although its economic significance drops slightly while the coefficient on *IFRS_NONEU*POST* is insignificant. Turning to the *NPLOANS* specification, both *IFRS_EU*POST* and *IFRS_NONEU*POST* are positive and significant. These results indicate that changes in enforcement alone are also insufficient to drive the observed effects around IFRS

adoption. We summarize these results as indicating that IFRS adoption and contemporaneous changes in enforcement appear to act as complements.

5.7 Borrower transparency and banking system fragility

We examine whether the effect of borrower transparency on bank risk-taking goes too far. Excessive risk-taking can have adverse effects such as bank runs and substantial costs to taxpayers of bailing out banks. Thus, bank regulators care about the circumstances that contribute to excessive bank risk-taking, which in turn causes instability in the banking sector. The effect of borrower transparency on bank fragility can go either way. For example, Hellman et al. (2000) argue that greater bank competition increases the probability of a banking crisis. In their model, the payoff of the risky asset in the bad state is insufficient to pay off depositors, thereby resulting in a bank failure. Similarly, Keeley (1990) states that increased competition is the cause for the higher occurrence of bank failures in the U.S. since the early 1980s.

While the above studies examine the effect of bank competition via deposit rates (i.e., the liabilities), studies that focus on the asset side reach an opposite conclusion. For example, Boyd and De Nicolo (2005) analytically derive the effects of bank competition on the asset side to conclude that competition fosters rather than hinders bank stability. Greater concentration in the lending market allows banks to charge higher interest rates, thereby making repayment more difficult. This in turn exacerbates borrowers' moral hazard incentives to shift into riskier projects, thereby increasing bank fragility. Increased competition in their model has the effect of lowering loan rates, thereby reducing these perverse incentives on the part of borrowers, and consequently reducing bank fragility (see also Berger et al., 2008). Similarly, Edwards and Mishkin (1995, pg. 27) reason that "declining profitability could tip the incentives of bank

managers toward assuming greater risk in an effort to maintain former profit levels", which suggests greater bank stability (see Carletti and Hartmann, 2003).

As noted in the Introduction, the lack of data on assets and liabilities of failed banks precludes us from examining the effect of IFRS adoption on bank failures (see Subramanian and Yadav, 2012 for a similar design in the U.S. setting). Instead, we use a cross-sectional, country-level design, following Barth et al. (2004) and examine whether borrower transparency is correlated with the likelihood a banking crisis. In particular, we use data on bank fragility from Barth, Caprio and Levine (2001, 2004). The bank fragility measure is based on a crisis indicator (*BNKCRISIS*) which denotes whether a country suffered a major banking crisis during the late 1980s or 1990s as per the data in Caprio and Klingebiel (1999).

We follow Bushman et al. (2004, pg. 207) and define borrower transparency (*CORPTRAN*) as the availability of firm-specific information to external market participants. We measure transparency based on a comprehensive set of country-level measures that encapsulate the financial reporting environment of industrial firms in the country (see Bushman et al. and Francis et al., 2009). The first is *CIFAR*, representing the average number of 90 accounting and non-accounting items disclosed by a sample of large companies in their annual reports created by the Center for International Financial Analysis and Research (CIFAR). The second is *GOVERN*, which captures the prevalence of specific governance related disclosures made by the firm. The third measure, *PRINCIPLE*, captures country-level differences in accounting principles that are used. The fourth measure is timeliness of financial reporting (*TIME*), which captures the frequency and comprehensiveness of interim reports. Our fifth measure, *AUDIT*, captures the credibility of financial reporting using CIFAR data on the share of Big 6 accounting firms of the total value audited in a country. *AUDIT* takes the values of 1-4 depending on the percentage share of Big 6 auditors (i.e., 0-25%, 25-50%, 50-75% and 75-100%).

We combine *CIFAR*, *GOVERN*, *PRINCIPLE*, *TIME* and *AUDIT* to form a composite measure (*CORPTRAN*) using principal component analysis. We retain the first component which has an eigenvalue of 2.719 and explains around 54% of the total variation. While the second component's eigenvalue (1.022) is marginally above the conventional cutoff of 1, we exclude it based on the scree test (Cattell, 1966). We label this first principal component as *CORPTRAN*.

In addition to our macroeconomic and financial development controls, we include *NONINT* to capture banks indulging in non-lending activities as Barth et al. (2004) show that this variable plays an important role in bank stability. Our specification is as follows:

$$\Pr(BNKCRISIS_i = 1) = \pi_0 + \pi_1 CORPTRAN_i + \pi_2 NONINT_{i,t} + \pi_3 GDP_{i,t} + \pi_4 GDPGROWTH_{i,t} + \pi_5 INFL_{i,t} + \pi_6 MKTCAP_{i,t} + \pi_7 TURNOVER_{i,t} + \pi_8 TRADE_{i,t} + \varepsilon_{i,t} \quad (3)$$

$\pi_1<0$ ($\pi_1>0$) indicates that borrower transparency correlates with bank stability (fragility).

Table 8 presents these results. As our variables are defined at the country level with some depicting intertemporal variation, we collapse our sample to a country-year panel. The coefficient on *CORPTRAN* is negative (-0.181) and significant (*z*-stat of -1.97) in Model 1, indicating that borrower transparency is associated with a less fragile banking sector.

One concern is that borrower transparency might be merely capturing the strength of country-level institutional features such as the extent of bank supervision. To assuage this concern, we decompose *CORPTRAN* into two orthogonal components – one which captures country-level institutional features and the other that captures borrower transparency. To do so, we regress *CORPTRAN* on several country-level features and label the predicted (residual) component as *CORPTRAN_INSTI* (*CORPTRAN_RESI*). The variables we use are cross-country differences in creditor rights (*CREDRIGHTS*) following LaPorta et al. (1998); private monitoring

(*PVTMON*), official supervisory powers (*OFFPOW*) following Barth et al. (2008). Following Djankov et al. (2007), we include heterogeneity in investor protection using the revised anti-director rights index (*INVPROT*), the extent to which self-dealing by insiders is prohibited (*ANTISELF*) and common law versus code law legal origin (*COMLAW*). Model 2 of Table 8 presents these results. We find that the coefficient on *CORPTRAN_RESI* remains negative (-0.274) and significant (*z*. stat of -2.74), but surprisingly that on *CORPTRAN_INSTI* is insignificant (z.stat of -0.04). To investigate this result further, we include the institutional variables directly into the specification in conjunction with *CORPTRAN* in Model 3. Not surprisingly, *CORPTRAN* remains negative and significant. In contrast, there is no consistent association between country-level institutional features and bank fragility. While some variables come in negative (*OFFPOW*, *CREDRIGHTS*, *COMLAW*), others come in positive (*PVTMON*, *INVPROT*, *ANTISELF*). This helps explain the insignificant coefficient on *CORPTRAN_INSTI* in Model 2.

In terms of economic significance, moving from the lower quartile of transparency (Israel: -0.604) to the upper-quartile (Norway: 0.874) reduces the likelihood of a banking crisis from 54% down to 40%. These results suggest that notwithstanding borrower transparency spurring banks' risk-taking behavior, it appears to correlate with a more stable banking sector.

Our results accord well with Subramanian and Yadav (2012) who use the deregulation of entry restrictions within the U.S. as an exogenous shock to bank competition and find that greater competition in the U.S. also increases bank stability. Further, consistent with our results and the theoretical prediction of Boyd and De Nicolo (2005), Subramanian and Yadav (2012) find that lower bank failures after deregulation are on account of lower interest rates charged by banks and also due to greater cost efficiency. A fuller examination of these channels is an interesting avenue for future work.

6 Conclusion

Using mandatory adoption of International Financial Reporting Standards (IFRS) as identifying variation in borrower transparency, we provide evidence of a (causal) link from transparency in the industrial sector to economic outcomes in the banking sector. Borrower transparency enables firms in a country to avail of financing from arm's-length financial markets. We posit and document that this induces greater competition between banks and these alternative financing sources. We then go on to examine how banks respond to these higher competitive pressures in their product markets.

We find that banks take on more risk and reduce costs in an effort to stay competitive in this environment. The increases in risk-taking seem to emanate both from lending as well as non-lending activities, with the relative importance of the latter being greater than that of the former. We also find that borrower transparency correlates with a banking sector that is less susceptible to banking crises. These results provide suggestive evidence that the actions taken by banks in response to borrower transparency do not compromise, but rather reinforce bank stability.

In addition to documenting real effects of borrower financial reporting on the banking sector, our study provides novel evidence of transmission mechanisms that emanate from the industrial sector and transmit to the banking sector. The policy implications of these findings are promising and a fruitful avenue for future research.

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Table 1: List of adopting and non-adopting countries

The list of IFRS adopters and non-adopters is from Daske et al. (2008, pg. 1100-1102). The adoption date of IFRS for Singapore is 2003 and for all other countries is 2005. The sample period comprises of the three years before and three years after the year of adoption (excluding the transition year).

IFRS adopters	**Obs.**		**Non-adopters**	**Obs.**
Australia	423		Argentina	370
Austria	1,471		Bermuda	61
Belgium	522		Brazil	928
Czech Republic	193		Canada	400
Denmark	713		Chile	190
Finland	142		China	532
France	2,885		Colombia	205
Germany	9,277		Egypt	200
Greece	200		India	549
Hong Kong	335		Indonesia	335
Hungary	230		Israel	135
Ireland	305		Japan	4,762
Italy	3,766		Korea	273
Luxembourg	647		Malaysia	550
Netherlands	438		Mexico	313
Norway	747		Morocco	117
Philippines	283		New Zealand	96
Poland	290		Pakistan	217
Portugal	302		Peru	162
Singapore	200		Russia	1,416
South Africa	201		Sri Lanka	128
Spain	1,259		Thailand	284
Sweden	576		Turkey	381
Switzerland	2,567			
United Kingdom	1,696			
Venezuela	132			
Total	**29,800**		**Total**	**12,604**

Table 2: Descriptive statistics

Panel A: Bank-level variables

The sample covers the period from 2000 to 2008 and comprises data for 11,462 unique banks across 49 countries (26 adopters and 23 non-adopters). *ROA* represents bank profitability (in percentage) and is defined as net income divided by total assets. *CAR* denotes the capital ratio (in percentage) and is defined as bank capital divided by total assets. *ROAVOL* represents *ROA* volatility and is defined as the standard deviation of five annual *ROA* observations. *ZSCORE* is the inverse measure of bank risk where lower values denote higher risk. It is computed as (the log of) return on assets plus the capital asset ratio divided by the standard deviation of asset returns. *NPLOANS* represents the percentage of non-performing loans to total loans. *EFFIC* represents the percentage of overhead costs to total revenues. *NONINT* is the ratio of non-interest income to total income. *GROWTH* represents annual growth in revenues and is denoted in percentage terms. *LNASSETS* is the log of total bank assets. *LIQUID* indicates the percentage of liquid assets to liquid liabilities. *LLP* stands for the percentage of loan loss provisions to total loans. *LISTED* is an indicator variable that denotes public banks. *MKTSHARE* denotes the market share of the country's deposits held by the bank and is expressed in percentage terms.

	Obs.	Mean	Median	Std. dev.	Min	Max
Bank-level:						
ROA (%)	42,404	0.840	0.460	1.532	-3.260	9.100
CAR (%)	42,404	10.031	6.908	10.512	0.972	70.890
ROAVOL	42,404	0.654	0.216	1.287	0.007	8.400
ZSCORE	42,404	3.665	3.670	1.265	0.618	6.808
NPLOANS (%)	18,823	5.472	3.390	6.197	0.030	35.300
EFFIC (%)	42,404	63.904	65.060	21.871	10.030	151.720
NONINT	42,233	0.236	0.199	0.239	-0.359	1.005
GROWTH (%)	42,404	0.507	-1.961	30.183	-86.990	169.333
LNASSETS	42,404	7.638	7.308	1.885	4.793	13.083
LIQUID (%)	42,404	32.709	20.290	39.608	0.470	272.190
LLP (%)	42,404	11.868	11.630	29.063	-44.000	141.180
LISTED	42,404	0.161	0.000	0.367	0.000	1.000
MKTSHARE (%)	42,404	0.506	0.020	1.629	0.000	11.251

Panel B: Country-level variables

The sample covers the period from 2000 to 2008 and comprises data for 11,462 unique banks across 49 countries (26 adopters and 23 non-adopters). *BNKDEV* denotes bank development and is measured as the percentage of bank credit to the private sector to GDP. *GDP* represents the log of Gross Domestic Product. *GDPGROWTH* and *INFL* represent the annual GDP growth and inflation respectively, both expressed in percentage terms. *MKTCAP*, *TURNOVER* and *TRADE* denote the percentages of market cap of listed firms, turnover of listed firms and total of exports and imports respectively to GDP.

	Obs.	Mean	Median	Std. dev.	Min	Max
Country-level:						
GDP	42,404	6.647	7.039	1.266	3.175	8.557
GDPGROWTH (%)	42,404	1.991	1.736	2.297	-2.077	9.040
INFL (%)	42,404	3.069	2.061	4.042	-1.598	19.068
MKTCAP (%)	42,404	78.861	59.347	61.029	14.603	309.919
TURNOVER (%)	42,404	112.593	119.634	55.812	0.835	269.822
TRADE (%)	42,404	59.772	54.842	36.891	19.241	271.093

Table 3: Effect of IFRS adoption on bank competition

The dependent variable in the first (next) two specifications is the percentage of foreign portfolio inflows of equity (debt) to GDP. *IFRS* is an indicator variable that denotes IFRS adopters vs. non-adopters. *POST* indicates the pre vs. post adoption periods, defined as the three years around IFRS adoption, excluding the year of adoption. *GDP* represents log GDP. *GDPGROWTH* and *INFL* represent the annual GDP growth and annual inflation respectively. *MKTCAP*, *TURNOVER* and *TRADE* denote the logs of the ratios of market cap of listed firms, annual turnover of listed firms and total of exports and imports respectively, each divided by GDP. All regressions include year and country fixed effects.

	ASSETCONC				*INTMARGIN*			
	Model 1		Model 2		Model 3		Model 4	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
IFRS*POST	**-4.547**	**-2.69**	**-6.493**	**-3.93**	**-0.404**	**-3.82**	**-0.344**	**-2.45**
GDP			-15.032	-1.54			0.557	0.58
GDPGROWTH			34.421	1.03			1.199	0.36
INFL			-18.813	-0.82			3.161	2.37
MKTCAP			4.714	1.44			0.097	0.17
TURNOVER			9.855	2.13			-0.071	-0.25
TRADE			24.914	1.26			0.592	0.92
Year effects	Yes		Yes		Yes		Yes	
Country effects	Yes		Yes		Yes		Yes	
Adj. R^2	0.85		0.86		0.91		0.91	
Obs.	285		285		292		292	

Table 4: Effect of IFRS adoption on bank risk-taking and cost efficiency

The dependent variable in the first specification is bank risk-taking (*ZSCORE*). The dependent variable in the second specification is *NPLOANS* which represents the percentage of non-performing loans to total loans. The dependent variable in the third specification is *EFFIC* which represents the ratio of overhead costs to revenues. *IFRS* is an indicator variable that denotes IFRS adopters vs. non-adopters. *POST* indicates the pre vs. post adoption periods, defined as the three years around IFRS adoption, excluding the year of adoption. *GROWTH* represents annual growth in revenues. *LNASSETS* is the log of total assets. *LIQUID* indicates the ratio of liquid assets to liquid liabilities. *LLP* stands for the ratio of loan loss provisions to total loans. *LISTED* is an indicator variable that denotes public banks. *MKTSHARE* denotes the market share of the country's deposits. *GDP* represents log GDP. *GDPGROWTH* and *INFL* represent the annual GDP growth and annual inflation respectively. *MKTCAP*, *TURNOVER* and *TRADE* denote the logs of the ratios of market cap of listed firms, annual turnover of listed firms and total of exports and imports respectively, each divided by GDP. All regressions include year and country fixed effects and robust standard errors clustered by country annually.

	Pred. signs	Risk-taking				Cost efficiency	
		ZSCORE (Model 1)		*NPLOANS* (Model 2)		*EFFIC* (Model 3)	
		Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
IFRS*POST	– ,+, –	**-0.143**	**-2.04**	**2.547**	**4.90**	**-0.037**	**-2.51**
GROWTH	–,+,?	0.134	3.72	0.451	1.59	-0.076	-5.21
LNASSETS	–,+,–	-0.033	-4.08	-0.681	-8.57	-0.041	-14.36
LIQUID	–,+,+	-0.004	-11.11	0.021	7.51	0.000	-1.38
LLP	–,+,?	-0.004	-4.26	0.043	9.34	0.001	3.79
LISTED	?	0.030	0.98	-0.305	-1.90	0.023	1.70
MKTSHARE	+,–,+	0.594	1.09	14.157	2.86	1.549	7.43
GDP	?	0.902	2.11	-18.867	-6.51	-0.184	-1.56
GDPGROWTH	?	-3.219	-2.35	-6.022	-0.52	0.903	2.24
INFL	?	0.150	0.16	-10.611	-1.99	0.157	0.76
MKTCAP	?	-0.113	-0.62	0.271	0.13	-0.096	-1.41
TURNOVER	?	-0.185	-1.04	-1.857	-1.44	-0.050	-0.95
TRADE	?	1.671	3.94	-0.828	-0.15	-0.336	-2.40
Year effects		Yes		Yes		Yes	
Country effects		Yes		Yes		Yes	
Adj. R^2		0.22		0.37		0.17	
Obs.		42,404		18,823		42,404	

Table 5: Role of lending vs. non-lending activities

The dependent variable in the first two specifications is *ZSCORE*, while that in the next two specifications is *NPLOANS*. Δ*NONINT*>0 (Δ*NONINT*<=0) denotes banks with more (less or equal) non-interest income in the post period than the pre. *IFRS* is an indicator variable that denotes IFRS adopters vs. non-adopters. *POST* indicates the pre vs. post adoption periods. *GROWTH* represents annual growth in revenues. *LNASSETS* is the log of total assets. *LIQUID* indicates the ratio of liquid assets to liquid liabilities. *LLP* stands for the ratio of loan loss provisions to total loans. *LISTED* denotes public banks. *MKTSHARE* denotes the market share of the country's deposits. *GDP* represents log GDP. *GDPGROWTH* and *INFL* represent the annual GDP growth and annual inflation respectively. *MKTCAP*, *TURNOVER* and *TRADE* denote the logs of the ratios of market cap of listed firms, annual turnover of listed firms and total of exports and imports respectively, each divided by GDP. All regressions include year and country fixed effects and robust standard errors clustered by country annually.

	Pred. signs	*ZSCORE*				*NPLOANS*			
		Δ*NONINT*>0 (Model 1)		Δ*NONINT*<=0 (Model 2)		Δ*NONINT*>0 (Model 3)		Δ*NONINT*<=0 (Model 4)	
		Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
IFRS*POST	– ,+	**-0.291**	**-3.49**	**-0.166**	**-3.23**	**1.646**	**5.27**	**1.467**	**2.98**
GROWTH	–,+	0.100	1.45	0.124	2.55	-0.139	-0.23	0.583	1.23
LNASSETS	–,+	-0.012	-0.89	-0.046	-3.42	-0.770	-6.81	-0.770	-8.00
LIQUID	–,+	-0.006	-9.57	-0.002	-7.24	0.022	4.88	0.024	5.01
LLP	–,+	-0.006	-4.06	-0.002	-2.86	0.049	8.99	0.045	5.78
LISTED	?	-0.012	-0.21	0.007	0.17	-0.880	-6.41	-0.083	-0.37
MKTSHARE	+,–	-1.910	-1.53	0.032	0.04	36.607	4.18	20.261	3.35
GDP	?	-0.592	-1.38	-0.010	-0.03	-14.171	-4.84	-9.609	-2.04
GDPGROWTH	?	0.892	0.45	-4.113	-3.19	4.314	0.41	-17.080	-1.30
INFL	?	0.479	0.49	0.304	0.31	0.569	0.10	-9.466	-1.62
MKTCAP	?	-0.364	-1.92	-0.279	-1.95	5.104	2.49	6.548	2.35
TURNOVER	?	-0.302	-1.68	-0.598	-3.13	-1.321	-0.80	0.207	0.12
TRADE	?	1.903	3.61	1.215	2.40	-7.505	-1.51	-10.782	-1.81
p. value of diff in *IFRS*POST*		0.071				0.661			
Year effects		Yes		Yes		Yes		Yes	
Country effects		Yes		Yes		Yes		Yes	
Adj. R^2		0.28		0.15		0.41		0.37	
Obs.		17,051		9,869		5,932		4,724	

Table 6: Cross-sectional variation: Bank entry restrictions

The dependent variables in the three models are *ZSCORE* (risk-taking), *NPLOANS* (non-performing loans) and *EFFIC* (cost efficiency). *IFRS_HI_REST* (*IFRS_LO_REST*) denotes IFRS adopting countries with higher (fewer) entry restrictions into the banking sector. *POST* indicates the pre vs. post adoption periods, defined as the three years around IFRS adoption, excluding the year of adoption. All other variables are as defined in Table 4. All regressions include year and country fixed effects and robust standard errors clustered by country annually.

	Pred. signs	Risk-taking				Cost efficiency	
		ZSCORE		*NPLOANS*		*EFFIC*	
		Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
IFRS_HI_REST*POST	– ,+, –	**-0.208**	**-2.79**	**3.633**	**6.97**	**-0.059**	**-3.75**
IFRS_LO_REST*POST	– ,+, –	**-0.098**	**-1.35**	**-0.988**	**-1.52**	**-0.012**	**-0.65**
GROWTH	–,+,?	0.132	3.51	0.324	1.13	-0.072	-4.70
LNASSETS	–,+,–	-0.031	-3.76	-0.682	-8.40	-0.038	-13.47
LIQUID	–,+,+	-0.004	-11.22	0.021	7.25	0.000	-1.34
LLP	–,+,?	-0.004	-4.04	0.041	8.56	0.001	3.61
LISTED	?	0.029	0.91	-0.357	-2.14	0.018	1.26
MKTSHARE	+,–,+	0.441	0.78	15.065	2.97	1.614	7.41
GDP	?	0.836	1.87	-18.061	-6.83	-0.158	-1.30
GDPGROWTH	?	-3.609	-2.57	-8.235	-0.73	0.856	2.00
INFL	?	0.498	0.54	-12.205	-2.03	0.078	0.34
MKTCAP	?	-0.163	-0.89	1.194	0.60	-0.101	-1.37
TURNOVER	?	-0.244	-1.26	-1.057	-0.96	-0.070	-1.42
TRADE	?	1.635	3.77	-6.815	-1.38	-0.423	-3.04
p. value of diff.		0.019		0.000		0.002	
Year effects		Yes		Yes		Yes	
Country effects		Yes		Yes		Yes	
Adj. R^2		0.22		0.37		0.17	
Obs.		40,192		17,736		40,192	

Table 7: Ruling out alternative explanations

Panel A: Bank adoption of IFRS: Restricting the sample to private banks

The sample is restricted to private banks (i.e., those not publicly listed). The dependent variable in Models 1 and 2 is *ZSCORE*, the inverse measure of bank risk while that in Models 3 and 4 is NPLOANS, the proportion of non-performing loans to total loans. *IFRS* is an indicator variable that denotes IFRS adopters vs. non-adopters. *POST* indicates the pre vs. post adoption periods, defined as the three years around IFRS adoption, excluding the year of adoption. *ACCTSTD* is an indicator variable that denotes whether the private bank reports under Local GAAP or under IFRS. *GROWTH* represents annual growth in revenues. *LNASSETS* is the log of total assets. *LIQUID* indicates the ratio of liquid assets to liquid liabilities. *LLP* stands for the ratio of loan loss provisions to total loans. *MKTSHARE* denotes the market share of the country's deposits. *GDP* represents log GDP. *GDPGROWTH* and *INFL* represent the annual GDP growth and annual inflation respectively. *MKTCAP*, *TURNOVER* and *TRADE* denote the logs of the ratios of market cap of listed firms, annual turnover of listed firms and total of exports and imports respectively, each divided by GDP. All regressions include year and country fixed effects and robust standard errors clustered by country annually.

	ZSCORE				*NPLOANS*			
	Model 1		Model 2		Model 3		Model 4	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
IFRS*POST	**-0.127**	**-2.02**	**-0.148**	**-2.18**	**2.982**	**6.09**	**2.207**	**5.24**
ACCTSTD			**0.062**	**0.89**			**1.308**	**2.85**
GROWTH	0.139	3.92	0.139	3.91	0.451	1.47	0.440	1.44
LNASSETS	-0.034	-4.12	-0.035	-4.56	-0.705	-8.60	-0.733	-9.22
LIQUID	-0.004	-10.40	-0.004	-10.38	0.018	6.37	0.018	6.26
LLP	-0.004	-3.96	-0.004	-3.97	0.042	8.14	0.042	8.12
MKTSHARE	-0.987	-1.36	-0.996	-1.37	13.365	2.48	12.850	2.42
GDP	0.718	1.73	0.726	1.70	-20.525	-6.27	-19.113	-5.69
GDPGROWTH	-2.252	-1.59	-1.925	-1.34	0.039	0.00	1.823	0.14
INFL	0.958	1.00	1.052	1.08	-15.329	-2.65	-13.416	-2.31
MKTCAP	-0.114	-0.59	-0.087	-0.44	-0.328	-0.15	0.221	0.11
TURNOVER	-0.181	-1.07	-0.172	-0.97	-1.923	-1.48	-1.699	-1.44
TRADE	1.580	3.68	1.665	3.92	-2.481	-0.47	-1.659	-0.31
Year effects	Yes		Yes		Yes		Yes	
Country effects	Yes		Yes		Yes		Yes	
Adj. R^2	0.22		0.22		0.37		0.38	
Obs.	35,587		35,587		14,198		14,198	

Panel B: Addressing endogeneity of IFRS adoption

Panel B1: Dynamic effects around IFRS adoption

The dependent variables in the three specifications are *ZSCORE, NPLOANS* and *EFFIC* (cost efficiency) respectively. *IFRS* is an indicator variable that denotes IFRS adopters vs. non-adopters. $POST_{-2}$ denotes two years prior to the date of IFRS adoption while $POST_{-1}$ denotes the year prior to adoption. Similarly, $POST_{1}$ represents the first year after IFRS adoption, while $POST_{2+}$ indicates years two and later relative to the year of adoption. *GROWTH* represents annual growth in revenues. *LNASSETS* is the log of total assets. *LIQUID* indicates the ratio of liquid assets to liquid liabilities. *LLP* stands for the ratio of loan loss provisions to total loans. *LISTED* is an indicator variable that denotes public banks. *MKTSHARE* denotes the market share of the country's deposits. *GDP* represents log GDP. *GDPGROWTH* and *INFL* represent the annual GDP growth and annual inflation respectively. *MKTCAP*, *TURNOVER* and *TRADE* denote the logs of the ratios of market cap of listed firms, annual turnover of listed firms and total of exports and imports respectively, each divided by GDP. All regressions include year and country fixed effects and robust standard errors clustered by country annually.

	Risk-taking				Cost efficiency	
	ZSCORE		*NPLOANS*		*EFFIC*	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
IFRS*POST$_{-2}$	**-0.008**	**-0.10**	**0.310**	**0.33**	**0.003**	**0.13**
IFRS*POST$_{-1}$	**-0.060**	**-0.78**	**0.946**	**0.90**	**-0.022**	**-0.86**
IFRS*POST$_{1}$	**0.015**	**0.18**	**3.102**	**3.78**	**-0.047**	**-2.07**
IFRS*POST$_{2+}$	**-0.282**	**-2.89**	**3.010**	**3.77**	**-0.043**	**-1.83**
GROWTH	0.128	3.55	0.444	1.60	-0.076	-5.24
LNASSETS	-0.033	-4.08	-0.682	-8.60	-0.041	-14.36
LIQUID	-0.004	-11.08	0.021	7.51	0.000	-1.37
LLP	-0.004	-4.28	0.043	9.35	0.001	3.80
LISTED	0.029	0.97	-0.302	-1.87	0.023	1.70
MKTSHARE	0.592	1.09	14.390	2.91	1.549	7.43
GDP	0.731	1.82	-18.631	-6.48	-0.195	-1.60
GDPGROWTH	-3.483	-2.58	-4.565	-0.42	0.902	2.33
INFL	0.037	0.04	-10.218	-1.97	0.140	0.68
MKTCAP	-0.174	-0.96	0.392	0.19	-0.098	-1.45
TURNOVER	-0.172	-1.07	-1.799	-1.38	-0.054	-0.98
TRADE	1.625	3.98	0.044	0.01	-0.348	-2.48
Year effects	Yes		Yes		Yes	
Country effects	Yes		Yes		Yes	
Adj. R^2	0.22		0.37		0.17	
Obs.	42,404		18,823		42,404	

Panel B2: Including country-year fixed effects

The dependent variables in the three specifications are *ZSCORE, NPLOANS* and *EFFIC* (cost efficiency) respectively. *IFRS* is an indicator variable that denotes IFRS adopters vs. non-adopters. *POST-2* denotes two years prior to the date of IFRS adoption while *POST-1* denotes the year prior to adoption. Similarly, $POST_1$ represents the first year after IFRS adoption, while $POST_{2+}$ indicates years two and later relative to the year of adoption. *GROWTH* represents annual growth in revenues. *LNASSETS* is the log of total assets. *LIQUID* indicates the ratio of liquid assets to liquid liabilities. *LLP* stands for the ratio of loan loss provisions to total loans. *LISTED* is an indicator variable that denotes public banks. *MKTSHARE* denotes the market share of the country's deposits. *GDP* represents log GDP. *GDPGROWTH* and *INFL* represent the annual GDP growth and annual inflation respectively. *MKTCAP*, *TURNOVER* and *TRADE* denote the logs of the ratios of market cap of listed firms, annual turnover of listed firms and total of exports and imports respectively, each divided by GDP. All regressions include year and country fixed effects and robust standard errors clustered by country annually.

	Risk-taking				Cost efficiency	
	ZSCORE		*NPLOANS*		*EFFIC*	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
NONINT_INCR	–	–	–	–	–	–
IFRS*POST	**–**	**–**	**–**	**–**	**–**	**–**
*NONINT_INCR*POST*	0.102	1.62	-0.759	-2.19	-0.003	-0.16
NONINT_INCR*IFRS*POST	**-0.119**	**-2.64**	**0.436**	**1.16**	**0.020**	**1.40**
Controls	Yes		Yes		Yes	
*NONINT_INCR*Controls	Yes		Yes		Yes	
Year effects	No		No		No	
Country effects	No		No		No	
Country-year effects	Yes		Yes		Yes	
Bank effects	Yes		Yes		Yes	
Adj. R^2	0.72		0.80		0.69	
Obs.	26,920		10,656		26,920	

Panel C: Public versus private firms

This panel uses a subset of German banks with data on listing status of their syndicated loan borrowers on Dealscan. The dependent variables in Models 1-3 is *ZSCORE* while that in Model 4 is *EFFIC*. *POST* is an indicator variable that denotes the post-IFRS adoption period. The *POST* indicator is split into two indicators – *POST_PVT* and *POST_PUB* that denote the post-IFRS adoption period for banks with above median lending concentration in private firms and public firms respectively. *GROWTH* represents annual growth in revenues. *LNASSETS* is the log of total assets. *LIQUID* indicates the ratio of liquid assets to liquid liabilities. *LLP* stands for the ratio of loan loss provisions to total loans. *MKTSHARE* denotes the market share of the country's deposits.

	ZSCORE						*EFFIC*	
	Model 1		Model 2		Model 3		Model 4	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
POST	**-0.108**	**-0.49**						
POST_PVT			**0.179**	**0.90**	**0.157**	**0.99**	**-0.013**	**-1.45**
POST_PUB			**-0.568**	**-2.29**	**-0.591**	**-2.12**	**-0.037**	**-0.78**
GROWTH	0.848	2.68	0.907	3.05	0.659	3.45	-0.267	-5.25
LNASSETS	-0.036	-0.72	-0.020	-0.44	0.531	2.40	-0.055	-1.51
LIQUID	-0.011	-4.22	-0.008	-3.79	0.003	1.37	0.000	0.46
LLP	0.002	0.31	0.000	-0.05	-0.009	-1.79	-0.001	-2.44
MKTSHARE	-44.392	-4.27	-40.252	-6.25	-21.640	-1.31	-20.970	-1.89
p. value of diff.								
Year effects	No		No		No		No	
Bank effects	No		No		Yes		Yes	
Adj. R^2	0.25		0.28		0.77		0.70	
Obs.	252		252		252		252	

Panel D: Are the results driven by the recent crisis?

The first panel presents factors that contributed to banks' poor performance in the crisis. *LEV* denotes bank leverage, while *DEPOSITS* indicates the proportion of deposits to total assets. *TIER1* indicates the tier 1 capital ratio, while *FUND_FRAG* denotes funding fragility, defined as the ratio of money market funding and inter-bank deposits to total funding. The values tabulated are for the pre-period (i.e., 2006). The second panel presents results of our primary specification as in Table 4 but is restricted to countries with high restrictions on bank activities, as defined by Barth et al. (2001). All regressions include year and country fixed effects and robust standard errors clustered by country annually.

Differences in contributing factors:

	LEV		*DEPOSITS*		*TIER1*		*FUND_FRAG*	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
IFRS = 1	88.606	91.791	67.239	74.331	14.608	10.761	38.024	31.532
IFRS = 0	86.954	90.698	64.807	72.651	16.174	12.972	31.876	26.933
p. value of difference	0.159	0.262	0.469	0.857	0.342	0.405	0.222	0.325

Restricting the sample to countries with high restrictions on bank activities:

	ZSCORE		*NPLOANS*	
	Coeff.	*t*-stat	Coeff.	*t*-stat
IFRS*POST	**-0.215**	**-2.61**	**3.683**	**6.24**
GROWTH	0.103	2.15	0.580	2.02
LNASSETS	-0.026	-2.85	-0.759	-8.38
LIQUID	-0.002	-6.03	0.024	6.16
LLP	-0.006	-5.49	0.049	9.49
LISTED	0.084	2.63	-0.551	-3.42
MKTSHARE	1.376	2.04	22.423	3.67
GDP	0.969	2.09	-15.981	-6.49
GDPGROWTH	-4.793	-2.74	2.844	0.32
INFL	-0.768	-0.71	-7.663	-1.25
MKTCAP	-0.409	-1.62	-0.600	-0.36
TURNOVER	-0.099	-0.41	-1.182	-1.02
TRADE	1.297	2.16	-14.168	-2.16
Year effects	Yes		Yes	
Country effects	Yes		Yes	
Adj. R^2	0.16		0.35	
Obs.	19,180		13,525	

Panel E: Are the results due to changes in enforcement?

The dependent variable in the first and third specification is *ZSCORE*, while that in the second and fourth is *NPLOANS*. *IFRS_EU* (*IFRS_NONEU*) denotes IFRS adopting countries that are within (outside) the European Union. *POST* indicates the pre vs. post adoption periods. All other variable are as defined in Table 4. All regressions include year and country fixed effects and robust standard errors clustered by country annually.

	All countries				Japan as the control group			
	ZSCORE		*NPLOANS*		*ZSCORE*		*NPLOANS*	
	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat	Coeff.	*t*-stat
IFRS_EU*POST	**-0.190**	**-2.61**	**3.453**	**5.86**	**-0.175**	**-1.83**	**2.939**	**5.27**
IFRS_NONEU*POST	**-0.025**	**-0.26**	**1.715**	**4.78**	**-0.002**	**-0.01**	**2.775**	**6.82**
GROWTH	0.134	3.71	0.422	1.51	0.141	2.86	0.652	2.04
LNASSETS	-0.032	-4.04	-0.683	-8.64	-0.026	-3.02	-0.777	-9.16
LIQUID	-0.004	-11.14	0.021	7.60	-0.005	-12.13	0.026	8.36
LLP	-0.004	-4.23	0.043	9.25	-0.004	-3.82	0.048	9.95
LISTED	0.030	0.99	-0.299	-1.86	-0.008	-0.18	-0.352	-1.72
MKTSHARE	0.570	1.05	14.596	2.98	0.130	0.19	14.748	2.66
GDP	0.760	1.73	-16.871	-6.07	1.133	2.15	-34.971	-6.45
GDPGROWTH	-3.266	-2.40	-3.241	-0.29	-2.755	-1.54	14.361	1.03
INFL	-0.203	-0.22	-7.561	-1.47	-2.692	-1.32	-19.423	-2.44
MKTCAP	-0.143	-0.79	0.814	0.43	0.335	1.08	-7.021	-3.69
TURNOVER	-0.190	-1.10	-1.654	-1.47	0.015	0.10	-2.060	-1.93
TRADE	1.742	4.06	-2.026	-0.41	2.335	4.23	-1.814	-0.32
Year effects	Yes		Yes		Yes		Yes	
Country effects	Yes		Yes		Yes		Yes	
Adj. R^2	0.22		0.37		0.17		0.44	
Obs.	42,404		18,823		34,562		13,077	

Table 8: Association between borrower transparency and bank fragility

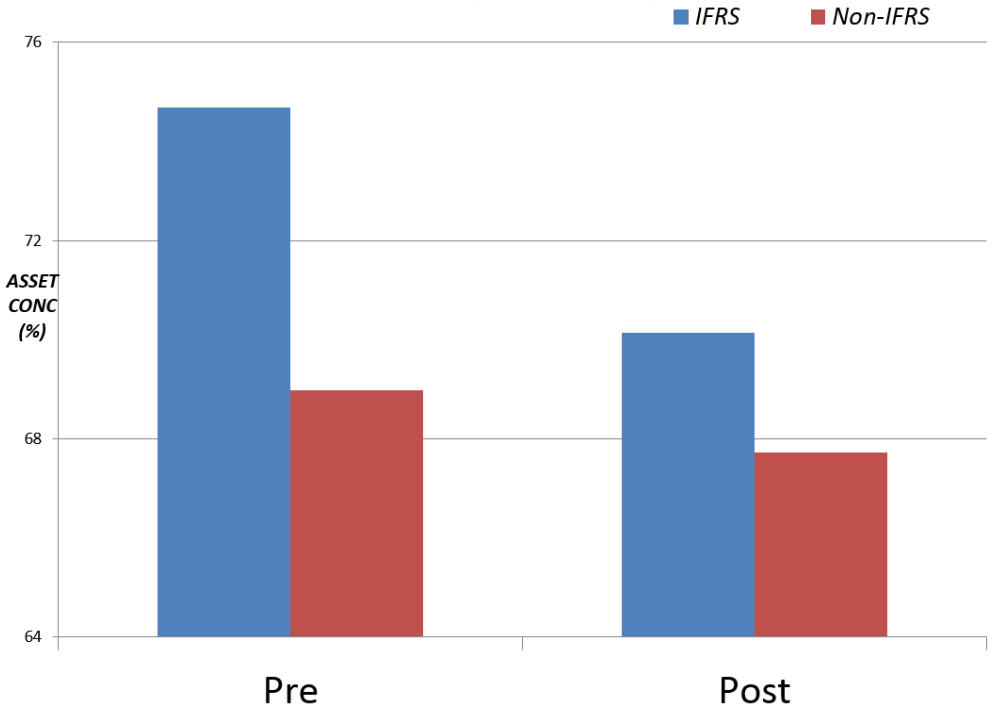
The dependent variable is *BNKCRISIS* which is an indicator variable that denotes whether or not the country had a banking crisis during the late 1980s and 1990s. *CORPTRAN* captures the country-level measure of corporate transparency. *NONINT* indicates the ratio of non-interest income to total income. *CREDRIGHTS* denotes country-level creditor rights as defined by LaPorta et al. (1998). *GDP* represents log GDP. *GDPGROWTH* and *INFL* represent the annual GDP growth and annual inflation respectively. *MKTCAP*, *TURNOVER* and *TRADE* denote the logs of the ratios of market cap of listed firms, annual turnover of listed firms and total of exports and imports respectively, each divided by GDP. All regressions include year and legal origin fixed effects and robust standard errors.

	Pr (*BNKCRISIS*=1)					
	Model 1		Model 2		Model 3	
	Coeff.	*z*-stat	Coeff.	*z*-stat	Coeff.	*z*-stat
CORPTRAN	**-0.181**	**-1.97**			**-0.318**	**-3.19**
CORPTRAN_INSTI			**-0.005**	**-0.04**		
CORPTRAN_RESI			**-0.274**	**-2.74**		
PVTMON					0.068	0.99
OFFPOW					-0.086	-2.94
CREDRIGHTS					-0.401	-4.91
INVPROT					0.079	1.07
ANTISELF					2.478	3.99
COMLAW					-1.361	-5.16
NONINT	-2.116	-3.66	-1.683	-2.77	-2.299	-3.44
GDP	0.125	1.83	0.170	2.45	0.128	1.83
GDPGROWTH	9.088	3.00	9.285	3.01	9.084	2.60
INFL	5.152	5.08	5.021	4.58	4.782	4.28
MKTCAP	-0.213	-0.65	-0.302	-0.87	-0.207	-0.58
TURNOVER	-0.120	-0.40	-0.149	-0.48	0.259	0.78
TRADE	-0.584	-1.76	-0.515	-1.58	-0.484	-1.20
Year effects	Yes		Yes		Yes	
Pseudo R^2	0.13		0.12		0.21	
Obs.	462		451		451	

Figure 1: IFRS adoption and bank competition

The horizontal axis indicates the pre and post IFRS adoption periods. The vertical axis in Panel A plots bank asset concentration (*ASSETCONC*) defined as the percentage of banking sector assets held by the five largest banks in the country; while that in Panel B plots the net interest margin (*INTMARGIN*) defined as the excess of interest income over interest expense scaled by total assets.

Panel A: Bank asset concentration (*ASSETCONC*)



Panel B: Net interest margin (*INTMARGIN*)

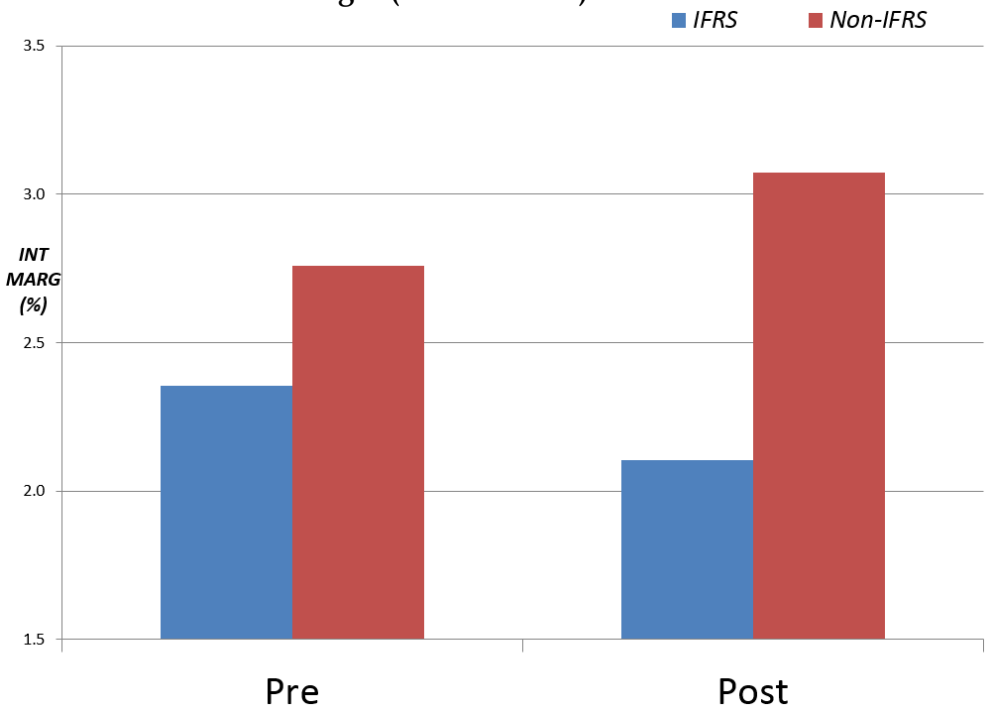
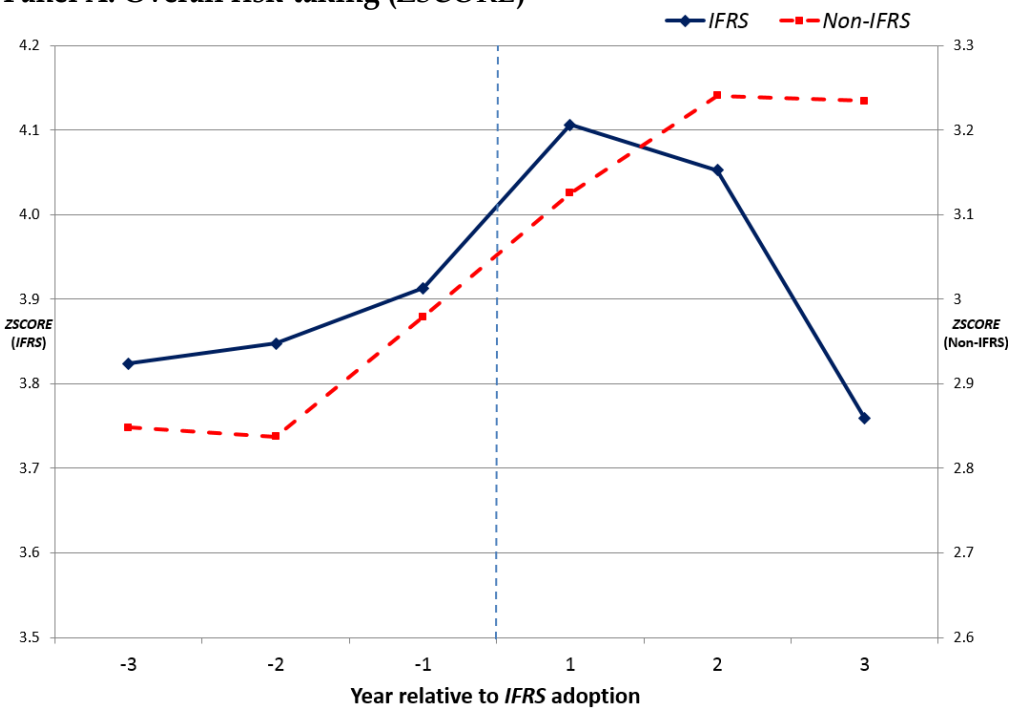
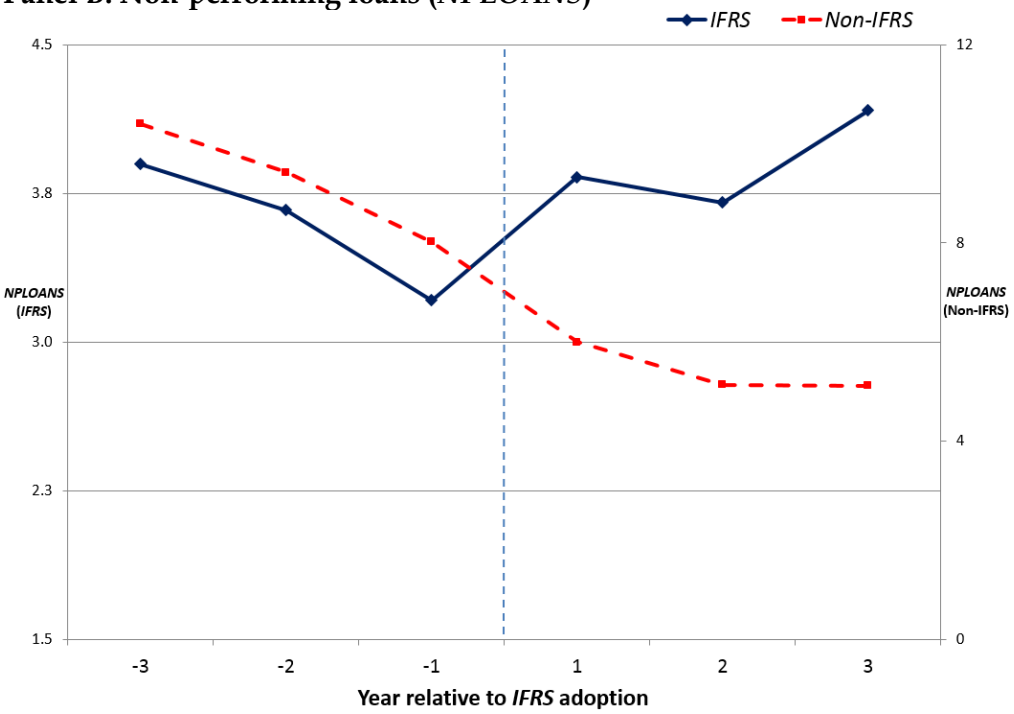


Figure 2: Univariate graphs for bank risk-taking and cost efficiency around IFRS adoption

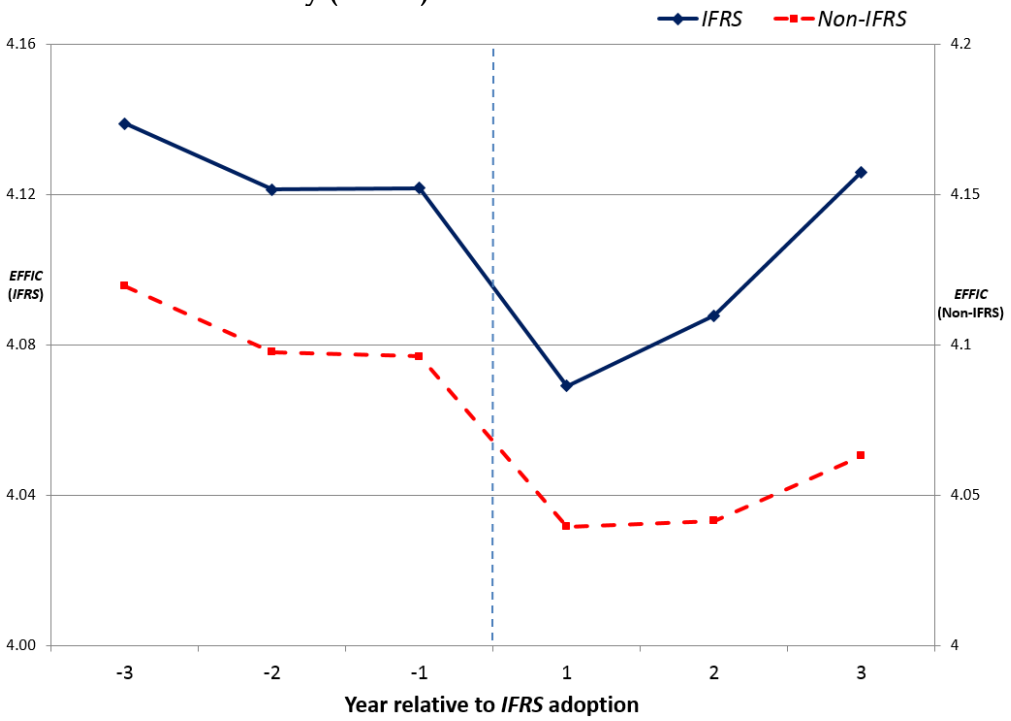
Panel A: Overall risk-taking (*ZSCORE*)



Panel B: Non-performing loans (*NPLOANS*)



Panel C: Cost efficiency (*EFFIC*)



Panel D: Residual cost efficiency (*EFFIC_RESI*)

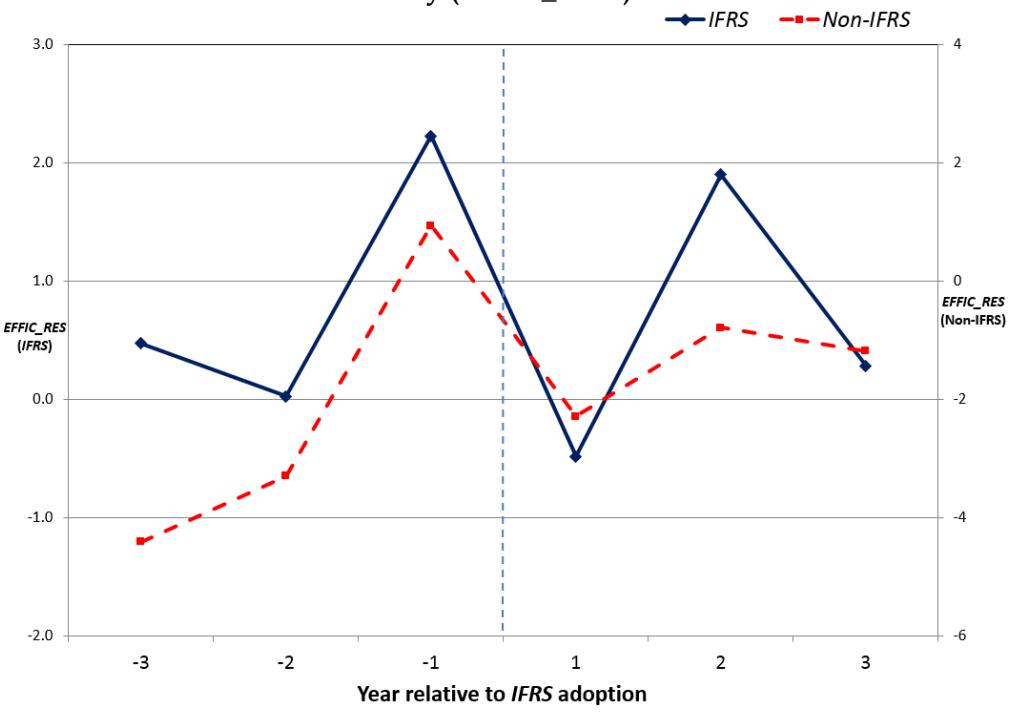


Figure 3: Differences in crisis-related factors between IFRS adopters and non-adopters

The horizontal axis presents factors that contributed to banks' poor performance in the crisis differentiated between IFRS adopters and non-adopters. *LEV* denotes bank leverage, while *DEPOSITS* indicates the proportion of deposits to total assets. *TIER1* indicates the tier 1 capital ratio, while *FUND_FRAG* denotes funding fragility, defined as the ratio of money market funding and inter-bank deposits to total funding. The values tabulated are for the pre-crisis period (i.e., 2006).