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The Effect of Corporate Taxation on Bank Transparency: Evidence from Loan Loss Provisions☆

Kathleen Andries[a], John Gallemore[b*], Martin Jacob[a]
[a]WHU – Otto Beisheim School of Management
[b]University of Chicago

kathleen.andries@whu.edu
john.gallemore@chicagobooth.edu
martin.jacob@whu.edu

[*]Corresponding author.

Abstract
We examine how the corporate tax system, through its treatment of loan losses, affects bank financial reporting. Exploiting cross-country and intertemporal variation in income tax rates and loan loss provision deductibility, we find that loan loss provisions are increasing in the tax rate for countries that permit general provision tax deductibility. When general provisions are deductible, a 1 percentage point rate increase leads to a provision increase of 4.9% of the sample average. This effect is driven by the tax system's encouragement of timelier loan loss recognition, suggesting that corporate taxation is an important determinant of bank financial reporting transparency.

JEL Classification Codes: G21, G28, H25, M41

Keywords: bank transparency, bank regulation, loan loss provisions, corporate taxation

1. Introduction

The role of the corporate tax system in the stability of the financial sector has received considerable attention in the wake of the 2007–09 financial crisis (Slemrod 2009; Shackelford, Shaviro, and Slemrod 2010; Shaviro 2011; Admati, DeMarzo, Hellwig, and Pfleiderer 2013). For the most part, academics and policymakers have focused on the potential negative effects of taxation on banks. For example, some have explored whether the tax-favored status of debt financing encourages banks to become excessively levered and the corresponding effect on financial crises (Keen and de Mooij 2012; Admati et al. 2013; de Mooij, Keen, and Orihara 2013; Schepens 2016). Whether the tax system has other effects on banks, including beneficial ones, is not clear.

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In this study, we investigate the effect of the corporate tax system on bank financial reporting choices. Specifically, we examine whether loan loss provisioning behavior and timely loan loss recognition are affected by tax incentives. In recent years, regulatory agencies and policymakers have contemplated increasing the tax deductibility of loan loss provisions because doing so may encourage timely loan loss recognition. For example, an IMF Staff Note suggested that "[u]nfavorable tax treatment can create disincentives for adequate provisioning" (International Monetary Fund 2015).[1] However, empirical evidence as to whether the corporate tax system affects provisioning is scarce.

Understanding whether tax incentives affect loan loss provisioning is critical because the loan loss provision is the most important and discretionary bank financial reporting choice (Ryan 2011; Beatty and Liao 2014), and one that conveys important news to investors (Grammatikos and Saunders 1990; Docking, Hirschey, and Jones 1997). Prior research has shown that provisioning and timely loan loss recognition can affect the length of economic downturns (Laeven and Majnoni 2003), lending (Beatty and Liao 2011), the monitoring and discipline of risk-taking (Bushman and Williams 2012), systemic risk (Bushman and Williams 2015), and regulatory oversight (Gallemore 2016). During the 2007-09 financial crisis, insufficient loan loss reserves may have contributed to bank instability (Balla and Rose 2015) and banks exploited provisioning discretion to boost earnings (Huizinga and Laeven 2012).

We focus on two aspects of the corporate income tax system that jointly can affect loan loss provisions: the corporate income tax rate and the tax deductibility of loan loss provisions.[2] While most countries require banks to recognize loan loss provisions for financial accounting purposes, the tax treatment of these provisions varies widely. Some countries allow banks to deduct general provisions (provisions for existing loans that have not yet been specifically identified as impaired) for tax purposes, whereas others only allow the deduction of provisions either for specifically identified impaired loans or

[1] Other recent examples include a IMF Staff Note on Poland (International Monetary Fund 2013), a European Parliament Staff note (European Parliament 2016), a Bank of England working paper (Bholat, Lastra, Markose, Miglionico, and Sen 2016), and a Bank of Italy working paper (De Vincenzo and Ricotti 2014).

[2] We use the term "corporate tax system" in this study to jointly reference both aspects.

not at all.[3] The value of the tax deduction depends on the corporate income tax rate. Of course, higher provisions can be costly to bank managers if regulatory scrutiny increases as a result of lower capital ratios, or if compensation decreases as a result of lower earnings. Thus, it is an empirical question as to whether the corporate tax system has an economically important effect on loan loss provisioning.

Furthermore, there are two mechanisms through which the corporate tax system could affect loan loss provisioning. First, the system could encourage banks to recognize loan portfolio deteriorations in the provision in a timelier manner. This is often referred to as timely loan loss recognition. Alternatively, the corporate tax system could encourage greater loan risk-taking if banks anticipate the tax deduction benefits generated by provisions when deciding on the riskiness of their loan portfolio. These mechanisms have very different regulatory implications: prior research associates the former with greater transparency because it provides timely signals of bank health and risk-taking to regulators and creditors (Bushman and Williams 2012, 2015; Gallemore 2016), whereas the latter suggests that taxation could have a potentially destabilizing effect on the banking sector.

Our identification strategy exploits cross-country and intertemporal variation in both the statutory corporate tax rate and the tax deductibility of loan loss provisions. Most of the tax system's characteristics—in particular, the top statutory corporate tax rate—are unlikely to be driven by an individual bank's loan loss provisions. To deal with possible correlated variables, we include either country or bank fixed effects, plus several variables that capture economic and institutional factors that vary at the country-year level. Our identification strategy is akin to a difference-in-differences design, with the first difference comparing provisions before and after a tax change and the second doing so for a country with a tax change to a country without one. Our sample includes 91 tax rate changes of at least one percentage point and 11 changes in the deductibility of the loan loss provision, which occur at different points in time and in different countries, providing us with an extensive set of counterfactuals.

Using an international sample of banks from 2001 through 2013, we find that the loan loss

[3] If provisions are not tax deductible, the bank must wait until the loan is charged off (and thus removed from the bank's balance sheet) before claiming the loss as a tax deductible expense. See Section 2.2 for more details.

provision is increasing in the corporate tax rate for countries that permit the tax deductibility of general provisions, supporting our hypothesis. The economic effects of the corporate tax system are substantial: a one percentage point increase in the corporate tax rate increases provisions by 4.9% of the sample average, or $5 million based on the median bank assets, if general provisions are tax deductible. We further show that bank managers do not appear to exercise discretion in other earnings components to offset the increased loan loss provisions and thus provision tax deductibility affects overall earnings.

We conduct several tests to address identification concerns. First, we examine how the impact of the corporate tax system on loan loss provisions varies across banks. We find that the effect of the tax system on provisioning holds for both large banks (which are more systemically important) and small banks (which are less likely to exert influence over the design of the corporate tax system). Second, we use a within-country difference-in-differences design to isolate the effect of provision tax deductibility and to address concerns that our results are driven by unobservable, time-varying differences across countries. We exploit the change in provision tax deductibility introduced by the U.S. Tax Reform Act of 1986 (TRA86), and find that banks no longer able to deduct provisions from taxable income after TRA86 reduced their provisions relative to banks that still could do so.

Next, we examine which mechanism—timely loan loss recognition or risk-taking—drives our findings. Our results support the timely loan loss recognition explanation. Specifically, we find that the sensitivity of the loan loss provision to large future and contemporaneous declines in loan portfolio quality is increasing in the tax rate when provisions are tax deductible. On the other hand, we find no consistent effect of the corporate tax system on risk-taking. Since prior research associates timely loan loss recognition with greater transparency (Bushman and Williams 2012, 2015; Gallemore 2016) and since provisions and earnings are used by regulators and creditors as signals of bank health, these findings indicate that the corporate tax system can shape bank transparency.

We conduct a number of additional tests to examine the robustness of our primary findings. For example, we show that our timely loan loss provisioning results are robust to the inclusion of country-year fixed effects that absorb any country-year-specific observable and unobservable characteristics.

Although our results are robust to multiple different specifications, we cannot conclusively rule out other explanations, since corporate income tax rates and rules regarding the tax deductibility of loan loss provisions are not randomly distributed across countries. However, we believe that our evidence suggests that the corporate tax system has a significant effect on loan loss provisioning behavior.

Additionally, we examine whether the effect of the corporate tax system on loan loss provisions varies across countries. First, we find that the effect of the corporate tax system on provisions is stronger in countries where regulators have lower supervisory power, suggesting that the corporate tax system can substitute for banking supervisors in encouraging banks to recognize loan loss provisions. Second, we find a stronger effect of the tax system on provisions in countries with higher book-tax conformity.

Finally, we examine whether the tax system's impact on loan loss provisioning has other real effects on financial institutions. We exploit the U.S. setting because U.S. tax law does not allow for the tax deductibility of loan loss provisions for banks with greater than $500 million in assets. We find that in recent years (2001-2013), U.S. banks near that threshold appear to manage their assets to be below $500 million. This suggests that the tax system might constrain the growth of some banks near the $500 million threshold as they seek to maintain the provision deductibility. We estimate that approximately 88% more banks have total assets just below the $500 million threshold than if this size cutoff in the tax law was absent. This indicates that the corporate tax system can have real effects on banks near the asset threshold.

Our study highlights the role of the corporate tax system in encouraging bank financial reporting transparency. Understanding the determinants of bank financial reporting transparency is important, especially since the lack of transparency in financial institutions played a major role in the 2007–09 financial crisis by impairing bank supervisors' and market participants' understanding of bank risk (Acharya and Richardson 2009; Bank for International Settlements 2012). Prior research associates timely loan loss recognition with greater informational transparency and better discipline over risk-taking (Bushman and Williams 2012, 2015). As mentioned above, regulators and policymakers have suggested that the corporate tax system could incentivize banks to recognize loan portfolio deteriorations in loan loss provisions in a timelier manner, thus "contributing to the transparency of banks' balance sheet[s]"

(De Vincenzo and Ricotti 2014, 1). We add to the literature on bank financial reporting transparency by documenting the role corporate taxation can play in encouraging timely loan loss recognition.

We also contribute to the literature on the interaction between taxation, financial accounting, and regulation within financial institutions. This literature examines the trade-offs that banks make between various factors, including capital, earnings, and tax objectives (Scholes, Wilson, and Wolfson 1990; Warfield and Linsmeier 1992; Beatty, Chamberlain, and Magliolo 1995; Collins, Shackelford, and Wahlen 1995; Chen and Daley 1996; Beatty and Harris 1999, 2001b, 2001a; Hodder, McAnally, and Weaver 2003). However, these studies mostly either do not examine or find little relation between taxation and loan loss provisions, possibly due to endogenous proxies for tax management incentives and a lack of identifying tax variation. In contrast, we exploit both cross-country and intertemporal variation in tax rules and tax rates to provide novel evidence on how different tax treatments of loan loss provisions can affect both financial reporting choices and real decisions by banks. Furthermore, we are the first to investigate the interaction between the tax system, financial reporting, and regulatory incentives in an international setting. In doing so, we answer the call in Hanlon and Heitzman (2010) for more evidence on the effect of taxation on financial institutions.

2. Conceptual framework

2.1. Financial accounting for loan losses

The primary financial accounting expense for a bank is the loan loss provision (Ryan 2011). Loan loss provisions account for more than half of banks' total accruals and explain a very large fraction of the variation in total accruals (Beatty and Liao 2014). When banks create loans, there is an expectation that some portion of them will go bad, resulting in losses for the bank. Therefore, banks recognize a provision at loan initiation equal to the expected loss on the loans. For certain types of loans, such as mortgage and consumer, banks will recognize a general loan loss provision. The assumption underlying the general provision is that some loans in the portfolio may already have incurred losses, although they have yet to be specifically identified. For other loan types, such as corporate loans, the provision is based on the economics of that particular loan and is referred to as a specific loan loss provision.

The loan loss provision appears in the income statement as an expense and is added to the loan loss reserve (a contra-asset for loans). This reserve acts as a cushion that the bank uses to absorb loan losses. Since the loan loss provision is an expense, it decreases both net income and regulatory capital (by reducing retained earnings). When loans actually go bad and result in losses, the bank will charge them off, which removes both the loans and the associated loan loss reserves from the balance sheet. As long as the loss on the loans equals the provision, there is no effect on either earnings or regulatory capital when the loans are charged off, since the expected loss was already absorbed by earnings at the time the loan was booked and the loss provision recognized.

A bank weighs the benefits and costs when determining the current period's loan loss provision. The benefits of increasing the current period provision for expected losses come primarily from having a higher loan loss reserve and thus being better able to absorb expected future losses. Regulators prefer banks to have higher loan loss provisions and loan loss reserves for this very reason (Wall and Koch 2000). The drawbacks of increasing the loan loss provision in anticipation of future losses include lower current earnings, which could affect the stock price and executive compensation, and lower capital ratios, which could attract the scrutiny of bank regulators, especially for banks that are already poorly capitalized (Walter 2004; Berger and Bouwman 2013). Prior studies find that banks use provisions to manage earnings (Collins et al. 1995; Liu and Ryan 2006) and capital ratios (Moyer 1990; Beatty et al. 1995).

2.2. The corporate tax system and loan loss provisioning

There is heterogeneity in how countries treat loan losses for tax purposes. The tax treatments used for loan loss provisions fall broadly into one of two categories: the reserve method and the charge-off method. Under the former, banks can deduct loan loss provisions from taxable income in the current period. Provisioning under this method does not create a deferred tax asset, as the tax and financial accounting treatments of provisions are similar. Furthermore, there are no tax consequences to loan charge-offs as long as a provision was already in place. Variations of the reserve method place limits on the type and amount of the tax deductible provision. Some countries (e.g., Germany) allow tax deductibility for general provisions, which are not tied to a specific loan or loan pool. Others (e.g.,

Canada, France, and the United Kingdom) only allow tax deductions for provisions associated with specifically identified loans or loan pools. Alternatively, some countries (e.g., Argentina and New Zealand) use the charge-off method. Under this method, the bank is not able to deduct the provision from its taxable income and must instead wait until it ultimately charges off the loan. Since this process results in different financial accounting and tax treatments of provisions, provisioning creates a deferred tax asset equal to the value of the future tax deduction. When the loan is charged off, the bank receives the tax deduction (and associated cash tax savings) and extinguishes the deferred tax asset. The primary difference between the reserve and charge-off methods is that under the former, a bank deducts provisions for tax purposes immediately rather than waiting until loans are charged off.[4]

Allowing banks to claim a tax deduction for loan loss provisions should encourage them to recognize provisions. Since managers have more discretion over general loan loss provisions (which are not tied to a specific borrower or loan), provisions may be sensitive to tax incentives when general provisions are tax deductible. On the other hand, in countries where only specific loan loss provisions are tax deductible, banks cannot deduct general provisions for tax purposes and must wait until the impaired loans are specifically identified. Thus, under either the specific provision or the charge-off method, tax incentives will likely not be a major determinant of provisioning. Furthermore, the benefit of the tax deduction (if permitted) is increasing in the corporate income tax rate, which also varies across countries. Hence, we predict that banks' loan loss provisions will be sensitive to the corporate income tax rate when general provisions are deductible for tax purposes. This leads to our primary hypothesis:

H1: Loan loss provisions are positively associated with the corporate income tax rate when general loan loss provisions can be deducted for tax purposes.

It is important to note that it is not obvious that tax incentives will have an economically important impact on loan loss provisioning. As mentioned earlier, higher loan loss provisions are costly to bank managers in several ways. First, lower capital ratios can attract regulatory scrutiny, which in turn can lead to negative outcomes for bank managers such as restrictions on lending behavior or bank closure

[4] The provision tax treatment has no mechanical effect on overall earnings because of deferred tax accounting.

(Walter 2004; Berger and Bouwman 2013). Second, loan loss provisions decrease accounting earnings, which can reduce compensation and decrease stock prices. Thus, it is an empirical question whether the corporate tax system has an economically important effect on loan loss provisioning.

2.3. Mechanism: Timely loan loss recognition vs. risk-taking

There are two mechanisms through which the corporate tax system can affect the current period's loan loss provision. The first can produce greater loan loss provisions in the current period by encouraging banks to accelerate the recognition of provisions for expected future and current deteriorations in loan portfolio quality. This is the concept of timely loan loss recognition developed in Beatty and Liao (2011) and Bushman and Williams (2012). When banks are allowed to deduct loan loss provisions for tax purposes, they may be timelier in recognizing provisions for expected future and current loan losses in order to accelerate the tax deduction. This leads to our second hypothesis:

H2: The extent to which future and current loan portfolio deteriorations are incorporated into the loan loss provision is increasing in the corporate income tax rate when general loan loss provisions can be deducted for tax purposes.

In the second mechanism, the corporate tax system can lead to higher current period loan loss provisions by encouraging greater loan risk-taking. This can occur if the bank decides to increase the risk of the loan portfolio, knowing that it can deduct the expected loss immediately rather than waiting for the loan to actually be charged off. In this scenario, the bank would recognize a larger loan loss provision in the current period because of greater risk in the loan portfolio. Therefore, the corporate tax system would promote risk-taking by allowing an immediate tax deduction. This leads to our third hypothesis:

H3: Loan portfolio risk is positively associated with the corporate income tax rate when general loan loss provisions can be deducted for tax purposes.

3. Research design

3.1. Identification strategy

To examine the effect of the corporate tax system on loan loss provisioning behavior, we use an international setting because it provides variation, both cross-sectional and inter-temporal, in the tax

incentive to recognize loan loss provisions. Our identification strategy exploits changes in statutory corporate income tax rates and in provision tax deductibility.[5] Our primary regression specification is similar to a difference-in-differences design (Roberts and Whited 2013). In effect, we compare loan loss provisioning before and after a change in the tax rate or the deductibility of provisions (*first difference*). The *second difference* compares loan loss provisioning in a country with a corporate tax system change to a country without one.

The aspects of the corporate tax system that we study—the top statutory corporate income tax rate, in particular—are likely to be exogenous with respect to any individual bank's loan loss provisioning. Countries tend to change corporate tax rates for other reasons, such as to alter corporate investment (Romer and Romer 2010) or in response to international tax competition (Devereux, Lockwood, and Redoano 2008). However, it is possible that other country-level factors might be correlated with the corporate tax system and loan loss provisioning. To mitigate concerns about country-level correlated omitted variables, we employ several strategies. First, we include several variables that capture country-year-level institutional and economic conditions. Second, we include country (bank) fixed effects to control for country-level (bank-level) observable and unobservable factors that are constant across our sample period. Third, we examine whether our results vary predictably across banks (Section 4.1) and across countries (Section 4.6). Finally, in Section 4.2 we examine a specific within-country setting (TRA86 in the United States) that mitigates concerns about country-level correlated omitted variables.

3.2. Measuring loan loss provision deductibility

Countries can allow general loan loss provisions to be tax deductible, restrict tax deductibility to loan loss provisions for specific loans, or not allow provisions to be deductible at all. As argued above, we expect that provisions are more likely to exhibit sensitivity to the corporate income tax rate when

[5] We examine the joint effect of these two aspects of the corporate tax system. Conceptually, the combination of the two features is what incentivizes loan loss provisioning. For example, if no deductibility is allowed, a tax rate change should not have an effect. Likewise, if the tax rate is 0% (or very low), a change in tax deductibility does not provide a strong incentive for banks to alter their loan loss provisioning behavior.

general provisions are tax deductible, rather than when only specific provisions are deductible or no provision deductibility is allowed. Therefore, *GENERAL* serves as our proxy for the tax deductibility of loan loss provisions: it is equal to one if the country permits general loan loss provisions to be deducted for tax purposes, zero otherwise. In our empirical research design, we do not distinguish between countries where only specific loan loss provisions are deductible and countries without deductibility. Conceptually, we believe that the tax system provides no incentive for provisioning when only specific provisions are tax deductible or no provisions are tax deductible.[6]

In practice, rules regarding loan loss provisions tax deductibility are more nuanced than we model them. Most countries that permit the tax deductibility of loan loss provisions have limitations on the amount that can be deducted in any particular year. These limitations are often based on the bank's prior loan loss history and/or the amount of provision-related deductions taken in prior years.[7] While we do not have data on the specifics of the tax deductibility rules per country, we are able to put them in a broad classification with general deductibility (*GENERAL*), specific deductibility (*SPECIFIC*) or neither (*NO DEDUCTION*). Even if we had the specifics on the tax deductibility rules for each country-year in our sample, we do not have sufficient data (e.g., tax filings) to calculate the bank-specific limitations on the provisions' deductibility. Therefore, we implement the simpler measurement scheme described above. This scheme likely biases us against finding our predicted result. This is because a country to which we assign a value of *GENERAL* equal to one, but which has significant restrictions on provision deductibility, may act more like a country for which *GENERAL* is equal to zero. Hence, our measurement scheme may lead to conservative estimates of the effect of taxation on provisioning.

3.3. Basic regression design

[6] Our results are qualitatively unaffected when we instead separate out specific-provision and no-deduction regimes (see Table A.1 of the online appendix). Consistent with our expectations, we find that neither the specific-provision nor the no-deduction regime has any effect on loan loss provisioning, nor is there any significant difference in provisioning across the two.

[7] For example, in Germany the tax deductible general loan loss allowance is defined as the full amount minus the minimum of the specific loan loss allowance and 40% of the average of annual loan defaults for the current and preceding four accounting periods. This difference is divided by the average risk-carrying customer loans for the preceding five accounting periods and is multiplied with the volume of customer loans minus the nominal impaired customer loans for the current period (Domikowsky, Bornemann, Duellmann, and Pfingsten 2014).

To test our first hypothesis, we employ a variant of the loan loss provisioning model from Bushman and Williams (2012). Specifically, we estimate the following regression using OLS:

$$LLP_{i,t} = \beta_0 + \beta_1 TAX\ RATE_{c,t} + \beta_2\ GENERAL_{c,t} + \beta_3 TAX\ RATE_{c,t} \times GENERAL_{c,t} \quad (1)$$
$$+ \sum_j \beta_j Bank\ Controls_{i,t} + \sum_k \beta_k Country\ Controls_{c,t} + \sum_l \beta_l\ Year_t + \varepsilon_{i,t}.$$

The unit of observation is the bank-year, with *i* indexing firms, *c* indexing countries, and *t* indexing years. The dependent variable *LLP* is the loan loss provision scaled by lagged total loans. The primary independent variable is the interaction between *TAX RATE* and *GENERAL*. *TAX RATE* is the top statutory corporate income tax rate (demeaned when used in the regressions). We use the statutory tax rate instead of the bank-specific marginal tax rate because we want to base our identification on exogenous variation in tax rates. Bank-specific marginal tax rates may more accurately measure the actual marginal rate the bank faces but they are likely endogenous to bank decisions. We predict that β_3, the coefficient on the interaction of *TAX RATE* and *GENERAL*, will be positive if banks' provisioning behavior is sensitive to corporate income tax rates when general provisions are tax deductible. All variables are defined in Appendix A.

3.4. Control variables

We include several bank-level control variables in our regression to account for other variables associated with loan loss provisioning. First, we include the lead, current, once-lagged, and twice-lagged changes in non-performing loans scaled by lagged total assets (ΔNPL_{t+1}, ΔNPL_t, ΔNPL_{t-1}, and ΔNPL_{t-2}, respectively). These variables capture whether banks incorporate future, contemporaneous, or prior changes in loan portfolio quality in the loan loss provision (Beatty and Liao 2011; Bushman and Williams 2012, 2015). Since banks might use the loan loss provision to smooth earnings (Liu and Ryan 2006; Bushman and Williams 2012), we include $EBLLP_t$, defined as earnings before the loan loss provision and taxes scaled by lagged total loans. We also control for the bank's capitalization at the beginning of the year ($TOTAL\ RATIO_{t-1}$), since banks face capital regulation and provisions lower capital ratios. Furthermore, capital is an indirect proxy for leverage, which creates a tax shield on interest. Finally, we

include a proxy for bank size, which is the natural logarithm of the bank's assets at the beginning of the year in millions of U.S. dollars ($SIZE_{t-1}$).

We also include several variables that control for country-year-level factors that might be correlated with loan loss provisions. First, to capture general macroeconomic conditions, we include the growth in GDP ($GDP\ GROWTH_t$), the natural logarithm of GDP (in millions of U.S. dollars) per capita ($GDP\ CAP_t$), and inflation ($INFLATION_t$). We expect there to be less loan loss provisioning in well-developed markets and growing countries. Next, since the quality of governance could affect provisioning behavior, we include five proxies for the governance in a country: $POLITICAL\ STABILITY_t$, $GOVERNMENT\ EFFECTIVENESS_t$, $REGULATORY\ QUALITY_t$, $RULE\ OF\ LAW_t$, and $CONTROL\ OF\ CORRUPTION_t$. Each variable is based on responses to an annual survey conducted by the World Bank. We include year fixed effects in all of our specifications to control for global banking industry shocks. Finally, additional specifications include country (bank) fixed effects to control for observable and unobservable country-level (bank-level) factors that are constant across the sample period.

3.5. Data sources, sample composition, and descriptive statistics

The data on the tax deductibility of loan loss provisions is from the 2003 and 2007 versions of the World Bank's Bank Regulation and Supervision survey. These surveys were administered to banking regulators in different countries and are discussed in Barth, Caprio, and Levine (2004) and Barth, Caprio, and Levine (2013). Since the 2003 World Bank survey began collecting data in 2001 and the 2007 survey in 2006, we start by applying the 2003 survey results to bank-years from 2001 through 2005 and the 2007 survey results to bank-years from 2006 through 2013. We supplement this data with information from additional sources. First, we conduct our own survey (via e-mail) of accounting professionals who specialize in either tax or financial institutions at Big 4 audit offices around the world. Second, Laurin and Majnoni (2003) report on the tax deductibility of loan loss provisions for some sample countries in early years. Third, we use survey data from the European Commission (2011). Finally, for a few countries we collect additional data from government websites and reports. We use these alternative sources to (1) confirm the World Bank data's accuracy and (2) update it when changes have occurred. In general, we

find the World Bank data to be accurate. Whenever we are confident that it is either incorrect or needs updating, we change the classification. We outline these changes in Appendix B.

Bank financial statement data comes from Bankscope.[8,9] Our data spans the period from 1999-2014, and our sample from 2001-2013.[10] The corporate income tax rate is from Jacob, Michaely, and Müller (2016) and is based on international tax summaries by the OECD, Ernst & Young, and KPMG. *GDP GROWTH*, *GDP CAP*, and *INFLATION* are from the World Bank's World Development Indicator database. The five country-level governance proxies come from the World Bank's Worldwide Governance Indicators project. The supervisory power and other bank regulatory variables come from the World Bank's Bank Regulation and Supervision surveys from 1999, 2003, 2007, and 2011.

Table 1 contains a list of the 44 countries included in our main analyses. To arrive at this list, we start with OECD and European Union members, countries included in Bushman and Williams (2012), and other large countries. To be included in our final sample, a country needs to have data on corporate tax rates, the tax deductibility of loan loss provisioning, and other country-level control variables. For our main sample, we exclude the U.S. as its rules for the tax deductibility of provisions are dependent on bank size. We examine the U.S. setting in Sections 4.2 and 4.7.

Table 1 also provides the number of unique banks and bank-years, the average top statutory corporate income tax rate across our sample period, and the value of *GENERAL* (the indicator variable for the tax deductibility of general loan loss provisions) for each sample country. Table 2 presents the descriptive statistics for our sample. All continuous variables are winsorized at the 1st and 99th

[8] Bankscope contains both consolidated and unconsolidated data on financial institutions. Sometimes, for a given financial institution, Bankscope will include consolidated data in some years and unconsolidated data in others, because it may change its data's sourcing. Where possible, we use consolidated data, but sometimes we are forced to use unconsolidated data to create reasonably sufficient time-series of non-missing data. We never include data for the same bank-year more than once in the sample.

[9] There are aspects of international taxation that we would prefer to incorporate into our design, but cannot due to data limitations in Bankscope. For example, for some banks in our sample, the loan portfolio could be located in multiple countries, and therefore we would be measuring the tax incentives of these banks with error because most of our sample countries use the territorial system for corporate taxation. We take comfort in finding that our results also hold for smaller banks that are less likely to have foreign-sourced loans. Finally, recent research has examined how the discretion in loan loss provisioning varies by loan type (Bhat, Lee, and Ryan 2015). Unfortunately, Bankscope does not provide a detailed breakdown of the loan loss provision by type.

[10] For some countries, 2013 is the last year for which we have Bankscope data. Since we require a non-missing value for ΔNPL_{t+1}, the last year in the sample for those countries is 2012.

percentiles.[11] On average, loan loss provisions are approximately 1.2% of lagged total loans.

General loan loss provisions are tax deductible in 38% of all country-year observations. Our sample has 11 changes in the tax deductibility of general loan loss provisions. Nine of them are repeals of tax deductibility.[12] Only one change in deductibility occurs without a simultaneous change in tax rate (Poland). The descriptive statistics for *TAX RATE* indicate that in our sample, corporate tax rates vary considerably across countries and within a country across time. For our sample countries, we observe 11 corporate tax rate increases and 80 corporate tax rate decreases of at least one percentage point. Only eight of the countries in our sample experience no tax rate changes between 2001 and 2013. This variation implies that the value of the loan loss provision tax deductibility varies considerably over time, which enables us to better identify the impact of the corporate tax system on loan loss provisioning.

4. Results

4.1. Main results

Panel A of Table 3 contains the results from estimating equation 1.[13] Each column includes all control variables and year fixed effects. In columns 1 and 2, we omit country or bank fixed effects to examine the effect of loan loss provision deductibility in the cross-section. In column 1, we do not include the interaction between *GENERAL* and *TAX RATE*. We find that allowing for the deductibility of general loan loss provisions is positively associated with provisioning in the cross-section. When we introduce the

[11] To address concerns that skewness in *LLP* or outliers affects our results, we run three sensitivity analyses for our baseline findings. First, we use the logarithm of *LLP* plus one as the dependent variable. Second, we exclude observations with a Cook's distance value greater than 1. Third, we winsorize continuous variables at the 2% and 3% levels. Our inferences are qualitatively unaffected in each of these robustness tests (not tabulated).

[12] Given that most changes in deductibility in our sample are towards restricting it, it is fair to question why countries moved in that direction during our sample period. In discussing the legislative history of TRA86, which eliminated deductibility for banks with total assets greater than $500 million, the 1987 Joint Committee on Taxation noted that Congress was concerned that some banks abused the tax treatment of provisions to substantially lower their tax burdens. This suggests that the benefit of reducing the tax deductibility of provisions—higher tax revenues—is clear to policymakers. On the other hand, the economic benefits of having timelier loan loss provisioning are more difficult to quantify and less obvious, especially as time passes since the last major banking crisis. Furthermore, research examining the benefits of timely loan loss recognition is relatively recent (e.g., Beatty and Liao (2011); Bushman and Williams (2012, 2015)).

[13] All tests of statistical significance are two-tailed tests using robust standard errors clustered at the bank level. In untabulated robustness tests, we find that clustering by country-year leads to unchanged statistical inferences and standard errors that are very close to those presented in the tables.

interaction term in column 2, we continue to find general loan loss provision deductibility is positively associated with provisioning at the average tax rate. Furthermore, we find a positive coefficient on the interaction term, supporting our primary hypothesis that provisioning is increasing in the tax rate when general provisions are allowed to be deducted for tax purposes.

In column 3 (4), we turn to a generalized difference-in-difference design by adding country (bank) fixed effects. The coefficient on *GENERAL* becomes insignificant once we include country or bank fixed effects, which is not surprising given that our sample has relatively few changes in tax deductibility. More importantly, the coefficient on the interaction term between *TAX RATE* and *GENERAL* remains positive and statistically significant, continuing to support our first hypothesis. The effect of the corporate tax system on loan loss provisioning is also economically significant. The coefficient estimates in column 4 indicate that if a country allows general loan loss provisions to be deducted for tax purposes, an increase in the corporate tax rate of 1 percentage point leads to an increase in *LLP* of approximately 4.9% of the sample average.[14] Using the median (mean) assets in the sample, this effect translates to an increase in provisions of $4.99 ($41.97) million.[15] To put this into perspective, a one standard deviation increase in future non-performing loans (ΔNPL_{t+1}) increases *LLP* by $4.01 ($33.73) million using median (mean) assets, or 3.9% of the sample average of *LLP*. Our results suggest that the design of the corporate tax system has an economically meaningful effect on banks' loan loss provisioning behavior, especially given that our *GENERAL* classification scheme may lead to conservative estimates of this effect.[16]

[14] To get this estimate, we multiply 0.058 (sum of the coefficients on *TAX RATE* and *TAX RATE* × *GENERAL*) by 0.01 (the tax rate change), and divide the resulting amount by 0.012 (sample average of *LLP*).

[15] To get these estimates, we multiply 0.058 (sum of coefficients on *TAX RATE* and *TAX RATE* × *GENERAL*) by 0.01 (the tax rate change) and then by the sample median ($8.49 billion) or mean ($71.38 billion) of total assets.

[16] We conduct several other calculations to assess the economic significance of our main result. First, we use the 95% confidence interval around our point estimate above, and find that the effect of a 1 percentage point increase in the tax rate should lead to an increase in provisions of between 2.3% to 7.5% of the sample mean *LLP*, or between $2.3 to $7.7 million in provisions using the sample median of assets. Second, we re-estimate column 4 using only countries that allowed general or no deductibility (removing those that made specific loans deductible), and find that a 1 percentage point increase in the tax rate leads to 3.0% increase in the sample mean *LLP*, or a $2.3 million increase in provisions, when general provisions are tax deductible. Finally, we re-estimate column 4 including only the top and bottom 5 countries by tax rate and find a 1 percentage point

Consistent with the expectation that there should be no effect of the tax rate on loan loss provisioning when general loan loss provisions are not tax deductible, we find an insignificant coefficient on *TAX RATE* once we include country or bank fixed effects. One potential reason for the negative coefficients on *TAX RATE* in columns 1 and 2 of Table 3 could be that there are other time-invariant correlated country-level variables that we purposely do not control for and that could affect loan loss provisions. Once we control for them by including country or bank fixed effects, we obtain the expected insignificant coefficient on *TAX RATE* when general loan loss provisions are not deductible.

With regard to the bank-level control variables, the coefficient signs generally match those documented in prior research (e.g., Bushman and Williams (2012)). For example, all four *ΔNPL* variables have positive coefficients, three of which are statistically significant. Furthermore, the coefficient on *EBLLP* is also positive and significant, indicating that on average banks use the provision to smooth earnings. The country-level control variables are also largely consistent with our expectations. For example, we generally find a negative and significant relation between *GDP GROWTH*, *GDP CAP*, and *INFLATION* with provisions. It is important to note that in the specifications that include either country or bank fixed effects, the coefficients on the governance variables are driven by changes in these variables.

We next examine whether managers exercise discretion in other elements of the bank's financial statement to offset the income-decreasing effect of loan loss provisions. First, we re-estimate equation 1 using earnings before loan loss provisions (*EBLLP*) as the dependent variable in Panel B of Table 3. A positive *TAX RATE* × *GENERAL* coefficient would be consistent with banks managing non-loan loss provision earnings components upward to offset provisioning's income-decreasing effect. However, we find an insignificant coefficient on *TAX RATE* × *GENERAL* when using *EBLLP* as the dependent variable. Furthermore, when we employ pre-tax income (*NIBT*) as the dependent variable in Panel C of Table 3, we find a negative and significant coefficient on *TAX RATE* × *GENERAL*, suggesting that provision tax deductibility leads to lower current period bottom-line earnings.

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increase in the tax rate leads to an increase of 14.3% in sample mean *LLP*, or a $14.3 million increase in provisions, when general provisions are tax deductible.

Next, we examine cross-sectional differences across banks to address an important identification concern. Since regulators and policymakers are more likely to be concerned with larger banks, the tax deductibility of loan loss provisions might not be exogenous to these banks. On the other hand, smaller banks are less likely to have influenced the design of the corporate tax system and it is thus more likely to be exogenous to these banks' provisioning. To examine whether our results vary by bank size, we create an indicator variable equal to one if the bank's total assets are in the top quartile in a given year, zero otherwise (*LARGE*). We then interact *LARGE* with each of our tax system variables (*TAX RATE*, *GENERAL*, and *TAX RATE* × *GENERAL*). The results of estimating this modified version of equation 1 are presented Table 3, Panel D. We find the coefficient on the triple interaction term to be statistically insignificant. Importantly, we find that both the main interaction *TAX RATE* × *GENERAL* and the sum of the coefficients on *TAX RATE* × *GENERAL* and the triple interaction are positive and statistically significant. This result suggests that the corporate tax system does not differentially affect the loan loss provisioning of large banks relative to small ones. Overall, the results in Table 3 suggest that the loan loss provision is increasing in the tax rate when general provisions are tax deductible for both small and large banks, and that managers do not change other components of earnings to offset its effect. This might not be surprising given that the loan loss provision is the most important and most discretionary financial reporting choice banks make (Ryan 2011; Beatty and Liao 2014).

4.2. Identification: The U.S. Tax Reform Act of 1986

One concern about our main findings is that potentially time-varying unobservable differences between countries are correlated with aspects of the corporate tax system and banks' loan loss provisioning behavior. Furthermore, given the relatively few changes in the tax deductibility of loan loss provisions in our international sample, the findings in Table 3 do not allow us to definitively conclude that changing the tax deductibility of general provisions alters provisioning behavior. We thus exploit a within-country setting to provide additional evidence on how the corporate tax system influences loan loss provisioning and to speak more directly to the effect of changing provision tax deductibility. The Tax Reform Act of 1986 changed the tax deductibility of loan loss provisions for U.S. banks. Before TRA86,

all banks were allowed to immediately deduct loan loss provisions for tax purposes, subject to limitations.[17] However, starting in 1987, banks with total assets greater than $500 million were required to use the charge-off method for tax purposes, whereas banks with total assets less than or equal to $500 million were allowed to continue using a variant of the reserve method. We thus test whether banks above the $500 million threshold (treatment group) decrease their loan loss provisioning relative to banks below the threshold (control group) in the quarters immediately after TRA86. This difference-in-difference approach mitigates the effects on provisions of other events that occurred during this time period that equally impacted banks above and below the size threshold.[18]

To test this, we modify equation 1 by replacing *TAX RATE* and *GENERAL* with two new variables. *GT500* is an indicator variable equal to one if the bank has assets greater than $500 million in that quarter, zero otherwise. *POSTTRA* is an indicator variable equal to one if the quarter occurs after January 1, 1987, zero otherwise. The variable of interest is the interaction of these two variables. We predict that the coefficient on the interaction term will be negative, indicating that the change to the charge-off method led to fewer provisions for affected banks relative to control banks. We replace the country-level variables with two state-level control variables, the quarterly changes in the unemployment rate and the housing price index. In addition, we control for three major loan type categories: real estate, commercial, and consumer. The remaining variables are similar to their international setting counterparts, except *TOTAL RATIO* is replaced with *EQUITY* (the ratio of the bank's equity to total assets), because banks do not report their total capital ratio in the pre-Basel period.

[17] The limit was either 0.6% of total loans or the average of net charge-offs to loans over the most recent six years.

[18] TRA86 also included many other significant reforms to the U.S. tax system (see Auerbach and Slemrod (1997) for an overview). Our difference-in-difference design removes the effects of all provisions that apply equally to all banks, such as the change in individual and corporate income tax rates or the introduction of the alternative minimum tax. To our knowledge, no other parts of TRA86 employed the $500 million threshold as a cutoff for applicability. However, TRA86 also eliminated the deductibility of interest on consumer debt for individuals, which could have led to a larger reduction in consumer debt among smaller banks. Our results could thus be driven by a lower denominator in smaller banks, rather than by a lower numerator for larger banks. In untabulated tests, we find that consumer lending does not appear to significantly differ across our treatment and control banks around the enactment of TRA86, suggesting that is unlikely that the business models differ across treatment status. To address remaining concerns, we document the robustness of our results estimating our regressions (1) within banks that experienced relatively smaller changes in consumer lending around TRA86, (2) within bank-quarters that are below the sample median of consumer loans, and (3) using the natural logarithm of loan loss provisions as the dependent variable (results untabulated).

We estimate this equation using call report data for U.S. commercial banks for the twelve quarters before and after the beginning of 1987. We limit the window around TRA86 to reduce the likelihood that our tests pick up the effect of other events on provisioning. To minimize the differences between the treatment (large) banks and control (small) banks, we limit our sample to banks with an average total assets in the years prior to (1986) and after the change (1987) within certain bands around $500 million. Furthermore, we require each bank to have at least eight quarters with non-missing data for the regression variables and at least one quarter with non-missing data both before and after TRA86. The call report data is from the Federal Reserve Bank of Chicago, the unemployment rate data from the Bureau of Labor Statistics, and the housing price index data from the Federal Housing Finance Agency.

Table 4 presents the results of this analysis. Each column repeats the estimation using a sample with a different band size. The band size increases with each column, starting with a +/- $25 million band in column 1 and ending with a +/- $250 million band in column 5. The smaller the band size around the $500 million threshold, the better the identification of banks for which this change was relevant. Furthermore, smaller bands likely minimize unobservable differences between treatment and control banks. However, using a wider band around the threshold allows for a more complete panel of observations that is less sensitive to changes in assets across quarters. Across all five columns, the coefficient on the interaction term is negative. Furthermore, the coefficient is statistically significant at the 5% level in two subsamples (the $25 million and $50 million bands) and at the 1% level in the other three subsamples, despite the relatively low number of observations in some subsamples. The negative coefficient indicates that treatment banks, which are subject to the charge-off method in the post-TRA86 period, reduce their loan loss provision relative to smaller banks since they no longer receive the tax deduction for the provision. This finding is consistent with the results in Table 3.[19]

One concern about the difference-in-difference analysis is that the assignment to treatment and

[19] In untabulated tests, we find that our TRA86 results are robust to using Roberts and Sufi (2009) regression discontinuity design. We find a diff-in-diff coefficient of 0.0007 (statistically significant at the 1% level) when estimating a modified model within the +/- $250 million sample that includes the following variations of our control variables: levels, squared, cubed, and indicators for each quintile.

control groups might not be random if banks manage their assets to maintain provision tax deductibility. In fact, as we show in Section 4.7, banks appear to be sensitive to the $500 million cutoff in later years. However, as it may require some time to manage the size of a bank, the assignment to the treatment (above $500 million in assets) and the control groups (below $500 million in assets) can be random immediately around TRA86. To test this assumption empirically, we use the methodology developed by Chetty, Friedman, Olsen, and Pistaferri (2011) and test whether firms are sensitive to the cutoff. We sort banks into $2 million bins of total assets and count the number of firms in each bin. Fig. 1 presents the histogram of the actual distribution of total assets around $500 million. Panel A uses pre-reform total assets over the period 1984–1986. Panel B uses data from 1987–1989. We observe essentially a flat distribution around $500 million. To quantify the effect of the cutoff, we compare the actual distributions plotted in Fig. 1 to a counterfactual distribution. Importantly, we find no statistical evidence that firms manage their assets immediately around TRA86.[20]

Overall, the results from the U.S. analysis deliver similar inferences as those presented in Table 3 using the international sample. The combination of the results from the international setting with higher external validity and those from the U.S. setting with higher internal validity suggest that the corporate tax system affects bank loan loss provisioning. The advantage of the U.S. setting, relative to the international setting used in our main analyses, is that U.S. banks are more homogeneous in terms of financial accounting standards, economic factors, and regulation and supervision. Furthermore, the U.S. sample allows us to better isolate the effect of changing the tax deductibility of provisions in a large sample of banks with high quality quarterly data. On the other hand, the U.S. analysis could still suffer from endogeneity if banks actively managed their assets, although our analyses (Fig. 1) suggest that this is not the case on average. Still, the results in Tables 3 and 4 should be interpreted with caution.

[20] To quantify the potential effect of the $500 million cutoff, we compare the actual distributions plotted in Fig. 1 to a counterfactual distribution that excludes the [-$14 million; +$0 million] range around $500 million. The comparison of the counterfactual and actual distributions, the "excess mass", describes the percentage of additional firms in the [-$14 million; +$0 million] range around $500 million because of the tax regime change. Both the pre- and post-reform estimates are statistically insignificant.

4.3. Mechanisms: Timeliness

There are two mechanisms through which the corporate tax system can affect loan loss provisioning: timely loan loss recognition (Hypothesis 2) and risk-taking (Hypothesis 3). The former suggests that the corporate tax system might lead to greater loan loss provisioning because it incentivizes banks to recognize provisions in the current period for future or current deteriorations in loan portfolio quality, also known as timely loan loss recognition. Timely loan loss recognition is costly to bank managers because it reduces earnings and regulatory capital and can attract the scrutiny of outside stakeholders into managerial actions. It is important, however, because it can inform investors and regulators of a bank's potential problems and allow them to discipline risk-taking (Bushman and Williams 2012). Regulatory agencies and policymakers (e.g., IMF and the European Parliament) have suggested that providing an immediate tax deduction for loan loss provisions can provide an incentive for banks to be timely in recognizing loan losses.

To test this timeliness mechanism, we create *HIGH ΔNPL*, an indicator variable equal to one if the change in non-performing loans (*ΔNPL*) is positive and above the yearly median, and zero otherwise. We use a median split instead of a continuous variable because we expect that the tax effect should only exist when there is a large positive change in non-performing loans. In contrast, we expect no tax effect in the case of a negative or small positive change in non-performing loans, as it is less likely that banks would decrease their loan loss provision and thus possibly accelerate a tax liability. Using a binary variable accounts for this non-linearity and also simplifies the interpretation of the results.[21] We use the change in non-performing loans (*ΔNPL*) from *t* to *t+1* as well as from *t-1* to *t*. We interact *HIGH ΔNPL* with *TAX RATE*, *GENERAL*, and *TAX RATE* × *GENERAL*. The coefficient on the triple interaction term represents whether the extent to which large future or current deteriorations in loan portfolio quality are incorporated into the current period's loan loss provision is affected by tax incentives for loan loss provisioning. Therefore, we predict that the coefficient on the triple interaction will be positive.

Table 5 present these results. We find strong support for the timeliness mechanism using both the

[21] In untabulated analyses, we find that our results are robust to using cutoffs at the 40th or 60th percentiles.

future (column 1) and current (column 3) change in non-performing loans. The coefficient on the triple interaction term is positive and statistically significant in both models. Furthermore, the sum of the coefficients on *TAX RATE* × *GENERAL* and *TAX RATE* × *GENERAL* × *HIGH ΔNPL* is also positive and statistically significant in both models. This suggests that the corporate tax system encourages loan loss provisioning when the bank is experiencing declines in its loan portfolio quality. In columns 2 and 4 of Table 5, we replace year fixed effects with country-year fixed effects to account for any observable and unobservable country-year-level characteristics. The coefficients on *TAX RATE* × *GENERAL* × *HIGH ΔNPL* continue to be positive and statistically significant. Overall, the results in Table 5 indicate that the corporate tax system can shape bank transparency, which can affect stakeholders' ability to monitor and discipline risk-taking (Bushman and Williams 2012). Furthermore, when coupled with the results in Panels B and C of Table 3, this finding suggests that earnings—an indicator of the bank's overall condition used by stakeholders such as regulators and creditors—is a timelier signal of health when the tax deductibility of loan loss provisions is allowed.

As an alternative approach, we examine whether the informativeness of provisions for predicting future loan losses is affected by the corporate tax system. Specifically, we examine whether current period provisions map into future loan charge-offs more strongly for countries where general provisions are tax deductible. We employ a variant of Beck and Narayanamoorthy (2013)'s methodology and estimate a modified version of equation 1 (including all control variables) in which future net charge-offs is the dependent variable and *LLP* is the primary independent variable. We measure future net charge-offs at three different times: year *t+1*, year *t+2*, and the sum of years *t+1* and *t+2*. Finally, we split the sample into two groups based on whether countries allow general provision tax deductibility. One important caveat is that due to a lack of coverage of loan charge-offs in Bankscope, we lose between 23 to 41 percent of our sample. Results reported in Panel A of Table 6 show that for all three charge-off variables, current provisions map more strongly into future net charge-offs for countries with general provision tax deductibility than without it, with the difference being statistically significant for charge-offs in year *t+2*. Furthermore, current provisions are only significantly associated with charge-offs in year *t+2* when

general provisions are deductible, suggesting that provisions incorporate information about future losses in a timelier manner when general provisions are tax deductible.

In Panel B of Table 6, we additionally split the *GENERAL* sample into two groups based on the country's average tax rate across the sample period, and repeat the analysis from Panel A. Corroborating the findings in Panel A, we find that within the subsample of high tax rate countries that allow general provision deductibility, current provisions map strongly into future net charge-offs. In contrast, this association is weaker within low tax rate countries that allow general deductibility. One explanation for this finding is that when the tax rate is low, the incentives are not sufficient to result in timely loan loss provisioning even though deductibility is permitted. Alternatively, this finding may be driven by noise in our *GENERAL* classification (as discussed on page 11). Consistent with our expectations and despite the small sample size, we find significant differences in the association of current provisions and future net charge-offs between the high tax and low tax *GENERAL* subsamples. Overall, these findings support the idea that provisions are more informative about future loan losses when general provisions are tax deductible, and that the effect within the *GENERAL* subsample is driven by high tax rate countries.

4.4. Mechanisms: Risk-taking

In addition to the timeliness mechanism, our results might be explained by differences in risk-taking (Hypothesis 3). To test this mechanism, we estimate a modified version of equation 1 where we replace *LLP* with a proxy for bank risk-taking (*RISK*). Our primary analysis uses three different proxies for risk-taking. The first has the change in non-performing loans (Δ*NPL*) as a dependent variable. The second uses the change in revenues from interest (Δ*INTEREST REVENUE*) and the third the change in interest income (Δ*INTEREST INCOME*). For each *RISK* variable, we use the change from *t-1* to *t* and from *t* to *t+1*, respectively, as alternative dependent variables. We include bank and year fixed effects as well as bank- and country-level controls as in equation 1, with two exceptions. First, we do not include the lead, current, once-lagged, and twice-lagged changes in non-performing loans (ΔNPL_{t+1}, ΔNPL_t, ΔNPL_{t-1}, ΔNPL_{t-2}, respectively). Second, we do not include $EBLLP_t$ when *RISK* is defined as Δ*INTEREST INCOME* or Δ*INTEREST REVENUE*. Increased loan risk-taking should be associated with a higher

change in non-performing loans as well as a higher change in revenues and income from interest. If the corporate tax system encourages risk-taking through the deductibility of loan loss provisions, the coefficient on *TAX RATE* × *GENERAL* should be positive ($\beta_3 > 0$). We present the results of these regressions in Table 7. In columns 1 and 2, we use the change in non-performing loans as the dependent variable. In columns 3 and 4 (5 and 6), we use the change in interest revenues (interest income) as the dependent variable. In all six regressions, we find insignificant coefficients on *TAX RATE*, *GENERAL*, and *TAX RATE* × *GENERAL*, which does not support the notion that the tax deductibility of provisions leads to greater risk-taking.

We investigate several other risk measures (see Table A.2 in the online appendix). Specifically, we use the future three-year standard deviation in interest income, interest revenues, and change in non-performing loans (Panel A), as well as indicator variables for the top 5%, 10%, 20%, or 25% of the following variables: net charge-offs scaled by loans (Panel B), ΔNPL_t (Panel C), and ΔNPL_{t+1} (Panel D). Finally, in Panel E (Panel F), we use indicator variables for observations that have extreme values (two standard deviations above the yearly mean) of current (future) interest revenues, interest income, and ΔNPL. Across all 27 regressions tabulated in Table 7 and Table A.2, we find only four significant interaction coefficients.[22] We conclude that it is unlikely that risk-taking explains the association between the corporate tax system and provisions documented in Table 3, although we cannot fully rule out this alternative story.[23]

4.5. Robustness Tests

One alternative explanation for our results is that countries with higher tax rates also have stronger tax regulatory environments, which might lead to better provisioning practices, including timelier provisions that are more informative about future loan losses. To rule out this alternative, we employ two approaches. First, we test whether current loan loss provisions map into future loan charge-offs

[22] Untabulated analyses indicate that these insignificant findings are unlikely to be the result of multicollinearity between control variables. We find that while *SIZE* and the country-year-level control variables have high variance inflation factors, we continue to find insignificant interaction coefficients after excluding them.

[23] In untabulated analyses, we examine whether the corporate tax system's effect on provisioning is moderated by bank risk, but find little evidence to support it.

differentially for high tax rate versus low tax rate countries. If banks in high tax rate countries better forecast their losses via loan loss provisions than banks in low tax countries do, we would expect a higher coefficient on *LLP* in the high tax group. However, we find that there is no significant difference in the relation between *LLP* and future net charge-offs across high tax versus low tax countries (Panel A of Table A.3). Furthermore, the coefficient in the low tax subsample is greater in two of the three models. This finding is inconsistent with high tax countries having stronger tax enforcement. Second, we use the tax evasion measure from Djankov, Ganser, McLiesh, Ramalho, and Shleifer (2010) as a proxy for weakness in the tax regulatory environment. We find that this proxy is not significantly correlated with tax rates at the macro level (Table A.3, Panel B). Additionally, including the tax evasion proxy as an additional control variable in our main and timeliness tests does not alter our inferences (Panel C of Table A.3). Furthermore, our fixed effects structure in our main tables (partly) controls for differences in tax regulatory environments across countries. Overall, our findings do not appear to be driven by differences in tax regulatory environments across countries.

We next examine the robustness of our primary findings. For these tests, we focus on the main effect of the corporate tax system on loan loss provisioning (Table 3) and the timeliness findings (Table 5), since we find little evidence supporting the risk-taking explanation in Hypothesis 3. First, we control for additional bank-level control variables. Specifically, we include the loan loss reserve scaled by total loans and the ratio of deposits to liabilities (to capture reliance on depositor funding). We do not include these variables in our main regressions because of poorer data coverage. Additionally, since in the earlier years of our sample period some banks used local GAAP, not IFRS or IAS, we include separate indicator variables for the different accounting standards. Our primary results are unaffected by the inclusion of these additional bank-level controls (see Table A.4, Panel A of the online appendix).

Second, we examine whether various country-level factors may explain our results. In Panel B of Table A.4, we include additional country-level variables from Barth et al. (2013) that capture supervisory power (*SUPERVISORY POWER*), external audit strength (*EXTERNAL AUDIT*), and country-level financial statement transparency (*TRANSPARENCY*). We find some evidence that higher supervisory

power is correlated with higher loan loss provisions and that external audit strength is negatively correlated with provisioning. Importantly, our results on the effect of the corporate tax system are not sensitive to re-estimating our primary regression with these additional control variables. Next, we control for the tax treatment of net operating losses using data on loss carryback and carryforward tax treatment from Jacob et al (2016). We find that our inferences remain unaffected after including indicators that capture (1) whether losses are allowed to be carried forward five years, (2) whether they are allowed to be carried back, and (3) the interactions between these variables and *TAX RATE* (which captures the tax value of carryforwards and carrybacks) (Table A.4, Panel C). We also control for lending interest rates using data from the OECD and the World Bank and find that our inferences are qualitatively unaffected (Table A.4, Panel D). Additionally, we find that our inferences are qualitatively unaffected by including country-specific time trends (Panel E of Table A.4), mitigating concerns about a spurious correlation between falling tax rates and falling provisions.[24] Finally, to ensure that the relatively high correlations between the five country-level variables from the World Development Indicators dataset do not affect our results, we document that our inferences are unaffected when excluding them (Table A.4, Panel F).[25]

The next set of robustness tests addresses concerns about the sample and its selection. Since a few countries do not allow any loan loss provisions to be deducted from taxable income, the findings in Tables 3 and 5 might simply pick up the difference between the two extremes. We therefore exclude country-years in which neither general loan loss provisions nor specific loan loss provisions are allowed to be deducted. In this case, the variation is driven purely by changes in tax rates and in the type of loan loss provisions—specific versus general—that can be deducted. These results are very similar to those reported in Tables 3 and 5 and the economic magnitude of the effects even increases slightly (see Table

[24] In untabulated analyses, we find that the effect of the corporate tax system on loan loss provisioning exists in both positive and negative GDP growth periods without differing across them.

[25] In untabulated analyses, we also find that *SIZE* has a relatively high variance inflation factor; our results are robust to excluding it.

A.5, Panel A of the online appendix).[26]

Finally, we examine the robustness of our results to different tax deductibility classifications. As explained in Section 3.3, we base our classification on data from the World Bank surveys, making modifications when alternative sources indicate that it is incorrect or needs updating. However, our changes may be erroneous and the original classification is correct. To this end, we demonstrate that our results are robust to using the original Barth et al. (2004) classification (Table A.6, Panel A of the online appendix). Additionally, in Panel B, we replace *GENERAL* with *BOTH*, an indicator variable equal to one if general *and* specific loan loss provisions are tax deductible. Using this more restrictive definition of tax deductibility, we continue to find similar inferences. We conclude that even if our primary classification scheme is potentially measured with some error, our findings are likely not driven by it.

4.6. Additional results: Differential effects of the corporate tax system across country-level institutions

In this section, we examine whether the effect of the corporate tax system on loan loss provisioning varies across countries. First, we explore whether the corporate tax system plays a larger role in encouraging loan loss provisioning when regulators have relatively little power. Regulators play an important role in banks' decision to provision for future losses. When they have relatively little power to do this, or to replace management, banks may be able to successfully defer loan loss provisions into the future. However, the corporate tax system can substitute for regulators in encouraging loan loss provisioning by providing a tax incentive.

To test this notion, we employ the measure of bank supervisory power developed by Barth et al. (2004), using data from the World Bank's Bank Regulation and Supervision surveys. They construct an index that captures the power of bank supervisors in each country. Index components include whether the agency has the authority to force bank management to recognize provisions to cover actual or potential losses, to meet with or take actions against auditors, or to remove and replace management or directors. We construct an indicator variable, *LOW SUPERVISORY POWER*, which is equal to one if the country's

[26] To mitigate concerns that countries with few observations drive our results, we show that our findings are robust to requiring at least 30 and 50 observations per country, which reduces the number of countries by six and fifteen, respectively (see the online appendix, Table A.5, Panels B and C).

supervisory power is below the yearly median, zero otherwise. We interact this variable with our tax system variables. The results are presented in Panel A of Table 8. Since the supervisory power measure exhibits almost no variation within a country across time, we only estimate models with year fixed effects. Consistent with the preceding discussion, we find that the corporate tax system has a greater impact on provisioning in countries with relatively low supervisory power, with the coefficient on the triple interaction term positive and highly significant. This finding suggests that with regard to encouraging greater loan loss provisions, the corporate tax system can substitute for strong bank regulators.

Second, we predict that the effect of the corporate tax system is stronger when the country exhibits higher book-tax conformity, as the tax code should have a greater effect on financial reporting choices when financial and tax reporting are more aligned. We test this prediction using a book-tax conformity measure developed by Atwood, Drake, and Myers (2010). Specifically, we estimate the following equation on a country-year level, requiring at least ten observations per estimation:

$$CTE = \theta_0 + \theta_1 PTBI + \theta_2 DIV + \varepsilon, \quad (2)$$

where *CTE* denotes current tax expense, *PTBI* pre-tax book income, and *DIV* total dividends. The root mean-squared error (RMSE) of each estimation captures the standard error of *CTE* for a given level of *PTBI* that is not explained by equation 2. It indicates the overall amount of discretion that managers have to report book income that differs from taxable income, with higher values indicating low book-tax conformity. We create *HIGH BTC*, an indicator variable equal to one if the RMSE is below the median at the country level that year, and zero otherwise. We then interact *HIGH BTC* with *GENERAL*, *TAX RATE*, and their interaction. We predict that the coefficient on the triple interaction term will be positive. The results are presented in Panel B of Table 8. Each column includes year fixed effects, and column 2 (3) also includes country (bank) fixed effects. We find that the effect of the tax system on provisions is stronger in countries with higher book-tax conformity, consistent with our prediction.

4.7. Additional results: Real effect on bank size

In Section 4.2, we document that U.S. banks experiencing a change in the tax deductibility of

loan loss provisions (assets greater than $500 million) altered their provisioning relative to banks that did not experience the change (assets at or below $500 million). While in the short run it might be too difficult or costly to manage assets to fall below this threshold (consistent with Fig. 1), over time banks may do so to maintain provision tax deductibility. Thus, the U.S. tax law on loan loss provisions could have real effects on bank size and growth. To this end, we repeat the analysis around the $500 million cutoff for the same sample period as our primary international analysis (2001 to 2013). Fig. 2 plots the actual distribution of total assets in $2 million bins around $500 million along with the counterfactual distribution based on a 5th-degree polynomial in the [$350 million; $650 million] range. We now observe a sharp bunching of total assets below $500 million. There is a difference between the counterfactual and the actual distribution left of the kink, as indicated by the two vertical lines. The excess mass estimate, 0.88, is significant at the 5% level (t-stat = 2.39). This estimate suggests that 88% more banks locate just below $500 million than when the tax-induced cutoff is absent, consistent with banks near the cutoff managing assets lower to maintain loan loss provision tax deductibility.

We conduct four robustness tests of this result. First, to examine whether our finding is simply a general phenomenon in the firm size distribution, we repeat the analysis with U.S. industrial firms using data from Compustat. Importantly, we do not find any bunching around $500 million and the excess mass estimate is negative and insignificant (Fig. A.1 of the online appendix). Second, to address concerns that the bunching could be mechanical because higher provisions lead to lower total assets, we rerun our analysis using assets before loan loss provisions in Fig A.2 of the online appendix, with similar results (an excess mass estimate of 0.92, with a t-stat of 2.18). Third, to address concerns that our result is simply the outcome of the parameter choices used to estimate the excess mass in Fig. 2, we examine several additional specifications: (1) estimating standard errors using alternative bootstrap iterations, (2) a 7th-degree polynomial, (3) a smaller range [-$10 million; +$0 million] around $500 million, and (4) both wider [-$200 million; +$200 million] and a smaller [-$100 million; +$100 million] bandwidth. In all these tests (Table A.7 of the online appendix), we obtain positive and significant excess mass estimates. Finally, FDICIA internal control reporting requirements also used the $500 million asset threshold until

this threshold increased to $1 billion in 2005. When we re-estimate the analysis using only observations after 2005, we still obtain a significant excess mass of 0.48 (t-stat = 2.27; results untabulated). Unfortunately, we cannot rule out that other U.S. bank regulations employ the same cutoff. However, our results are consistent with U.S. banks near the $500 million threshold managing their assets to maintain provision tax deductibility.

5. Conclusion

This study provides evidence on the corporate tax system's effect on loan loss provisioning behavior. We find robust evidence that banks' loan loss provisions are increasing in the corporate tax rate when the provisions are tax deductible. Furthermore, our findings suggest that this effect is driven not by increased risk-taking, but by the corporate tax system encouraging timelier loan loss recognition. We also find that the corporate tax system can act as a substitute for strong banking regulators in encouraging banks to increase their loan loss provisions. Finally, we find evidence that the rules regarding the tax deductibility of loan loss provisions influence bank size choices in the U.S.

Overall, our study provides a different view on how the corporate tax system affects banks. While prior studies (e.g., Admati et al. (2013)) suggest that taxation can destabilize the banking sector by encouraging excessive leverage, we find that the it can lead to timelier loan loss recognition and hence a more transparent banking system. These findings should be of interest to regulators and policymakers, such as the IMF and the European Parliament, as they debate changes to provision tax deductibility in hopes of encouraging adequate and timely provisioning. As a supplement to regulatory monitoring of provisions, the tax system can also be used to encourage bank managers to establish adequate reserves, leading to more stable banks and a more stable banking system. We call for future research that further examines the effects of the corporate tax system on the banking sector.

Appendix A: Variable Definitions

VARIABLE	DESCRIPTION	SOURCE
LLP	Loan loss provision, scaled by lagged total loans.	Bankscope
TAX RATE	Top marginal statutory corporate tax rate.	Jacob et al. (2016)
GENERAL	Indicator variable equal to one if general loan loss provisions are tax deductible, and zero otherwise.	World Bank's Bank Regulation and Supervision (2003 and 2007), our own survey
ΔNPL	Change in non-performing loans, scaled by lagged total assets.	Bankscope
HIGH ΔNPL	Indicator variable equal to one if the bank's *ΔNPL* is above the sample median in a given year, and zero otherwise.	Bankscope
EBLLP	Earnings before loan loss provision and taxes, scaled by lagged total loans.	Bankscope
TOTAL RATIO	Total regulatory capital ratio.	Bankscope
SIZE	Natural logarithm of the bank's total assets in millions of U.S. dollars.	Bankscope
LARGE	Indicator variable equal to one if the bank's *SIZE* is in the top quartile in a given year, and zero otherwise.	Bankscope
GDP GROWTH	Annual percentage growth rate of GDP.	World Bank
GDP CAP	Natural logarithm of GDP per capita.	World Bank
INFLATION	Annual growth rate of the GDP deflator.	World Bank
POLITICAL STABILITY	Annual estimate of the political stability of a country that measures perception, e.g., of the likelihood of political instability and/or politically motivated violence and terrorism.	World Bank's Worldwide Governance Indicator
GOVERNMENT EFFECTIVENESS	Annual estimate of government effectiveness that captures, among other factors, quality of public and civil services and the credibility of governments.	World Bank's Worldwide Governance Indicator
REGULATORY QUALITY	Annual estimate of the regulatory quality that captures the government's ability to formulate and implement policies and regulations.	World Bank's Worldwide Governance Indicator
RULE OF LAW	Annual estimate of the rule of law that captures the extent to which agents have confidence in rules, the quality of contract enforcement, property rights, and courts.	World Bank's Worldwide Governance Indicator
CONTROL OF CORRUPTION	Annual estimate of the regulatory quality that captures the extent to which public power is exercised for private gain and corruption; we define *CONTROL OF CORRUPTION* so that high values indicate lower corruption.	World Bank's Worldwide Governance Indicator
NIBT	Pre-tax income scaled by lagged total loans.	Bankscope
GT500	Indicator variable equal to one if the bank has assets greater than $500 million in that quarter, and zero otherwise.	Call report data from the Federal Reserve Bank of Chicago
POSTTRA	Indicator variable equal to one if the quarter occurs after TRA86 takes effect on January 1, 1987, and zero otherwise.	Call report data from the Federal Reserve Bank of Chicago
ΔHPI	Change in the quarterly state housing price index.	Federal Housing Finance Agency
ΔUNEMP	Change in the quarterly state unemployment ratio.	Bureau of Labor Statistics
EQUITY	Ratio of the bank's equity to total assets.	Call report data from the

		Federal Reserve Bank of Chicago
NCO	Net charge-offs scaled by lagged total loans.	Bankscope
ΔINTEREST REVENUE	Change in interest revenues, scaled by lagged total loans.	Bankscope
ΔINTEREST INCOME	Change in interest income, scaled by lagged total loans.	Bankscope
SUPERVISORY POWER	Indicates whether the supervisory authorities have the authority to take specific actions to prevent and correct problems; this variable is the sum of the assigned values to yes-answers (1) and no-answers (0) to 16 questions and may range from 0 to 16, with a higher value indicating more power.	World Bank's Bank Regulation and Supervision surveys (2003, 2007, and 2011)
LOW SUPERVISORY POWER	Indicator variable equal to one if the supervisory power is below the median that year, and zero otherwise.	World Bank's Bank Regulation and Supervision surveys (2003, 2007, and 2011)
BOOK-TAX CONFORMITY	Following Atwood et al. (2010), yearly ranked RMSE from equation 2, which captures the unexplained variation in the current tax expense.	Compustat Global
HIGH BTC	Indicator variable equal to one if the *BOOK-TAX CONFORMITY* measure is above the median at the country level that year, and zero otherwise. To calculate book-tax conformity, we use data from Compustat Global and follow Atwood et al. (2010). However, we do not include foreign taxes (ForPTBI) because this variable is no longer available. Atwood et al. (2010) note that the exclusion of ForPTBI results in similar BTC measures (see their footnote 10).	Compustat Global

Appendix B: Changes to BCL Classification

Panel A: Used BCL Data

Australia	Hong Kong	Norway
Belgium	Hungary	Peru
Brazil	India	Philippines
Bulgaria	Israel	Poland
Canada	Italy	Portugal
Chile	Korea	Romania
China	Latvia	Russia
Croatia	Lithuania	Singapore
Czech Republic	Luxembourg	Spain
Denmark	Malaysia	Switzerland
Finland	Mexico	Thailand
Germany	Netherlands	United Kingdom
Greece	New Zealand	

Panel B: Changes made to BCL data

Country	Explanation
France	The 2003 BCL survey does not have data for France, but Laurin and Majnoni (2003) classify France as "specific", matching 2007 BCL, our survey, and the EU survey. We classified France as "specific" for 2001-2005 and used BCL data for all other years.
Japan	Our survey responses matched the 2003 BCL data classifying Japan as "both", and in contrast to the 2007 BCL data that classified Japan as "general". We changed the classification to "both" for 2006-2013, and used BCL data for all other years.
Slovakia	Our communication with the Slovakian ministry of finance indicated that provisions were not deductible starting in 2004. This did not match either the 2003 or 2007 BCL, which classified Slovakia as "both" and "specific", respectively. We classified Slovakia as "neither" from 2004-2013, and used BCL data for all other years.
South Africa	Our survey responses indicate that there was a change to the tax rules in 2012 that enabled general and specific provisions to be tax deductible. We changed the classification to "both" for 2012-2013, and used BCL data for all other years.
Sweden	Our survey responses and the EU survey generally supported classifying Sweden as "both", which matches the 2003 BCL data. There was no 2007 BCL data for Sweden. Furthermore, we have searched all available annually published overviews of tax and policy changes in Sweden (for example, the "*The Swedish Reform Programme for Growth and Employment*") and found no indication of a change.[27] We updated the classification to "both" for 2006-2013, and used BCL data for all other years.

[27] http://www.regeringen.se/contentassets/80397b337f544988a55e9d3714447cb/the-swedish-reform-programme-for-growth-and-employment-2005-2008 (last accessed January 24, 2016).

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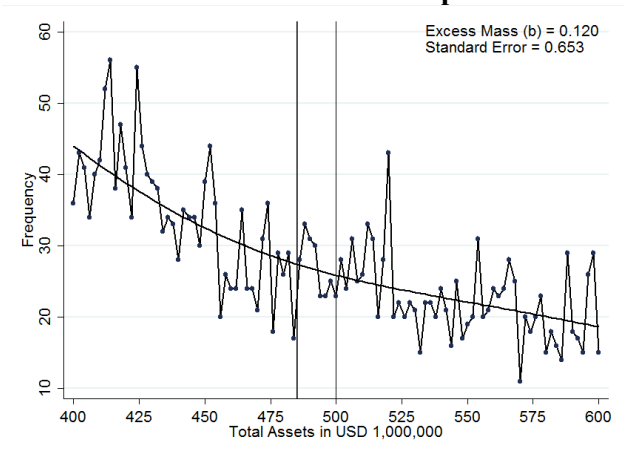
Figure 1: Size Distribution around the $500 Million Cutoff around the Tax Reform Act of 1986. This figure presents the empirical distribution of U.S. banks' total assets around $500 million. Each point represents the number of observations in a $2 million bin. Excess mass estimates compare the actual distribution around $500 million to a 5th-degree polynomial fitted to the empirical distribution excluding bins within the range of [-$14m; +$0m] around $500 million. The vertical lines indicate the upper and lower bounds of this range. Panel A uses the quarterly data of U.S. banks from 1984–1986. In Panel B, we use the quarterly data of U.S. banks from 1987–1989.

Panel A: 1984-1986 Sample



Panel B: 1987-1989 Sample

Figure 2: Size Distribution around the $500 Million Cutoff, 2001–2013. This figure presents the empirical distribution of banks' total assets around $500 million. Each point represents the number of observations in a $2 million bin. Excess mass estimates compare the actual distribution around $500 million to a 5th-degree polynomial fitted to the empirical distribution excluding bins within the range of [-$14m; +$0m] around $500 million. The vertical lines indicate the upper and lower bounds of this range. We use the annual data of U.S. banks from 2001–2013.

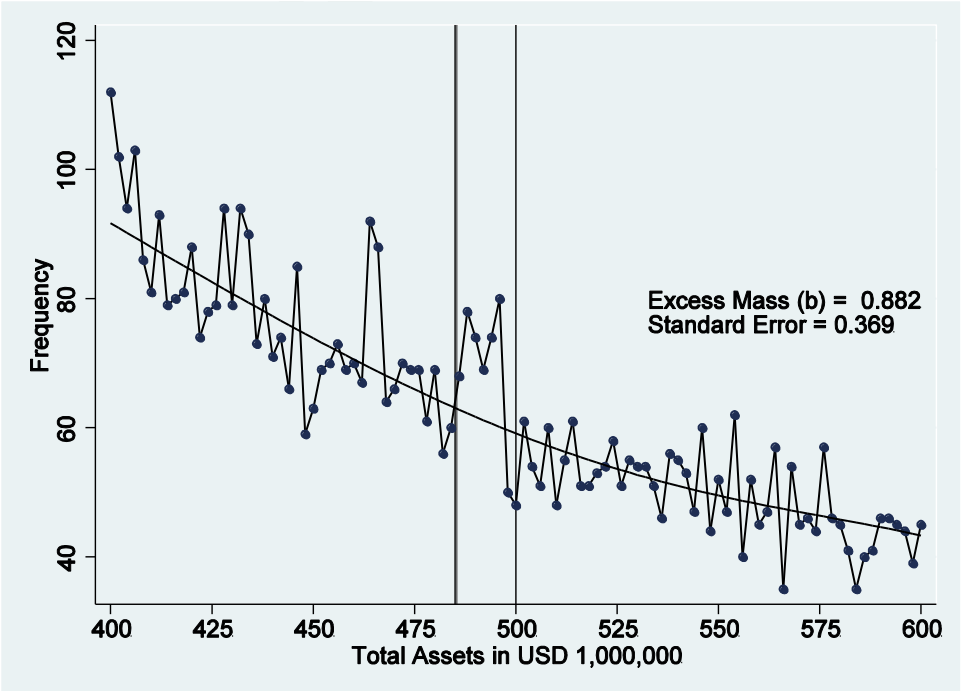


Table 1: Country Overview and Sample Composition. This table presents data for each country represented in our sample, including the number of unique banks and bank-years with non-missing regression data, the average *TAX RATE* over the sample period, the time range with non-missing regression data, and the time range with *GENERAL* = 1 during our sample period. Variables are defined in Appendix A. Appendix B and Section 3.5 describe the data collection for *GENERAL*.

Country	# Unique Banks	# Bank-Year Obs	Tax Rate	Time range in dataset	Deduction of *GENERAL*
Australia	21	126	30.35%	2001-2013	2001-2013
Belgium	6	31	34.59%	2002-2012	/
Brazil	96	476	34.00%	2003-2012	/
Bulgaria	15	47	10.43%	2005-2012	/
Canada	30	202	32.61%	2001-2012	/
Chile	24	137	17.50%	2001-2012	/
China	92	341	26.01%	2006-2012	2006-2012
Croatia	13	42	20.00%	2007-2012	2007-2012
Czech Republic	9	42	21.14%	2003-2012	/
Denmark	35	159	27.74%	2001-2012	2001-2005
Finland	6	40	26.49%	2001-2012	2001-2005
France	26	144	33.33%	2001-2012	/
Germany	25	102	33.43%	2001-2013	2001-2013
Greece	11	37	22.65%	2007-2012	/
Hong Kong	24	137	16.65%	2001-2012	/
Hungary	7	48	17.38%	2001-2012	2006-2012
India	62	457	33.37%	2001-2013	/
Ireland	10	56	13.09%	2001-2012	2001-2005
Israel	11	98	31.46%	2001-2012	/
Italy	498	2,052	33.67%	2001-2012	2001-2005
Japan	153	1,364	40.96%	2001-2013	2001-2013
Korea	6	14	28.76%	2002-2005	/
Latvia	8	24	15.71%	2001-2012	/
Lithuania	6	24	15.00%	2007-2012	/
Luxembourg	3	8	29.71%	2008-2012	/
Malaysia	45	265	26.44%	2001-2013	/
Mexico	28	130	29.17%	2006-2012	2006-2012
Netherlands	17	61	26.39%	2003-2012	/
New Zealand	13	81	30.78%	2001-2013	/
Norway	18	96	28.00%	2001-2012	2001-2012
Peru	3	18	29.83%	2004-2012	/
Philippines	15	76	31.84%	2001-2012	/
Poland	13	58	19.00%	2005-2012	2005
Portugal	13	68	26.48%	2001-2012	/
Romania	11	34	16.53%	2001-2012	/
Russia	66	306	21.42%	2001-2013	/
Singapore	6	29	19.52%	2001-2012	2001-2012
Slovak Republic	6	26	19.62%	2001-2012	2001-2003
South Africa	9	60	35.72%	2001-2012	2012
Spain	31	186	32.59%	2001-2012	2001-2005
Sweden	20	118	27.35%	2001-2012	2001-2012
Switzerland	14	56	26.11%	2001-2012	2001-2005
Thailand	19	133	29.16%	2003-2012	2003-2005
United Kingdom	41	208	27.79%	2001-2013	/

Table 2: Descriptive Statistics. This table presents descriptive statistics of our main variables for 1,585 banks and 8,217 observations over the 2001–2013 period. Variables are defined in Appendix A.

Variable	Mean	Standard Deviation	25th percentile	Median	75th percentile
LLP	0.012	0.019	0.003	0.007	0.013
TAX RATE	0.314	0.070	0.280	0.314	0.373
GENERAL	0.380	0.485	0.000	0.000	1.000
ΔNPL	0.005	0.017	-0.001	0.001	0.008
EBLLP	0.033	0.045	0.011	0.021	0.037
NIBT	0.020	0.035	0.005	0.013	0.027
TOTAL RATIO	14.388	6.257	10.680	12.860	15.950
SIZE	8.878	2.141	7.219	8.919	10.305
ΔINTEREST INCOME	0.006	0.021	-0.001	0.001	0.007
ΔINTEREST REVENUE	0.010	0.044	-0.003	0.002	0.015
GDP GROWTH	9.706	1.135	8.800	10.335	10.481
GDP CAP	1.448	3.484	-0.175	1.468	3.284
INFLATION	0.027	0.036	0.003	0.020	0.041
POLITICAL STABILITY	0.332	0.752	-0.010	0.510	0.940
GOVERNMENT EFFECTIVENESS	0.840	0.717	0.310	0.800	1.460
REGULATORY QUALITY	0.830	0.637	0.480	0.950	1.220
RULE OF LAW	0.706	0.769	0.170	0.610	1.330
CONTROL OF CORRUPTION	0.642	0.933	-0.030	0.400	1.420

Table 3: The Corporate Tax System and Loan Loss Provisions. This table presents the results of estimating equation 1 using the international sample of banks. The dependent variable in Panel A is *LLP*, the bank's loan loss provision scaled by lagged total loans. In Panel B (Panel C), we use earnings before loan loss provision (pre-tax income) scaled by total loans as the dependent variable. The primary independent variable is the interaction of *TAX RATE*, the top statutory corporate tax rate centered around the sample average tax rate, and *GENERAL*, a dummy variable equal to one if general loan loss provisions are tax deductible and zero otherwise. The full set of control variables is used in Panel A. In Panels B and C, *EBLLP* is not used as a control variable. In Panel D, we additionally include interactions with *LARGE*, an indicator variable equal to one if the bank's size is in the top quartile in that year, and zero otherwise. Variables are described in Appendix A. We report robust standard errors clustered at the bank level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Dependent Variable is Loan Loss Provisions (*LLP*)

	(1)	(2)	(3)	(4)
TAX RATE	-0.0134**	-0.0382***	0.0131	0.0163
	(0.0062)	(0.0081)	(0.0125)	(0.0131)
GENERAL	0.0023***	0.0019***	0.0002	-0.0012
	(0.0007)	(0.0007)	(0.0012)	(0.0013)
TAX RATE × GENERAL		**0.0609*** **	**0.0413*** **	**0.0425** **
		(0.0076)	**(0.0120)**	**(0.0180)**
ΔNPL_{t+1}	0.0116	0.0203	0.0323*	0.0278
	(0.0191)	(0.0189)	(0.0187)	(0.0175)
ΔNPL_{t}	0.2900***	0.2927***	0.2975***	0.2854***
	(0.0208)	(0.0207)	(0.0209)	(0.0239)
ΔNPL_{t-1}	0.1788***	0.1822***	0.1785***	0.1287***
	(0.0193)	(0.0193)	(0.0191)	(0.0204)
ΔNPL_{t-2}	0.1761***	0.1786***	0.1624***	0.0961***
	(0.0188)	(0.0187)	(0.0184)	(0.0176)
EBLLP	0.1765***	0.1770***	0.1527***	0.1010***
	(0.0186)	(0.0185)	(0.0189)	(0.0203)
$TOTAL\ RATIO_{t-1}$	-0.0001	-0.0001	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
$SIZE_{t-1}$	-0.0003**	-0.0004**	-0.0006***	0.0005
	(0.0001)	(0.0001)	(0.0002)	(0.0013)
GDP GROWTH	-0.0009***	-0.0008***	-0.0005***	-0.0005***
	(0.0001)	(0.0001)	(0.0001)	(0.0001)
GDP CAP	-0.0012*	-0.0014**	-0.0083***	-0.0122***
	(0.0007)	(0.0007)	(0.0026)	(0.0035)
INFLATION	-0.0003	0.0030	-0.0384***	-0.0290***
	(0.0087)	(0.0088)	(0.0092)	(0.0104)
POLITICAL STABILITY	-0.0003	-0.0010	0.0024	0.0048***
	(0.0008)	(0.0008)	(0.0015)	(0.0016)
GOVERNMENT EFFECTIVENESS	-0.0025	-0.0026	0.0014	-0.0004
	(0.0019)	(0.0019)	(0.0017)	(0.0018)
REGULATORY QUALITY	-0.0061***	-0.0059***	0.0005	-0.0006
	(0.0016)	(0.0015)	(0.0014)	(0.0016)
RULE OF LAW	-0.0059***	-0.0065***	0.0098***	0.0090***
	(0.0021)	(0.0021)	(0.0034)	(0.0031)
CONTROL OF CORRUPTION	0.0092***	0.0100***	-0.0062***	-0.0043***
	(0.0019)	(0.0019)	(0.0015)	(0.0015)
Country FE	No	No	Yes	No
Bank FE	No	No	No	Yes
Year FE	Yes	Yes	Yes	Yes
Observations	8,217	8,217	8,217	8,217
Adjusted R^2	0.451	0.460	0.498	0.727

Panel B: Dependent Variable is Earnings before LLP (*EBLLP*)			
	(1)	(2)	(3)
TAX RATE × GENERAL	**-0.0122**	**-0.0264**	**-0.0034**
	(0.0208)	**(0.0259)**	**(0.0249)**
Controls	Yes	Yes	Yes
Country FE	No	Yes	No
Bank FE	No	No	Yes
Year FE	Yes	Yes	Yes
Observations	8,217	8,217	8,217
Adjusted R^2	0.362	0.428	0.752

Panel C: Dependent Variable is Pre-Tax Income (*NIBT*)			
	(1)	(2)	(3)
TAX RATE × GENERAL	**-0.0650*****	**-0.0678*****	**-0.0481***
	(0.0157)	**(0.0245)**	**(0.0258)**
Controls	Yes	Yes	Yes
Country FE	No	Yes	No
Bank FE	No	No	Yes
Year FE	Yes	Yes	Yes
Observations	8,217	8,217	8,217
Adjusted R^2	0.311	0.347	0.669

Panel D: Cross-Sectional Test: Breakdown by Size	
TAX RATE × GENERAL	0.0390*
	(0.0207)
TAX RATE × GENERAL × LARGE	**0.0032**
	(0.0174)
TAX RATE × GENERAL + *TAX RATE × GENERAL × LARGE*	0.0422**
F-Statistic	4.82
Controls	Yes
Bank FE	Yes
Year FE	Yes
Observations	8,217
Adjusted R^2	0.728

Table 4: The Corporate Tax System and Loan Loss Provisions, Diff-in-Diff Analysis in the U.S. This table presents the results of estimating a modified version of equation 1 using quarterly data from U.S. banks over 1984 to 1989. The dependent variable is *LLP*, the bank's loan loss provision scaled by lagged total loans. The primary independent variable is the interaction term *GT500* × *POSTTRA*. *GT500* (the treatment group assignment) is an indicator variable equal to one for firms with total assets above $500 million in a quarter, and zero otherwise. *POSTTRA* (the post-treatment period) is an indicator variable equal to one for quarters after 1986, and zero otherwise. We create five different samples of treatment and control firms using five different bandwidths around the $500 million cutoff ranging from [$475m; $525m] to [$250m; $750m] around $500 million, based on average total assets in 1986 and 1987. The bandwidth for each model is indicated below the regression coefficients. Variables are described in Appendix A. We report robust standard errors clustered at the bank level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)
GT500	0.0008	0.0004	0.0004	0.0004	0.0002
	(0.0005)	(0.0007)	(0.0004)	(0.0003)	(0.0003)
POSTTRA	0.0014*	0.0007	0.0009*	0.0006**	0.0003**
	(0.0007)	(0.0006)	(0.0005)	(0.0003)	(0.0001)
GT500 × POSTTRA	**-0.0022****	**-0.0021****	**-0.0017*****	**-0.0014*****	**-0.0007*****
	(0.0009)	**(0.0009)**	**(0.0005)**	**(0.0004)**	**(0.0003)**
Controls	Yes	Yes	Yes	Yes	Yes
Bandwidth	[475m;525m]	[450m;550m]	[400m;600m]	[350m;650m]	[250m;750m]
Observations	360	748	2,833	5,169	11,745
Adjusted R^2	0.211	0.127	0.133	0.126	0.128

Table 5: The Corporate Tax System and Loan Loss Provision Timeliness. This table presents the results of estimating a modified version of equation 1 using the international sample of banks. The dependent variable is *LLP*, the bank's loan loss provision scaled by lagged total loans. The primary independent variable is the interaction of *TAX RATE*, the top statutory corporate tax rate centered around the sample average tax rate, and *GENERAL*, a dummy variable equal to one if general loan loss provisions are tax deductible and zero otherwise. In columns 1 and 2 (3 and 4), we additionally include interactions with *HIGH* Δ*NPL*, an indicator variable equal to one if the firm's change in non-performing loans from *t* to *t+1* (*t-1* to *t*) is above the median in that year, and zero otherwise). Variables are described in Appendix A. We report robust standard errors clustered at the bank level in parentheses. We also report the result of an F-Test of the joint significance of the double and triple interactions (columns 1 and 3). *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Breakdown by Future Change in Non-Performing Loans		**Breakdown by Current Change in Non-Performing Loans**	
	(1)	(2)	(3)	(4)
TAX RATE × GENERAL	0.0217		0.0298*	
	(0.0164)		(0.0172)	
TAX RATE × GENERAL × HIGH ΔNPL	**0.0325****	**0.0293****	**0.0238****	**0.0346****
	(0.0134)	**(0.0144)**	**(0.0119)**	**(0.0137)**
TAX RATE × GENERAL + TAX RATE × GENERAL × HIGH ΔNPL	0.0542***		0.0536***	
F-Statistic	7.22		7.18	
Controls	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes
Year FE	Yes	No	Yes	No
Country-Year FE	No	Yes	No	Yes
Observations	8,217	8,217	8,217	8,217
Adjusted R^2	0.729	0.746	0.728	0.745

Table 6: The Corporate Tax System and Loan Loss Provisions Informativeness. This table presents the results of estimating a modified version of equation 1 using the international sample of banks. The main dependent variable is *NCO*, the bank's future net charge-offs scaled by lagged total loans. We measure future net loan charge-offs at three different times: *t+1* plus *t+2* (columns 1 and 2), *t+1* (columns 3 and 4), and *t+2* (scaled by loans in *t+1*, columns 5 and 6). The main independent variable is *LLP*, the bank's loan loss provision scaled by lagged total loans. We include the full set of control variables as well as bank and year fixed effects. In Panel A, columns 1, 3, and 5 (2, 4, and 6), we run each model separately for country-years with GENERAL = 0 (GENERAL = 1). We compare the difference in coefficients below the coefficient estimates. In Panel B, we repeat this analysis but include only observations with GENERAL = 1. In Panel B, we split the same at the average tax rate in a country over the sample period. We use the median at the country level to have the same number of countries in each subsample. Variables are described in Appendix A. We report robust standard errors clustered at the bank level in parentheses. *, **, and *** denotes significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Breakdown by GENERAL

	NCO in t+1 and t+2		**NCO in t+1**		**NCO in t+2**	
	GENERAL = 0	GENERAL = 1	GENERAL = 0	GENERAL = 1	GENERAL = 0	GENERAL = 1
LLP	0.1475*	0.3767***	0.1669***	0.2358***	0.0649	0.2045**
	(0.0890)	(0.1427)	(0.0448)	(0.0824)	(0.0407)	(0.0798)
Difference in Coefficients [t-stat]	0.2292 [1.59]		0.0689 [0.85]		0.1396* [1.84]	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	3,071	1,736	4,102	2,235	3,263	2,005
Adjusted R^2	0.838	0.788	0.747	0.709	0.734	0.719

Panel B: Within GENERAL Analysis, Breakdown by TAX RATE

	NCO in t+1 and t+2		**NCO in t+1**		**NCO in t+2**	
	GENERAL = 1 & LOW TAX	GENERAL = 1& HIGH TAX	GENERAL = 1 & LOW TAX	GENERAL = 1 & HIGH TAX	GENERAL = 1 & LOW TAX	GENERAL = 1& HIGH TAX
LLP	0.0851	0.3852**	-0.0304	0.2641***	0.0652	0.1998**
	(0.1509)	(0.1587)	(0.1119)	(0.0949)	(0.1274)	(0.0878)
Difference in Coefficients [t-stat]	0.3001* [1.66]		0.2945*** [2.40]		0.1346 [1.08]	
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	302	1,434	411	1,824	329	1,676
Adjusted R^2	0.792	0.843	0.765	0.777	0.702	0.794

Table 7: The Corporate Tax System and Risk-Taking. This table presents the results of estimating a modified version of equation 1 using the international sample of banks. The dependent variables are Δ*NPL* in period *t* (column 1), Δ*NPL* in period *t+1* (column 2), Δ*INTEREST REVENUE* in period *t* (column 3), Δ*INTEREST REVENUE* in period *t+1* (column 4), Δ*INTEREST INCOME* in period *t* (column 5), and Δ*INTEREST INCOME* in period *t+1* (column 6). The primary independent variable is the interaction of *TAX RATE*, the top statutory corporate tax rate centered around the sample average tax rate, and *GENERAL*, a dummy variable equal to one if general loan loss provisions are tax deductible and zero otherwise. Variables are described in Appendix A. We report robust standard errors clustered at the bank level in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

	Change in NPL		**Change in Interest Revenue**		**Change in Interest Income**	
	t-1 – t	**t – t+1**	**t-1 – t**	**t – t+1**	**t-1 – t**	**t – t+1**
	(1)	(2)	(3)	(4)	(5)	(6)
TAX RATE	-0.0186	-0.0158	-0.0126	-0.0343	-0.0003	-0.0064
	(0.0157)	(0.0180)	(0.0406)	(0.0345)	(0.0194)	(0.0163)
GENERAL	-0.0071	-0.0051	-0.0054	-0.0041	-0.0035	-0.0018
	(0.0065)	(0.0080)	(0.0078)	(0.0078)	(0.0039)	(0.0029)
TAX RATE × GENERAL	**0.0249**	**0.0122**	**0.0171**	**0.0130**	**0.0161**	**0.0122**
	(0.0190)	**(0.0232)**	**(0.0258)**	**(0.0237)**	**(0.0129)**	**(0.0095)**
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	8,217	8,217	8,209	8,207	8,209	8,207
Adjusted R^2	0.295	0.275	0.331	0.331	0.376	0.261

Table 8: The Corporate Tax System and Loan Loss Provisions, Country-Level Cross-Sectional Tests. This table presents the results of estimating a modified version of equation 1 using the international sample of banks. The dependent variable is *LLP*, the bank's loan loss provision scaled by lagged total loans. The primary independent variable is the interaction of *TAX RATE*, the top statutory corporate tax rate centered around the sample average tax rate, and *GENERAL*, a dummy variable equal to one if general loan loss provisions are tax deductible and zero otherwise. In Panel A, we additionally include interactions with *LOW SUPERVISORY POWER*, which is an indicator variable equal to one if the country's supervisory power according to Barth, Caprio, and Levine (2013) is below the median. Panel B additionally includes interactions with *HIGH BTC*, an indicator variable equal to one if the country's book-tax conformity (own calculations) is above the median in that year. Variables are described in Appendix A. We report robust standard errors clustered at the bank level in parentheses. We also report the result of an F-Test of the joint significance of the double and triple interactions. *, **, and *** denote significance at the 10%, 5%, and 1% levels, respectively.

Panel A: Breakdown by Supervisory Power

TAX RATE × GENERAL	0.0089
	(0.0136)
TAX RATE × GENERAL × LOW SUPERVISORY POWER	**0.0686*** **
	(0.0163)
TAX RATE × GENERAL +	
TAX RATE × GENERAL × LOW SUPERVISORY POWER	0.0775***
F-Statistic	76.79
Controls	Yes
Year FE	Yes
Observations	8,217
Adjusted R^2	0.467

Panel B: Breakdown by Book-Tax Conformity

TAX RATE × GENERAL	0.0045	0.0106	-0.0015
	(0.0155)	(0.0155)	(0.0168)
TAX RATE × GENERAL × HIGH BTC	**0.0750*** **	**0.0382** **	**0.0549*** **
	(0.0180)	**(0.0161)**	**(0.0204)**
TAX RATE × GENERAL +			
TAX RATE × GENERAL × HIGH BTC	0.0795***	0.0488***	0.0534***
F-Statistic	71.09	15.42	7.17
Controls	Yes	Yes	Yes
Country FE	No	Yes	No
Bank FE	No	No	Yes
Year FE	Yes	Yes	Yes
Observations	8,217	8,217	8,217
Adjusted R^2	0.461	0.499	0.729