ORIGINAL RESEARCH

Banks' deferred tax assets during the financial crisis

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Abstract

Prior studies have demonstrated that the net deferred tax liabilities of industrial firms are valued by market participants in a manner consistent with an expected net present value. In this study, using a sample of bank holding companies, we address several issues not directly addressed in the prior studies. First, do market participants value a firm's net deferred assets similarly to how they value net deferred tax liabilities? Second, can a regulatory environment that provides incentives to defer recognition of deferred tax assets impact the valuation of net deferred tax assets? Third, does the valuation of net deferred assets change during an economic downturn? Fourth, can explicit or implicit government guarantees impact how firms' deferred tax assets may be valued? Using a sample of 433 banks from 2006 to 2010, we find that prior to the financial crisis of 2008 the components of net deferred tax assets of banks, other than those deferred tax assets related to NOLs, were viewed as valuable assets, similar to the deferred tax assets of industrial firms. The coefficient on deferred tax assets related to NOLs is negative throughout the period examined. Also, post-crisis, even the coefficients on the other components of deferred tax assets either became significantly negative or lost any positive association with stock prices, consistent with the assets being viewed primarily as an indicator of bankruptcy risk. We also find that, consistent with a market perception that a too-big-to-fail policy continues to exist, the valuation of large banks' deferred tax assets is less affected by the financial crisis.

Keywords Deferred tax assets · Banks · NOL carryforwards · Loan loss reserves

JEL Classification E44 · G01 · G10 · G18

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1 Introduction

Prior studies, using broad samples of industrial firms, find that deferred tax assets and liabilities have an association with stock price consistent with the probability and timing of future reversals.[1] However, one exception to the valuation of deferred tax assets and liabilities appears to exist. Amir et al. (1997) find that the deferred tax assets associated with net operating loss (NOL) carryforwards are negatively associated with stock price. The authors suggest that this evidence either indicates that investors believe some part of the NOL carryforwards may not be utilized or simply may exist because of model misspecification. Amir and Sougiannis (1999) suggest that these prior results may exist because NOL-related deferred taxes provide good news about future cash flows from the use of the NOLs to reduce future tax liabilities and bad news about future firm performance. They add controls for expected future firm performance and are able to get a positive coefficient on the deferred tax assets from NOL carryforwards. Their findings nicely summarize the tension inherent in the evaluation of deferred tax assets generated by operating losses: they have elements of both good and bad news.

The purpose of this paper is to provide a greater understanding of the weighting of the good and bad news in the interpretation of deferred tax assets related to NOLs and other deferred tax assets by addressing four issues beyond the scope of the prior literature. First, do market participants value a firm's net deferred assets similarly to how they value net deferred tax liabilities? Second, can a regulatory environment that provides incentives to defer recognition of deferred tax assets impact the valuation of net deferred tax assets? Third, does the valuation of net deferred assets change during an economic downturn? Fourth, can explicit or implicit government guarantees impact how firms' deferred tax assets may be valued? As explained below, we replace the industrial sample with a sample of banks to more efficiently address these issues.

Banks, unlike industrial firms, are more likely to have net deferred tax assets rather than net deferred tax liabilities. This is important because ASC 740 requires additional steps in the recognition process for deferred tax assets. While deferred tax liabilities are recognized in full, deferred tax assets are recognized only if it is "more likely than not" that the value will be realized in future periods.[2] If a firm does not believe it meets the "more likely than not" hurdle, then the book value of deferred tax assets must be reduced to the amount that meets the threshold. U. S. GAAP requires the use a contra-account called a valuation allowance to measure the portion of the deferred tax asset that will not be realized.[3] ASC 740 provides two objective standards not to set up a valuation reserve: (1) sufficient income in prior years to absorb NOL carrybacks, and (2) deferred tax liabilities currently recognized that will offset the losses created by the turnaround of deferred tax assets in the future. If a company cannot meet these objective tests, the decision of whether to establish a valuation allowance becomes a subjective exercise. Since banks generally have net

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[1] See for example, Amir et al. (1997). Also, Guenther and Sansing (2000) find that the market values deferred tax assets and liabilities at an amount approximating present value, which implies a valuation coefficient of less than one for deferred tax assets and liabilities which are reported at the sum of undiscounted future cash flows.

[2] See ASC 740 for more discussion of this requirement.

[3] Miller and Skinner (1998) report that the level of a firm's net operating loss carryforwards is the single most important explanatory variable for the existence of a valuation allowance which reduces the reported value of the deferred tax assets.

deferred tax assets, they often must determine the need for a valuation allowance by predicting future taxable income beyond the turnaround of deferred tax liabilities. This greater reliance on subjective measures of valuation may lead to a greater 'discounting' of the net deferred tax asset.

Skinner (2008) provides evidence on the importance of the role that deferred tax assets could have on the evaluation of bank solvency during a period of financial turmoil and related government intervention. He documents three changes in Japanese governmental regulatory policy, in addition to injections of cash, around the 1998 Japanese financial crisis in response to the public's concern that the financial industry might collapse. First, regulators permitted banks to elect to value investment securities at cost, so that they would not have to recognize losses on their portfolios. Second, it permitted banks to set up revaluation reserves to recognize gains on land investments. Third, to encourage banks to properly reserve for loan losses, regulators permitted the banks to set up partially offsetting deferred tax assets with broad discretion regarding whether they would create a valuation reserve for the deferred tax assets. This last provision resulted in Japanese banks recognizing net deferred tax assets of $55 billion dollars. Without these deferred tax assets, the banks would have been insolvent. Skinner (2008) concludes that Japanese regulators used deferred tax accounting as a part of a regulatory forbearance strategy, and that bank managers used these assets to bolster their banks' regulatory capital. This policy stayed in existence until 2003 when the head of the Japanese Institute of Certified Public Accountants sent out a letter to all Japanese auditing firms encouraging them to apply strict assessments of banks' DTAs.

While U.S. GAAP imposes a more stringent asymmetric hurdle for the recognition of deferred tax assets as compared to deferred tax liabilities, the magnitude of deferred assets reported by banks suggest that their valuation should be a more important factor for banks than industrial firms. As we document later in Table 1 for the banks in our sample, the average gross (net) deferred tax assets as a percentage of equity was 14.4% (9.5%) in 2008. These percentages are significantly greater than similar percentages for other industries.[4] Also, the major elements of deferred tax assets for banks, those related to previous net operating losses and those related to existing loan loss reserves, are the result of negative economic events and convey potentially bad news about a bank's future prospects. As a result, both major sources of banks' deferred tax assets might also suggest the need for a valuation allowance and its more subjective measurement approach.

U.S. banks face a regulatory environment that differs greatly from industrial firms. To avoid possible intervention by government regulators, banks are required to keep minimum capital levels. These levels are directly related to the amount of net deferred tax assets (liabilities) recognized. For example, the amount of Tier 1 legal capital that can be comprised of deferred tax assets that are dependent upon future taxable income, net of any valuation allowance, is currently limited for U.S. Banks to the lesser of: (A) the amounts of deferred tax assets expected to be realized within 1 year of the calendar quarter, based on projected future income; or (B) 10% of the amount of Tier 1 capital (before various exclusions). This restriction increases a bank's incentive to underestimate any expenses that are not currently deductible for tax purposes, such as loan loss reserves.

A significant downturn in the economy could increase the proportion of bad news in the interpretation of deferred tax assets related to NOLs and loan loss reserves. Unlike

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[4] Poterba et al. (2011) document that financial firms are more likely to have net deferred tax assets than non-financial firms.

Table 1 Sample and data

Panel A: sample selection

Unique banks with Y-9C filings and available financial statements	460
Less: banks without CRSP/Compustat data	27
Unique banks with available data	433
Total potential bank-year observations	2165
Missing data due to new banks, business combinations or bankruptcy filing	626
Bank-years with complete data for regressions	1539
Less: outlier observations	25
Trimmed regression sample (remove studentized residuals > 3.0)	1514

Panel B: summary statistics (means with medians in parentheses)

Variable	2006	2007	2008	2009	2010
N	324	312	301	297	280
PRC	28.816	20.592	14.859	13.334	15.576
	(25.220)	(17.605)	(11.960)	(9.060)	(11.835)
EPS	1.753	1.354	−0.257	−0.937	0.181
	(1.550)	(1.270)	(0.560)	(0.040)	(0.485)
BNKAE	0.278	−0.144	−1.780	−2.480	−1.251
	(0.297)	(−0.004)	(−0.773)	(−1.407)	(−0.656)
AT	27.040	24.348	35.815	37.040	40.136
	(1.914)	(1.912)	(1.804)	(1.844)	(1.981)
CEQ	2.323	2.173	2.259	2.926	3.422
	(0.162)	(0.165)	(0.147)	(0.133)	(0.158)
LOANS/AT	0.690	0.712	0.709	0.673	0.643
	(0.709)	(0.726)	(0.725)	(0.684)	(0.661)
LLR/LOANS	0.012	0.012	0.017	0.023	0.024
	(0.012)	(0.012)	(0.015)	(0.020)	(0.021)
DTAGRS/CEQ	0.071	0.072	0.144	0.200	0.267
	(0.064)	(0.063)	(0.095)	(0.119)	(0.122)
DTANET/CEQ	0.032	0.031	0.076	0.098	0.065
	(0.032)	(0.029)	(0.054)	(0.048)	(0.052)
DTALLR/CEQ	0.035	0.038	0.068	0.044	0.109
	(0.032)	(0.035)	(0.051)	(0.065)	(0.056)
DTANOL/CEQ	0.005	0.005	0.016	0.042	0.079
	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
VALALL/DTAGRS	0.014	0.017	0.051	0.117	0.143
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
CAPR1	11.221	10.638	11.020	11.654	12.756
	(10.765)	(10.170)	(10.830)	(11.830)	(12.765)

The beginning sample of 460 bank holding companies consisted of those banks that filed Y-9C reports reported on WRDS. The sample includes U.S. bank holding companies with consolidated assets of $500 million or more. The final sample includes 1514 bank-year observations for 433 unique bank holding companies. The final sample excludes any observations with a studentized residual >3 from the regression: $PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_6 NETDTA + \alpha_7 CAPR1 + \varepsilon$, where PRC is stock price; LIABPS is liabilities per share; OASSPS is assets per share (other than loans); NLONPS is loans net of reported loan loss reserve per share; BNKAE is the bank abnormal

industrial firms this is directly measurable for banks through the impact on the capital adequacy ratio. While Amir and Sougiannis (1999) were able to control for the bad news through adding control variables for future performance, they did not examine if these control variables were effective in a period of stress when prediction of future performance may be more difficult. We provide evidence regarding the effect of an economic downturn on the market's interpretation of the value of deferred tax assets by examining changes around a major event to the banking industry, the Financial Crisis of 2008.

Finally, questions remain over whether there is either a real or perceived 'too-big-to-fail' (TBTF) policy for large banks in the United States. TBTF was first espoused by the Comptroller of the Currency during the 1980s third world debt crisis. The biggest banks were thought too large to allow to fail because of the ramifications for the larger economy, thereby, making the U. S. government an effective guarantor for these institutions. The U. S. government did, however, allow a large financial institution, Lehman Brothers, to fail after the 2008 financial crisis and they have disavowed any continuing TBTF policy in the recent Dodd Frank Wall Street Reform and Consumer Protection Act of 2010 (Dodd Frank Act). Still, the government stepped in during the 2008 financial crisis on behalf of banks. How they will act in future crises is an open question. If the policy is still perceived to continue to exist, we would expect that the markets might view deferred tax assets differently for small and large banks.

In summary, even after controlling for future performance using Amir and Sougiannis (1999) model methods, we find that banks' deferred tax assets are significantly and negatively associated with stock price in pooled regressions for the entire 2006–2010 period. Next, we disaggregate the deferred tax asset into components that relate to their causal activities: (1) those related to NOL carryforwards, (2) those related to loan loss reserves, and (3) those related to other activities. We find that all three elements are either significantly and negatively related to stock price or experience significant negative changes in their association with stock prices after the financial crisis (i.e., there is no longer any positive association between deferred tax assets and stock prices).

When we partition the sample into large and small banks, we find that small banks have a negative relationship between the amount of the deferred tax asset related to NOLs and stock prices throughout the period while the coefficients on the other two elements of deferred tax assets are significantly negative only after the financial crisis. In contrast, we find that the coefficients on the deferred tax assets for the large banks remain largely insignificant throughout the entire sample period. This evidence is consistent with market participants anticipating the continuation of either a real or implicit TBTF policy during this sample period.

The remainder of this article is structured as follows. The next sections will provide the model development and the motivation for the hypotheses that we examine. Following that

are the sample description and descriptions of tests performed. Finally, results and conclusions are presented.

2 Model development

We use a version of the Feltham and Ohlson (1995) model proposed by Amir and Sougiannis (1999) which adds control variables to separate the information (bad news) and measurement (good news) aspects of the reported deferred tax assets related to loss carryforwards. Specifically, we relate banks' stock prices (PRC) to their total liabilities (LIABPS), other assets (OASSPS), net loans receivable (NLONPS), abnormal earnings (BNKAE), lagged abnormal earnings (L_BNKAE), deferred taxes (NETDTA), and—especially important for banks—the amount of Tier 1 legal capital reported on the Y9C filing (CAPR1). Notice that OASSPS + NLONPS − LIABPS + NETDTA = CEQ, or net book value of assets, per share. Abnormal earnings are calculated as operating income minus expected earnings where expected earnings are 10% of operating assets at the beginning of the period.[5] Consistent with prior studies, we add a lagged abnormal earnings variable to account for cross-sectional differences in earnings persistence.

Net loans receivable (NLONPS) are measured net of reported loan loss reserves. This allows us to observe the market interpretation of loan loss reserve in the estimated coefficient on the 'deferred tax asset related to loan loss reserves.' When both the loan loss reserve and the related deferred tax asset are included in the same regression, much of the explanatory power shifts to the primary measure, the loan loss reserve. The two numbers are highly correlated (Pearson, 0.870; Spearman, 0.952). Clearly, we are able to demonstrate our results using either the loan loss reserve or the 'deferred tax asset related to the loan loss reserve' and get similar results. This is different from the 'deferred tax asset related to NOL carryforwards' where the primary measure (the amount of NOL carryforward) is not recognized separately on the balance sheet. In this latter case, the deferred tax asset is the only variable available to explain variation in stock prices due to NOL carryforwards.

Because of a concern that the interpretation of deferred taxes may by complicated by changes in estimates of a firm's future performance, Amir and Sougiannis (1999) added two additional variables which allow the coefficients on both book value and abnormal earnings to take different values for firms that report deferred tax assets related to NOL carryforwards. Expected future performance should be weaker for firms that have had recent losses, so the coefficients on these variables should take negative values when significant. Our version of these two variables are DUMCEQ and DUMBAE. DUMCEQ is CEQ (above) multiplied by a dummy variable that is equal to one if a bank reports deferred tax assets related to NOL carryforwards. DUMBAE is BNKAE (above) multiplied by the same dummy variable.

Finally, we include a variable to capture the level of banks' legal capital, the Tier 1 capital ratio (CAPR1), as provided in banks' Y-9C filings. This variable measures a bank's legally-required level of capital reserves relative to risk-weighted assets. During our sample period, the minimum required level was 4% (subsequently raised to 6% minimum in

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[5] Compustat: $EPSPX_t - (0.10 * (CEQ_{t-1}/CSHO_{t-1}))$.

2013).[6] Interpretation of CAPR1 is complicated given it could capture the effects of bankruptcy risk or the effects of overinvestment in safer, low return assets. To the extent that the variable captures bankruptcy or government intervention risks due to an increased probability of the failure by a bank to maintain the required capital reserves, the coefficient on CAPR1 should be positive. However, a bank could maintain a relatively high CAPR1 ratio by overinvesting in less risky assets that would lead to a less profitable overall investment strategy. This overinvestment effect would suggest a negative coefficient on CAPR1. The complete model becomes (subscripts for firm and year suppressed):[7]

$$PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE$$
$$+ \alpha_6 NETDTA + \alpha_7 DUMCEQ + \alpha_8 DUMBAE + \alpha_9 CAPR1 + \varepsilon$$

(1)

Assuming investors viewed assets and liabilities as being priced fairly, we would predict coefficients of approximately one for loans (NLONPS) and other assets (OASSPS) and predict a coefficient of negative one for liabilities (LIABPS). The coefficient on abnormal earnings (BNKAE) should be positive and significant to the extent abnormal earnings persist. Assuming some decay in the persistence of abnormal earnings we expect a higher positive coefficient on current abnormal earnings relative to the coefficient on lagged abnormal earnings (L_BNKAE).

The estimated coefficient on banks' Tier 1 legal capital ratio (CAPR1) is somewhat more difficult to predict. A higher level of capital (above the required minimum of 4% during this time period) should suggest a healthier bank with lower chances of regulatory intervention. However, there is a cost to keeping significant amounts of wealth tied up in more liquid and, generally speaking, lower expected return types of investments. The more capital invested in less risky investments, the lower the expected overall return for the bank. The trade-off between safer investments and lower expected return is the essence of the risk-return relationship studied in finance. As a result, the implications for bank value are not easily predictable. Up to some level, increasing amounts of legal capital will help ensure a bank's survival through difficult economic times and avoid the possibility of regulatory intervention. Beyond the optimal level of legal capital, further investments in low expected return investments will depress a bank's overall expected return. During the financial crisis, it is possible that regulatory issues will dominate but we make no predictions on the predicted sign of this variable, on average.[8,9]

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[6] In unreported tests, we also added a dummy variable to indicate if a bank was in violation of its minimum capital adequacy ratio. The inclusion of this variable does not change the results reported through the paper.

[7] All variables are scaled by the number of shares outstanding.

[8] It should be noted that U.S. regulations severely restrict the amount of deferred tax assets that can count towards a bank's legal capital. The international BASEL accords governing banks have become increasingly restrictive in the amount of deferred tax assets that count towards banks' legal capital and are converging to a position very similar to that currently held in the U.S. The amount of Tier 1 legal capital that can be comprised of deferred tax assets that are dependent upon future taxable income, net of any valuation allowance, is currently limited to the lesser of: (A) the amounts of deferred tax assets expected to be realized within one year of the calendar quarter, based on projected future income; or (B) 10% of the amount of Tier 1 capital (before various exclusions).

[9] We considered two alternative approaches to capture risk; (1) the spread on credit default swaps and (2) a z-score. Unfortunately, credit default swap information is not available for most of the smaller banks in our sample. We did, however, add a z-score variable to our regression proposed by Li et al. (2017). We found that all definitions were highly correlated with CAPR1 and did not change any interpretation in the paper.

The estimated coefficient on the remaining variable in model 1, NETDTA, captures the market's valuation of the firm's net deferred tax asset (liability) position. Assuming deferred tax assets are viewed similarly to other assets this variable should have a coefficient approximately equal to one. However, given deferred taxes are not reported at present value but instead at the value at which they will turn around in the future, the coefficient should be positive but less than one if market participants discount the expected future cash flows. In the extreme, if the 'information' value conveyed by deferred tax assets dominates the 'measurement' value of future tax deductions, the coefficient on NETDTA would be equal to zero or negative.

Prior studies have disaggregated net deferred taxes to test if components of deferred taxes are valued similarly. We test the valuation of banks' deferred tax assets by estimating model 1 with the net deferred tax assets separated into the components most relevant to banks, the deferred tax assets related to net operating losses (DNOLPS), the deferred tax assets related to loan loss reserves (DLLRPS), and the residual deferred tax assets or liabilities (NDTAPS), as follows (subscripts for firm and year suppressed):[10]

$$PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_{6a} NDTAPS$$
$$+ \alpha_{6b} DNOLPS + \alpha_{6c} DLLRPS + \alpha_7 DUMCEQ + \alpha_8 DUMBAE + \alpha_9 CAPR1 + \varepsilon$$

$$(2)$$

If investors believe that the deferred tax assets and liabilities of banks are likely to be realized in a timely manner, the coefficient on each of the deferred tax asset variables should be significant and positive. The individual components of deferred tax assets, however, may differently reflect the 'measurement' (good news) and 'information' (bad news) aspects conveyed to market participants. In particular, both the 'deferred tax assets related to NOL carryforwards' which are created by recent operating losses and the 'deferred tax assets related to loan loss reserves' which are created by an increased assessment of uncollectible loans have significant potential to convey information about both the economy and future firm prospects. If the control variables, DUMBAE and DUMCEQ are insufficient to absorb the magnitude of bad news conveyed by increasing amounts of deferred tax assets during the financial crisis, we might expect to observe negative coefficients on some or all of the components of deferred tax assets in our regressions with bank stock prices.

3 Hypothesis development

In response to the negative coefficient on deferred tax assets related to NOL carryforwards observed in regressions explaining stock prices, Amir and Sougiannis (1999) add controls for future performance to the regression and are able to get a positive valuation coefficient on these deferred tax assets. Miller and Skinner (1998) find that the most important explanatory variable for the recognition of a valuation allowance is the existence of a deferred tax asset related to net operating losses. They conclude that deferred tax assets related to net operating loss carryforwards are more difficult for firms to realize. Skinner (2008)

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[10] DNOLPS and DLLRPS are negatively correlated. This is not surprising. DLLRPS is created when a firm records a reserve for loan losses for financial reporting purposes, but the firm is not yet eligible for an associated tax deduction. Later, when the loans are written off, a deduction is created for tax purposes resulting in a larger NOL and, therefore, increasing DNOLPS. Simultaneously with getting the tax deduction, the loan loss reserves are decreased and the associated deferred tax asset, DLLRP would be reduced by the same amount that DNOLPS is increasing.

documented that Japanese banks used the relaxation of their accounting rules to recognize deferred tax assets to improve their computed solvency ratios.

The 2006–2010 period for banks provides us with a unique opportunity to test the markets' evaluation of deferred tax assets for several reasons more directly. First, banks have significantly larger gross (net) deferred tax assets as a percentage of common equity, averaging 7.1% (3.2%) in 2006, relative to other industries that have on average net deferred tax liabilities. Therefore, banks must look to more sources of future income to avoid recognizing a valuation allowance than firms in other industries. Second, given the similarity in operating processes across banks, we are able to isolate two important sources of deferred tax assets, NOLS and loan loss reserves, which accounting for more than 100% of the net deferred tax asset balance for additional study. Third, the financial crisis of 2008 and the resulting Dodd Frank legislation had the most direct impact on the banking industry. As we discuss later, the average gross and net deferred tax assets for banks tripled between 2006 and 2008. The valuation allowance as a percentage of gross deferred tax assets also dramatically increased from 1.4% in 2006 to 14.3% in 2010. Beatty and Liao (2011) demonstrate the importance of regulation to the banking industry because sensitivity to regulatory constraints led to a decline in lending activities during a recessionary period.[11] Finally, we find, surprisingly, that none of the large U.S. banks set-up general valuation reserves in response to the recession suggesting that they viewed the financial crisis would have a lesser impact on future profitability than did the smaller banks.

Poterba et al. (2011) document that financial institutions are more likely to have net deferred tax assets than industrial firms and the amounts of the deferred tax assets are skewed in magnitude. The presence of a net deferred tax asset creates valuation implications not generally present for a net deferred tax liability. Under ASC 740, deferred tax assets are subject to the establishment of a valuation allowance unless it can be established that the firm can generate future income to absorb the future tax deductions represented by the deferred tax assets. When a firm has net deferred tax liabilities, it can avoid recognition of a valuation allowance through an objective test that demonstrates that the deferred tax liabilities will turn around (create future taxable income) during the period that the tax deductions represented by the deferred tax assets are realized. Therefore, in practice, valuation allowances on deferred tax assets for firms with net deferred tax liabilities are generally limited to instances of specific losses, such as net capital losses or continuing losses from a specific country or state. In contrast, firms with net deferred tax assets have to rely on two subjective tests to avoid recognition of a valuation allowance. First, they can demonstrate that they will generate taxable income in the future sufficient to absorb the deductions represented by the deferred tax assets. This may be difficult in years where firms report current operating losses. Second, they can demonstrate that the firm has feasible tax strategies, such as the recognition of a gain on the sale of a non-strategic asset, that can be used to absorb the tax deductions represented by the deferred tax assets. At a minimum, these requirements suggest that the valuation of net deferred tax assets is more complicated than that of net deferred tax liabilities.

Banks invest primarily in financial assets. In 2006, 68% of an average bank's assets were loans. Unlike operating assets of an industrial firm, these financial assets are valued at fair

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[11] Several of the prior studies focused on valuation of deferred taxes after an accounting pronouncement, the passage of FAS 109, *Accounting for Income Taxes*, or FAS 106, *Employers' Accounting for Post-Retirement Benefits Other Than Pensions*. Therefore, these studies did not attempt to address the impact of economic shocks and the implications for deferred taxes of the resulting changes to firm bankruptcy risk.

value on the balance sheet. Focusing on one industry that values its assets and liabilities at fair value permits a cleaner test of the implications of deferred taxes on firm value because we avoid any introduction of measurement error caused by failing to properly control for inter-industry differences. To provide a base test for comparability to prior studies of industrial firms, we test the following hypothesis using model 1:

H1 For our sample of banks, the net deferred tax assets are valued as assets with a coefficient less than one due to the discounting of net cash flows.

Similar to prior studies, we next disaggregate the net deferred tax asset into source-related components. After examining the financial statement footnotes, we determined that the banks consistently had two dominant components of deferred tax assets: deferred tax assets related to NOL carryforwards (DNOLPS) and deferred tax assets related to loan loss reserves (DLLRPS). The remaining net deferred tax assets are captured in the variable, NDTAPS. We separate deferred taxes from NOLs and loan loss reserves for two reasons. First, these two items are consistently the largest elements of deferred tax assets across banks and account for the entire net deferred tax asset position for the industry. Second, these two elements are most directly related to future bankruptcy risk. Based on the prior studies, we would expect DLLRPS and NDTAPS to be valued as assets, appropriately discounted for the time value of money.[12] Based on Amir and Sougiannis (1999), we would predict the same for DNOLPS. We test the following hypothesis using model 2:

H2 For our sample of banks, the components of deferred tax assets are valued as assets with a coefficient less than one due to the discounting of net cash flows.

Miller and Skinner (1998) find a link between deferred taxes related to net operating losses and the establishment of the valuation allowance. Also, Blaylock et al. (2012) demonstrate that temporary book-tax differences (like those represented by deferred tax assets) provide incremental information over the magnitude of accruals for the persistence of earnings. However, no prior study has directly tested if the financial markets' valuation of deferred taxes changes within a business cycle. Amir and Sougiannis (1999) address the dual good/bad nature of NOL-related deferred tax assets by adding controls for future performance in their model. However, they do not examine whether the balance of the good and bad news elements contained in the disclosure of NOLs or loan loss reserves change as an industry experiences extreme distress and how it changes the valuation of these elements.

Banks experienced an extreme industry-specific shock with the financial crisis of 2008 and the resulting Dodd Frank legislation. Primarily due to NOLs and increases in loan loss reserves, the net deferred tax assets reported by banks increased significantly after the crisis. Citigroup, for example, reported a net deferred tax asset of $4.697 billion in 2006 compared to a $46.052 billion in 2009. The financial collapse resulted in a need for a significant bail-out of many banks through the establishment of the Toxic Asset Recovery Program (TARP).

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[12] Mamun and Tannous (2018) found that an SEC action in 2001 lead to greater accuracy in the estimation of the loan loss reserve, suggesting greater confidence in the DLLRPS variable to capture the value of future cash flows.

To test if a significant economic crisis would change the valuation implications of deferred tax assets, we examine the change in the coefficient on deferred taxes from the 2006/07 pre-crisis period to the 2009/10 post-bailout period. Assuming that valuation of deferred tax assets is conditional on overall industry health, we predict the coefficient on deferred tax assets would decline in the later years of our study as investors become increasingly concerned about the ability of banks to utilize deferred tax assets in future periods. Observing a negative coefficient on deferred tax assets in the later period would suggest that the bad news conveyed by reporting increased amounts of deferred tax assets overwhelms any good news related to having increased future tax deductions. We expect that:

H3 For our sample of banks, the valuation coefficient on deferred tax assets will significantly decrease in the post-bailout period.

One unusual issue related to banks is the possibility that the U.S. government believes that some banks are too-big-to-fail (TBTF). O'Hara and Shaw (1990) document that the Comptroller of the Currency announced a TBTF policy during the third world debt crisis in the late 1980s which led to a premium in the valuation of large banks. Subsequently, the United States Government has taken actions that suggest an implicit source of support for larger banks in this country exists, as evidenced by actions taken during the recent financial crisis when some banks benefited through the Toxic Asset Relief Program (TARP). While a TBTF policy has been in place historically, the U.S. government has also taken actions to convince financial markets that this policy will not continue. First, the Federal Deposit Insurance Corporation Improvement Act of 1991 was enacted in response to the savings and loan crisis and explicitly disavowed the existence of a TBTF policy. Second, for the first time in recent history, the federal government permitted a large financial institution, Lehman Brothers, to fail during the financial crisis. Finally, Congress again affirmed in the Dodd Frank Wall Street Reform and Consumer Protection Act of 2010, that any TBTF policy, explicit or implicit, would no longer exist. The government has had an on-again, off-again history with TBTF.[13]

To examine the effect of TBTF around the financial crisis, we split the banks into two groups based on asset size. Banks in the top quintile (of each year) are classified as large banks while the remaining 80% of our sample is classified as small banks.[14] To the extent that markets perceive that a TBTF policy is in place providing support to only large banks, small banks should have relatively higher failure risk and correspondingly lower coefficients on deferred tax assets when explaining stock prices. In the event of a negative industry shock, this coefficient should become significantly smaller for small banks

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[13] Cyree et al. (2017) provide evidence of a continued presence of the TBTF policy during the financial crisis by demonstrating that larger banks were less likely to borrow through the Federal Reserve's term auction facility.

[14] We tested the sensitivity of the split two ways. First, we tested the top one-eighth of the banks versus the bottom seven-eighths. We also split the firms by classifying large banks as banks with total assets greater than $13 billion in 2006. The smaller banks all had assets of less than $11 billion. This was the largest natural split in asset size in our sample. Regressions reported using these splits are substantially similar to those reported in Tables 4 and 5. We also ran the regressions for each quintile. Results for the smallest three quintiles are substantially identical as those for the aggregated 80% small bank group. Results for the fourth largest quintile are similar to the small bank group but weaker. Berger and Bouwman (2013) also use total assets to partition their sample of banks into large and small.

as the appropriate discount rate on future cash flows increases. In the extreme, if reported deferred tax assets related to NOLs conveying more information about bankruptcy risk than they do about beneficial future tax reductions, we expect the coefficient on this component of deferred taxes to be significantly negative in the post-bailout period. We should not observe a similar decrease in the coefficient for large banks if these banks do not have similar changes to their perceived default risk. On the other hand, if the government's actions that allowed the collapse of Lehman Brothers or the enactment of Dodd Frank Act[15] removed the perception that a TBTF policy was effectively in place, we would expect a decrease in the coefficient on deferred tax assets related to NOLs for large banks similar to that observed for small banks. We test the following hypothesis:

H4 The deferred tax assets of small banks will be valued as assets in the pre-crisis period with a significant decline in the coefficient in the post-bailout period.

H4a If the market believes that the government will continue to act in a manner consistent with a TBTF policy, the coefficient on deferred taxes for large banks will remain positive in the pre-crisis period with no significant decline in the coefficient in the post-bailout period.

One reason we might not observe a decline in the valuation of deferred tax assets post-bailout is the fact that the Internal Revenue Service issued Notice 2008-78 suspending the restrictions imposed by Internal Revenue Code Section 382 on the use of net operating losses by banks after an ownership change. This notice had the effect of permitting an acquirer to fully utilize an acquired bank's net operating loss after a merger. After this regulatory change, the value of deferred tax assets related to NOL carryforwards no longer depended upon the ability of the originating bank to generate sufficient future taxable income. Therefore, deferred tax assets from the acquired bank could have increased value to an acquiring bank, resulting in the acquirer paying a higher price for the target bank. As a result, we would expect little or no change in the positive valuation of deferred tax assets related to NOL carryforwards for banks in the post-bailout period.[16] We expect that:

H5 If the action taken by the IRS through Notice 2008-78 increased the probability of realization of deferred tax assets related to NOLs, the coefficient on deferred taxes related to NOLs should not change for banks that had a high probability of takeover because of the financial crisis.

4 Sample selection and description

As reported in Panel A of Table 1, our sample of banks begins with 460 bank holding companies that filed Y-9C reports accessed through the Wharton Research Data Services (WRDS). The sample includes U.S. bank holding companies with consolidated assets of $500 million or more. For each bank-year, we collected required financial information

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[15] Akhigbe et al. (2016) provide evidence that Dodd-Frank reduced risk in the financial system which would support hypothesis 4.

[16] We initially use the small banks as a surrogate for takeover candidates, given the TBTF policy would not be available to these firms. As noted in the results, we rerun the pre-period observations identifying the 63 firms that were subsequently taken over to test the sensitivity of the identification.

about the deferred tax assets from either the SEC's Electronic Data Gathering, Analysis and Retrieval (EDGAR) system or from the banks' own websites. These bank-years were matched to CRSP to provide stock price information. The final sample consists of 1514 bank-year observations across the 5-year period from 433 unique bank holding companies. There are between 324 and 280 bank-year observations per year, decreasing with time during our sample period.

Panel B of Table 1 reports summary statistics for the bank sample. Consistent with the timing of the financial crisis, banks' mean earnings per share (EPS) is $1.75 in 2006, falling to a loss of $0.94 per share shortly after the crisis (2009) and then recovering to earnings of $0.18 per share by 2010. Consistent with the idea of a "credit crunch," loans make up approximately 69.0% of total assets in 2006 and 71.2% in 2007. This number decreases through the crisis and is only 64.3% of total assets by 2010. Loan loss reserves are 1.2% of total loans in 2006, but increase to 2.4% by 2010.

During our sample period, banks' gross deferred tax assets increase from 0.6% of total assets in 2006 to 1.4% by 2010 (not reported). While these numbers may seem small, banks are highly leveraged and the contribution of deferred tax assets to measures of net book value provide more insight about their importance to banks' financial strength. In 2006, gross deferred tax assets make up only 7.1% of net book value but this ratio increases to 26.7% in 2010. Net deferred tax assets (net of deferred tax liabilities) are 3.2% of net book value in 2006 but increase to 9.8% in 2009 before falling to 6.5% in 2010.

The mean deferred tax asset related to loan loss reserves, reported in Panel B, is 3.5% of net book value in 2006. This number increases to 10.9% of net book value in 2010. The mean deferred tax asset related to net operating loss carryforwards (DNOLPS) is 0.5% in 2006. It increases to 7.9% of net book value by 2010. Notice that the median values (in parentheses) of DNOLPS are very close to zero. Most firms report a zero balance for this account. Those that report NOLs are reporting very large corresponding deferred tax assets. The valuation allowances recognized during our time period begin at 1.4% of gross deferred tax assets in 2006 and increase to 14.3% by 2010. Again, the median values indicate that most banks report a valuation allowance of zero. Approximately 30% of our bank-year sample observations have a non-zero valuation allowance. However, for most banks this is a small number and pertains most often to foreign or state NOLs. The mean value of banks' Tier 1 legal capital (CAPR1) is 11.2% in 2006 but, after an initial decrease in 2007, increases through the financial crisis to a high of 12.8% in 2010.[17]

5 Results

The results for the estimation of the pooled regression of model 1 are reported in the first column of Table 2. As mentioned earlier, Amir et al. (1997) found a significant difference in the relationship between stock prices and financial assets as compared to the relationship between stock prices and operating assets. In contrast, we find that loans (NLONPS, $\alpha_3 = 1.298$), other assets (OASSPS, $\alpha_2 = 1.329$) and liabilities (LIABPS, $\alpha_1 = -1.314$) are valued similarly and with a coefficient of approximately one (negative one for LIABPS). This result is consistent with the fact that most operating assets

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[17] Of the 1514 bank-year observations, only ten banks reported CAPR1 at less than the required level of 4%. Also, less than 10% of the observations in any year were below the higher level of 6% that was required after 2011.

Table 2 Bank regressions: dependent variable is stock price, PRC; pooled 2006–2010

$$PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_6 NETDTA$$
$$[+\alpha_{6a} NDTAPS + \alpha_{6b} DNOLPS + \alpha_{6c} DLLRPS] + \alpha_7 DUMCEQ + \alpha_8 DUMBAE + \alpha_9 CAPR1 + \varepsilon$$

Variables		
N	1514	1514
Intercept	6.753***	6.486***
t-stat	(7.34)	(7.06)
LIABPS	− 1.314***	− 1.350***
t-stat	(− 26.29)	(− 26.92)
OASSPS	1.329***	1.363***
t-stat	(28.00)	(28.61)
NLONPS	1.298***	1.331***
t-stat	(28.38)	(28.87)
BNKAE	3.025***	3.055***
t-stat	(17.65)	(17.78)
L_BNKAE	0.701***	0.806***
t-stat	(6.58)	(7.38)
NETDTA	− 0.726***	
t-stat	(− 3.83)	
NDTAPS		− 0.520***
t-stat		(− 2.62)
DNOLPS		− 2.470***
t-stat		(− 6.24)
DLLRPS		− 0.588
t-stat		(− 1.34)
DUMCEQ	− 0.158***	− 0.140***
t-stat	(− 7.02)	(− 6.19)
DUMBAE	− 2.126***	− 2.095***
t-stat	(− 11.47)	(− 11.36)
CAPR1	− 0.284***	− 0.261***
t-stat	(− 4.01)	(− 3.70)
ADJ R^2	0.791	0.794

The beginning sample of 460 bank holding companies consisted of those banks that filed Y-9C reports reported on WRDS. The sample includes U.S. bank holding companies with consolidated assets of $500 million or more. The final sample includes 1514 bank-year observations for 433 unique bank holding companies. The final sample excludes any observations with a studentized residual >3 from the regression: $PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_6 NETDTA + \alpha_7 CAPR1 + \varepsilon$, where variables are as described below

PRC is stock price at fiscal year-end; LIABPS is liabilities per share (defined by total assets minus common shareholders' equity, and excluding NLONPS); OASSPS is other assets (other than loans); NLONPS is loans net of loan loss reserve per share; BNKAE is bank abnormal earnings per share; L_BNKAE is lagged bank abnormal earnings per share; NETDTA is the firm's reported net deferred tax assets per share; NDTPS is net deferred tax assets per share (excluding DNOLPS, DLLRPS); DNOLPS is deferred tax asset related to NOL carryforwards per share minus any valuation allowance per share (because these were universally related to carryforwards); DLLRPS is deferred tax assets related to loan loss reserve per share; DUMCEQ is a dummy variable times common equity per share and takes the value 1*CEQ (0 otherwise, CEQ = OASSPS + LONPS − LLRPS − LIABPS) when a bank has a non-zero amount of deferred tax assets from NOL carryforwards; and DUMBAE is a dummy variable times bank abnormal earnings and takes the value 1*BNKAE (0 otherwise) when a bank has a non-zero amount of deferred tax assets from NOL carryforwards; CAPR1 is the firm's Tier 1 Capital ratio in percent

Statistical significance indicated by asterisks: ***$\alpha < 0.01$; ** $\alpha < 0.05$; and *$\alpha < 0.10$

and liabilities of banks are recorded at fair value while operating assets of nonfinancial firms are recorded at amortized cost. Also consistent with prior studies, we find that both current abnormal earnings (BNKAE, $\alpha_4 = 3.025$) and lagged abnormal earnings (L_BNKAE, $\alpha_5 = 0.701$), are positively related to stock price. The coefficients on the control variables for indicated poor future performance, DUMCEQ ($\alpha_7 = -0.158$) and DUMBAE ($\alpha_8 = -2.126$), are negative, as predicted. The coefficient on the banks' Tier 1 legal capital (CAPR1, $\alpha_9 = -0.284$) is statistically negative, suggesting that the impact on expected return might dominate any bankruptcy-related interpretation of this variable.

The coefficient on the net deferred tax asset variable (NETDTA, $\alpha_6 = -0.726$) is significantly negative which is inconsistent with hypothesis 1 and also inconsistent with findings of both Amir et al. (1997) and Amir and Sougiannis (1999). One interpretation might be that the net deferred tax assets that are common for banks are valued differently than the net deferred tax liabilities predominant in the nonfinancial sectors given the greater subjectivity related to the recognition of net asset positions.

In the second column of Table 2, we disaggregate NETDTA into three component parts: the deferred tax asset related to net operating loss carryforwards (DNOLPS), the deferred tax asset related to loan loss reserves (DLLRPS), and the residual net deferred tax asset (NDTAPS = NETDTA − DLLRPS − DNOLPS). The coefficients on the variables that are not related to deferred income taxes are all similar to the amounts observed in the first column of Table 2. Again, unlike prior studies, we find a significantly negative coefficient on NDTAPS ($\alpha_{6a} = -0.520$) and DNOLPS ($\alpha_{6b} = -2.470$), and a negative but insignificant coefficient on DLLRPS ($\alpha_{6c} = -0.588$), even with the controls implemented by Amir and Sougiannis (1999) that enabled their model to measure a positive coefficient on the DNOLPS variable for industrial firms. This finding is inconsistent with hypothesis 2 and suggests that the news about potentially poor future performance dominates the good news about increased amounts of future tax deductions. This can be seen in the increased magnitude and statistical significance of the coefficient on DNOLPS—the deferred taxes associated with reported net operating losses. This result supports a hypothesis that net deferred tax assets may be valued differently than net deferred tax assets due to the different mix of good/bad news in the disclosure.

We next examine the impact of the financial crisis by focusing on the level and changes in the estimated coefficients of the deferred tax variables from the pre-crisis period (2006/07) to the post-crisis period (2009/10). The impact that the crisis had on the health of banks can be illustrated by the fact that the percentage of our sample banks reporting losses (as measured by Compustat's *epspx* variable) is 0.9% in 2006, 5.8% in 2007, 32.2% in 2008, 49.5% in 2009, and 33.6% in 2010. Hayn (1995) documents decreased information content for losses as compared to positive earnings. These findings suggest that the financial crisis should be associated with reduced information content for earnings (and lagged earnings). If banks with losses are more likely to fail, it seems more likely that the coefficient on DNOLPS will be negatively related to banks' stock prices.

We estimate Model 2 separately before and after the financial crisis and the results are reported in Table 3. Column A reports the 2006–2007 pre-crisis period and column C reports the 2009–2010 post-bailout period. Column B, the height of the financial crisis, is reported for completeness. It is difficult to interpret these variables given the drastic changes in the financial services industry at this time. Consistent with the fact that most assets and liabilities of banks are recorded at fair value, the coefficients on NLONPS, OASSPS, and LIABPS increase in magnitude after the financial crisis but remain approximately equal to one, highly significant, and similar to each other. Consistent with an

Table 3 Bank regressions: deferred taxes split into component parts and controlling for presence of NOL carryforwards

$$PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_{6a} NDTPS$$
$$+ \alpha_{6b} DNOLPS + \alpha_{6c} DLLRPS + \alpha_7 DUMCEQ + \alpha_8 DUMBAE + \alpha_9 CAPR1 + \varepsilon$$

Variables	[A]	[B]	[C]	Test of A=C
	Pooled (2006–2007)	2008	Pooled (2009–2010)	
N	636	301	577	1213
Intercept	1.681	4.107*	1.416	−0.264
t-stat	(1.17)	(1.86)	(1.31)	(−0.15)
LIABPS	−1.140***	−1.222***	−1.340***	−0.199**
t-stat	(−14.20)	(−11.15)	(−24.44)	(−2.07)
OASSPS	1.168***	1.224***	1.360***	0.192**
t-stat	(15.48)	(11.59)	(26.24)	(2.12)
NLONPS	1.128***	1.189***	1.307***	0.179**
t-stat	(15.00)	(11.85)	(25.79)	(1.99)
BNKAE	5.722***	2.171***	1.313***	−4.409***
t-stat	(13.32)	(6.68)	(7.55)	(−10.11)
L_BNKAE	2.352***	3.391***	0.277***	−2.074***
t-stat	(6.05)	(5.68)	(2.95)	(−5.66)
NDTAPS	0.704**	0.230	−0.880***	−1.584***
t-stat	(2.20)	(0.65)	(−3.53)	(−3.88)
DNOLPS	−2.569	−0.083	−1.775***	0.794
t-stat	(−1.45)	(−0.07)	(−5.33)	(0.48)
DLLRPS	3.845***	−0.457	−0.014	−3.858***
t-stat	(2.93)	(−0.64)	(−0.03)	(−2.96)
DUMCEQ	−0.012	−0.221***	−0.139***	−0.128***
t-stat	(−0.36)	(−3.79)	(−5.21)	(−2.98)
DUMBAE	−0.127	−1.805***	−0.927***	−0.800
t-stat	(−0.19)	(−5.42)	(−5.14)	(−1.26)
CAPR1	0.216*	0.045	−0.110	−0.326**
t-stat	(1.83)	(0.27)	(−1.48)	(−2.38)
ADJ R^2	0.828	0.659	0.894	

The beginning sample of 460 bank holding companies consisted of those banks that filed Y-9C reports reported on WRDS. The sample includes U.S. bank holding companies with consolidated assets of $500 million or more. The final sample includes 1514 bank-year observations for 433 unique bank holding companies. The final sample excludes any observations with a studentized residual >3 from the regression: $PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_6 NETDTA + \alpha_7 CAPR1 + \varepsilon$, where variables are as described below

PRC is stock price at fiscal year-end; LIABPS is liabilities per share (defined by total assets minus common shareholders' equity, and excluding NLONPS); OASSPS is other assets (other than loans); NLONPS is loans net of loan loss reserve per share; BNKAE is bank abnormal earnings per share; L_BNKAE is lagged bank abnormal earnings per share; NDTPS is net deferred tax assets per share (excluding DNOLPS, DLL-RPS); DNOLPS is deferred tax asset related to NOL carryforwards per share minus any valuation allowance per share (because these were universally related to carryforwards); DLLRPS is deferred tax assets related to loan loss reserve per share; DUMCEQ is a dummy variable times common equity per share and takes the value 1*CEQ (0 otherwise, CEQ=OASSPS+LONPS−LLRPS−LIABPS) when a bank has a non-zero amount of deferred tax assets from NOL carryforwards; and DUMBAE is a dummy variable times bank abnormal earnings and takes the value 1*BNKAE (0 otherwise) when a bank has a non-zero amount of deferred tax assets from NOL carryforwards; CAPR1 is the firm's Tier 1 Capital ratio in percent

Statistical significance indicated by asterisks: ***$\alpha < 0.01$; **$\alpha < 0.05$; and *$\alpha < 0.10$

increased frequency of losses, the coefficient on both earnings (BNKAE) and lagged earnings (L_BNKAE) decreased significantly subsequent to the crisis. The coefficients on both DUMCEQ and DUMBAE are not significantly different from zero before the crisis and become statistically negative afterwards. This is consistent with an increased bad news interpretation of firms reporting deferred tax assets related to NOL carryforwards. The coefficient on banks' Tier 1 legal capital ratio (CAPR1) is significantly positive before the crisis and not significantly negative afterwards. These results suggest that while the market interpreted CAPR1 as a measure of financial risk in the pre-financial crisis period, the importance of CAPR1 as a measure financial risk lessened in post-collapse period.

The coefficients on both deferred taxes related to the loan loss reserves (DLLRPS, $\alpha_{6c} = 3.845$) and 'other net deferred tax assets' (NDTAPS, $\alpha_{6a} = 0.704$) are significantly positive in the pre-crisis period, suggesting these are valued as assets by market participants, consistent with prior research and hypothesis 3. After the financial crisis (2009/10), the coefficient on deferred tax assets related to loan loss reserves (DLLRPS, $\alpha_{6c} = -0.014$) is insignificantly different from zero and the coefficient on 'other net deferred tax assets' (NDTAPS, $\alpha_{6a} = -0.880$) is significantly negative. The change in the estimated coefficients for both of these variables is statistically significant. While they are viewed positively in the pre-crisis period, increased levels of these deferred tax assets are associated with lower stock prices in the post-bailout period (or, at least, less positive for the DLLRPS variable). This finding supports a hypothesis that the interpretation of net deferred tax assets changes during a financial crisis due to increased bankruptcy risk that is not captured by traditional risk measures.

The coefficient on deferred tax assets related to NOLs (DNOLPS), while negative, is not significantly different from zero in the pre-crisis period (DNOLPS, $\alpha_{6b} = -2.569$), which is inconsistent with hypothesis 3. While decreasing in magnitude, this coefficient becomes negative and statistically significant in the post-bailout period (DNOLPS, $\alpha_{6b} = -1.775$). The change in the coefficient, however, is not statistically significant. This result, in combination with the results for the other two components of deferred tax assets, suggests that market participants are more focused on the potential information about default risk in the post-bailout period.

Next, we separate the banks into two samples based on size to examine the too-big-to-fail (TBTF) hypotheses. If market participants believe that the government will continue to act in a manner consistent with a TBTF policy, we would predict that investors would be less likely to view increased 'deferred tax assets related to loan loss reserves' or 'deferred tax assets related to NOL carryforwards' as bad news for large banks because these banks are more likely to survive difficult economic periods. Therefore, these variables should be less negative (compared to smaller banks) when explaining stock prices. Table 4 reports the results of estimating model 2 for the subsamples of the small and large banks. Similar to the regression results for the complete sample, the coefficients on the liabilities (LIABPS, small $\alpha_1 = -1.274$, large $\alpha_1 = -1.220$), other assets (OASSPS, small $\alpha_2 = 1.288$, large $\alpha_2 = 1.233$), and loans (NLONPS, small $\alpha_3 = 1.250$, large $\alpha_3 = 1.227$) are all statistically significant and are close to one. The differences in coefficients between the two groups are not statistically significant. The coefficients on abnormal earnings (BNKAE, small $\alpha_4 = 2.629$, large $\alpha_4 = 4.873$) and the 1-year lagged abnormal earnings (L_BNKAE, small $\alpha_5 = 0.920$, large $\alpha_5 = 0.608$) are significantly positive for both groups. Compared to the small banks, current abnormal earnings appear to be more important for large banks while lagged earnings is less important for this group. The two controls for future performance DUMCEQ and DUMBAE are both significantly negative as predicted for both the small banks and the large banks. DUMBAE, the dummy variable on abnormal earnings,

Table 4 Bank regressions split by firm size: dependent variable is stock price, PRC; pooled 2006–2010

$$PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_{6a} NDTAPS$$
$$+ \alpha_{6b} DNOLPS + \alpha_{6c} DLLRPS + \alpha_7 DUMCEQ + \alpha_8 DUMBAE + \alpha_9 CAPR1 + \varepsilon$$

Variables	[A]	[B]	Test of A = B
	Pooled small banks	Pooled large banks	
N	1244	270	
Intercept	6.751***	6.372**	−0.379
t-stat	(6.64)	(2.30)	(−0.16)
LIABPS	−1.274***	−1.220***	0.054
t-stat	(−22.02)	(−9.80)	(0.48)
OASSPS	1.288***	1.233***	−0.054
t-stat	(23.42)	(10.40)	(−0.50)
NLONPS	1.250***	1.227***	−0.023
t-stat	(23.23)	(10.76)	(−0.22)
BNKAE	2.629***	4.873***	2.244***
t-stat	(15.36)	(9.09)	(5.02)
L_BNKAE	0.920***	0.608**	−0.313
t-stat	(8.05)	(1.98)	(−1.19)
NDTAPS	−0.475*	0.140	0.614
t-stat	(−1.79)	(0.36)	(1.49)
DNOLPS	−2.617***	0.395	3.012**
t-stat	(−6.34)	(0.24)	(2.27)
DLLRPS	−0.944*	−0.745	0.199
t-stat	(−1.94)	(−0.61)	(0.19)
DUMCEQ	−0.160***	−0.175***	−0.015
t-stat	(−5.45)	(−3.83)	(−0.32)
DUMBAE	−1.859***	−3.225***	−1.366***
t-stat	(−9.96)	(−5.73)	(−2.89)
CAPR1	−0.179**	−0.078	0.101
t-stat	(−2.44)	(−0.31)	(0.50)
ADJ R^2	0.659	0.873	

The beginning sample of 460 bank holding companies consisted of those banks that filed Y-9C reports reported on WRDS. The sample includes U.S. bank holding companies with consolidated assets of $500 million or more. The final sample includes 1514 bank-year observations for 433 unique bank holding companies. The final sample excludes any observations with a studentized residual > 3 from the regression: $PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_6 NETDTA + \alpha_7 CAPR1 + \varepsilon$, where variables are as described below

PRC is stock price at fiscal year-end; LIABPS is liabilities per share (defined by total assets minus common shareholders' equity, and excluding NLONPS); OASSPS is other assets (other than loans); NLONPS is loans net of loan loss reserve per share; BNKAE is bank abnormal earnings per share; L_BNKAE is lagged bank abnormal earnings per share; NDTPS is net deferred tax assets per share (excluding DNOLPS, DLL-RPS); DNOLPS is deferred tax asset related to NOL carryforwards per share minus any valuation allowance per share (because these were universally related to carryforwards); DLLRPS is deferred tax assets related to loan loss reserve per share; DUMCEQ is a dummy variable times common equity per share and takes the value 1*CEQ (0 otherwise, CEQ = OASSPS + LONPS − LLRPS − LIABPS) when a bank has a non-zero amount of deferred tax assets from NOL carryforwards; and DUMBAE is a dummy variable times bank abnormal earnings and takes the value 1*BNKAE (0 otherwise) when a bank has a non-zero amount of deferred tax assets from NOL carryforwards; CAPR1 is the firm's Tier 1 Capital ratio in percent

Statistical significance indicated by asterisks: ***$\alpha < 0.01$; **$\alpha < 0.05$; and *$\alpha < 0.10$

is significantly more important for the large bank sample. The coefficient of banks' Tier 1 legal capital, CAPR1, is significantly negative only for the small banks, suggesting that viewing CAPR1 as a measure of overinvestment in safer assets is limited only to the behavior of smaller banks.

The coefficients on the three components of deferred taxes, however, differ across the two groups. For the small banks, the estimated coefficient on each of the DTA variables (NDTAPS, $\alpha_{6a} = -0.475$, DNOLPS, $\alpha_{6b} = -2.617$, and DLLRPS, $\alpha_{6c} = -0.944$) are negative (two of them only weakly), supporting a hypothesis that the market views deferred tax assets as a measure of bankruptcy risk even after controlling for future performance. In contrast, for the sample of large banks only the coefficient on the deferred tax asset related to the loan loss reserve (DLLRPS, $\alpha_{6c} = -0.745$) is negative and none of the three are significantly different from zero. The difference between the estimated coefficients for small and large banks is statistically significant only for the coefficient on DNOLPS (small $\alpha_{6b} = -2.617$, large $\alpha_{6b} = 0.395$). The non-negative coefficient for large banks suggests that the bad news interpretation of these deferred tax assets for large banks is less than for small banks, and provides some support that the market acted as if there was a TBTF policy in place during the financial crisis period in spite of denials by the U.S. government.

Table 5 provides evidence on how the financial crisis affected the interpretation of the results based on firm size by testing the differences in coefficient estimates from the pre-crisis (2006/07) period and the post-bailout (2009/2010) separately for the small and large banks. The results for small banks are reported in the leftmost 4 columns of Table 5. For small banks, the coefficients on liabilities (LIABPS), loans (NLONPS) and other assets (OASSPS) are not significantly different in the pre-crisis and post-bailout periods. Similar to the full sample results, these coefficients are all close to one, consistent with these amounts being reported at values close to fair value. In contrast, the financial crisis had a significant effect on many of the remaining control variables. The coefficients on the two measures of abnormal earnings (BNKAE and L_BNKAE) both become significantly less positive, consistent with earnings providing less information about firm value during the crisis. The controls for future performance of small banks (DUMCEQ and DUMBAE) also change pre-crisis and post-bailout. The dummy variable on book value becomes significantly more negative while the dummy variable on abnormal earnings remains negative and significant both before and after the crisis (the change is not statistically significant). The coefficient on banks' Tier 1 legal capital, CAPR1, does not play an important role before or after the crisis for the small banks.

For small banks, the financial crisis changes the interpretation of the estimated coefficients for two of the three categories of deferred tax assets. Prior to the financial crisis, only the deferred taxes associated with NOL carryforwards, DNOLPS, have a negative association with prices. Consistent with hypothesis 3, the coefficient on 'other deferred tax assets' (NDTAPS) and the 'deferred tax assets related to loan loss reserves' (DLLRPS) are valued as assets in the pre-crisis period but the coefficients decline significantly in the post-bailout period. Inconsistent with hypothesis 3, the coefficient on the deferred tax assets associated with NOL carryforwards (DNOLPS) is significantly negative in both the pre-crisis and post-bailout periods.

By comparison, the results for large banks are reported in the rightmost 4 columns of Table 5. The coefficients on liabilities (LIABPS), loans (NLONPS) and other assets (OASSPS) are not significantly different between the pre-crisis and post-bailout periods. The values of these coefficients are again close to one. The coefficients on abnormal earnings (BNKAE) and lagged abnormal earnings (L_BNKAE) both decrease, but the change is not statistically significant. The controls for future performance (DUMCEQ and

Table 5 Large compared to small banks. Bank regressions: deferred taxes split into component parts and controlling for presence of NOL carryforwards

$$PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_{6a} NDTPS + \alpha_{6b} DNOLPS + \alpha_{6c} DLLRPS + \alpha_7 DUMCEQ + \alpha_8 DUMBAE + \alpha_9 CAPR1 + \varepsilon$$

Variables	Small banks				Large banks			
	[A]	[B]	[C]	Test of A=C	[D]	[E]	[F]	Test of D=F
	Pooled (2006–2007)	2008	Pooled (2009–2010)		Pooled (2006–2007)	2008	Pooled (2009–2010)	
N	524	249	471	995	112	52	106	218
Intercept	2.926*	2.120	2.486**	−0.440	−12.539*	13.081	4.138	16.677**
t-stat	(1.88)	(0.92)	(2.14)	(−0.23)	(−1.94)	(1.66)	(1.35)	(2.45)
LIABPS	−1.232***	−1.355***	−1.255***	−0.023	−1.157***	−0.827***	−1.131***	0.027
t-stat	(−13.93)	(−10.71)	(−20.44)	(−0.22)	(−5.15)	(−3.02)	(−8.14)	(0.10)
OASSPS	1.270***	1.376***	1.277***	0.006	1.174***	0.844***	1.169***	−0.006
t-stat	(15.28)	(11.39)	(21.73)	(0.06)	(5.50)	(3.19)	(8.94)	(−0.02)
NLONPS	1.217***	1.304***	1.214***	−0.003	1.152***	0.826***	1.165***	0.013
t-stat	(14.62)	(11.03)	(21.27)	(−0.03)	(5.43)	(3.35)	(9.16)	(0.05)
BNKAE	5.365***	1.626***	1.166***	−4.199***	6.009***	3.631***	4.383***	−1.627
t-stat	(12.02)	(4.56)	(7.12)	(−9.39)	(4.87)	(4.68)	(5.62)	(−1.11)
L_BNKAE	2.813***	3.886***	0.315***	−2.497***	1.600	2.000	0.364	−1.236
t-stat	(7.19)	(5.81)	(3.29)	(−6.71)	(1.30)	(1.46)	(1.45)	(−1.13)
NDTAPS	2.001***	0.232	−0.920***	−2.921***	0.223	0.632	0.427	0.204
t-stat	(3.47)	(0.53)	(−3.24)	(−4.73)	(0.38)	(0.75)	(0.73)	(0.22)
DNOLPS	−3.825**	−0.563	−1.955***	1.869	8.605	1.391	0.027	−8.578
t-stat	(−2.31)	(−0.49)	(−5.38)	(1.20)	(0.97)	(0.28)	(0.02)	(−1.13)
DLLRPS	2.515*	−0.401	−0.202	−2.717*	4.402	−0.176	−1.608	−6.010*
t-stat	(1.84)	(−0.53)	(−0.36)	(−1.94)	(1.26)	(−0.06)	(−1.55)	(−1.84)
DUMCEQ	−0.037	−0.110	−0.153***	−0.116**	−0.089	−0.395***	−0.352***	−0.262**
t-stat	(−0.90)	(−1.59)	(−4.24)	(−2.10)	(−1.01)	(−3.29)	(−6.40)	(−2.51)
DUMBAE	−1.554**	−1.497***	−0.825***	0.728	3.693**	−2.431***	−3.651***	−7.344***

Table 5 (continued)

Variables	Small banks				Large banks			
	[A]	[B]	[C]	Test of A=C	[D]	[E]	[F]	Test of D=F
	Pooled (2006–2007)	2008	Pooled (2009–2010)		Pooled (2006–2007)	2008	Pooled (2009–2010)	
t-stat	(−2.21)	(−4.10)	(−4.78)	(1.09)	(2.01)	(−3.04)	(−4.65)	(−3.94)
CAPR1	0.033	0.046	−0.049	−0.082	1.747**	−0.088	−0.149	−1.896***
t-stat	(0.27)	(0.27)	(−0.65)	(−0.58)	(2.61)	(−0.14)	(−0.61)	(−2.91)
ADJ R²	0.697	0.616	0.778		0.885	0.719	0.956	

The beginning sample of 460 bank holding companies consisted of those banks that filed Y-9C reports on WRDS. The sample includes U.S. bank holding companies with consolidated assets of $500 million or more. The final sample includes 1514 bank-year observations for 433 unique bank holding companies. The final sample excludes any observations with a studentized residual >3 from the regression: $PRC = \alpha_0 + \alpha_1 LIABPS + \alpha_2 OASSPS + \alpha_3 NLONPS + \alpha_4 BNKAE + \alpha_5 L\_BNKAE + \alpha_6 NETDTA + \alpha_7 CAPR1 + \varepsilon$, where variables are as described below

PRC is stock price at fiscal year-end; LIABPS is liabilities per share (defined by total assets minus common shareholders' equity, and excluding NLONPS); OASSPS is other assets (other than loans) per share; NLONPS is loans net of loan loss reserve per share; BNKAE is bank abnormal earnings per share; L_BNKAE is lagged bank abnormal earnings per share; NDTPS is net deferred tax assets per share (excluding DNOLPS, DLLRPS); DNOLPS is deferred tax asset related to NOL carryforwards per share minus any valuation allowance per share (because these were universally related to carryforwards); DLLRPS is deferred tax assets related to loan loss reserve per share; DUMCEQ is a dummy variable times common equity per share and takes the value 1*CEQ (0 otherwise, CEQ = OASSPS + LONPS − LLRPS − LIABPS) when a bank has a non-zero amount of deferred tax assets from NOL carryforwards; and DUMBAE is a dummy variable times bank abnormal earnings and takes the value 1*BNKAE (0 otherwise) when a bank has a non-zero amount of deferred tax assets from NOL carryforwards; CAPR1 is the firm's Tier 1 Capital ratio in percent

Statistical significance indicated by asterisks: ***α < 0.01; **α < 0.05; and *α < 0.10

DUMBAE) decline significantly, changing from positive or indistinguishable from zero in the pre-crisis period to significantly negative in the post-bailout period. The coefficient on large banks' Tier 1 legal capital ratios is statistically positive in the pre-crisis period and becomes negative in the post-period, but not significantly so.

The financial crisis did not dramatically change the interpretation of the estimated coefficients on the three categories of deferred tax assets for large banks. The coefficient on the deferred tax assets associated with loan loss reserves (DLLRPS) is positive but indistinguishable from zero in the pre-crisis period but becomes negative in the post-bailout period. The coefficient on both the deferred tax assets associated with NOL carryforwards (DNOLPS) and the other deferred tax assets (NDTAPS) are positive but not distinguishable from zero in both the pre-crisis and post-bailout periods.

The separate examination of the banks by size provides some evidence consistent with the continued perception of a TBTF policy supporting large U.S. banks. For small banks, the estimated coefficients on other deferred tax assets (NDTAPS, $\alpha_{6a} = 2.001$) and deferred tax assets related to the loan loss reserve (DLLRPS, $\alpha_{6c} = 2.515$) are significant and positive in the pre-crisis period (2006/07) consistent with prior studies of industrial firms. However, both coefficients decline significantly in the 2009/10 post-bailout period (NDTAPS, $\alpha_{6a} = -0.920$ and DLLRPS, $\alpha_{6c} = -0.202$). This change is significant for both variables. These results suggest, at a minimum that market participants change their estimate of the realizability of deferred tax assets for small banks because of the financial crisis. In contrast, the coefficient on the deferred tax asset related to NOLs is significantly negative in both the pre-crisis (DNOLPS, $\alpha_{6b} = -3.825$) and the post-bailout periods (DNOLPS, $\alpha_{6b} = -1.955$). This suggests that deferred tax assets related to NOLs, at least for banks, are not valued as assets but as measures of bankruptcy risk and this interpretation is not affected by industry shocks.

For the large banks, the coefficients on all three types of the deferred tax assets (NDTAPS, $\alpha_{6a} = 0.223$; DNOLPS, $\alpha_{6b} = 8.605$; and DLLRPS, $\alpha_{6c} = 4.402$), while positive in the pre-crisis period are not significantly different from zero. Also, while the magnitude of two of these estimated coefficients decline in the post-bailout period, none of the changes are significant at traditional levels and only the coefficient on the deferred tax assets related to the loan loss reserves (DLLRPS, $\alpha_{6c} = -1.608$) is weakly negative. Because the recoverability of the deferred tax assets does not appear to change in the pre-crisis and post-bailout periods, these results provide some support that the market perceives the existence of a continuing TBTF policy even after the failure of Lehman Brothers. The valuation implications of reported deferred tax assets change much more for small banks, and in a manner consistent with the crisis changing the prospects for the future realization of the values inherent in these deferred tax assets.

Hypothesis 5 would be supported by a finding that the coefficient on the 'deferred tax assets related to NOL carryforwards increased for firms likely to be taken over as a result the U.S. government's suspension of the code Section 382 restrictions on the use of NOLs. Using the small firms as a surrogate for takeover candidates, the results shown in Table 5 for small banks does not support this hypothesis. As noted earlier, the coefficient on DNOLPS is significant in both periods. One concern with using small firms as a surrogate for takeover candidates is the fact that many were not taken over. Therefore, we reran the pre-crisis results for the 68 banks that were taken over because of the crisis. The 2006/07 coefficient on these banks was -6.60, significant at the .02 level, similar to the small banks. Only 10 banks survived the crisis so we were not able to estimate the post-acquisition effect for those taken over.

6 Conclusions

In this paper, we examine the information contained in reported deferred tax assets for banks during the recent 2008 financial crisis. Deferred tax assets should play a positive role in valuation if they represent available future tax savings. Deferred tax assets, however, have a dual nature to the information that they convey to markets. First, they represent future tax savings. Second, specific deferred tax assets such as those related to NOL carryforwards and loan loss reserves are created because of poor economic performance and, therefore, convey negative information about expected future performance (if current losses make future losses more likely). Prior research on net deferred tax liabilities has been able to separately identify the good and bad news components of reported deferred taxes.

For our sample of banks, we find that the interpretation of reported deferred tax assets especially during the financial crisis is more complicated than described in the prior literature. The negative news aspect of deferred tax assets dominates an interpretation based on future tax savings during this period even when using controls for the future performance element of their information content. Both the net deferred tax asset and the separate components of deferred tax assets (those related to loan loss reserves, those related to net operating loss carryforwards, and the residual 'other' deferred tax assets) have a negative association with bank stock prices in the full sample for the 2006 through 2010 period.

When we look before and after the financial crisis, we find evidence that this negative interpretation is exacerbated by the crisis. Before the financial crisis, only the deferred tax assets associated with net operating loss carryforwards have a negative association with bank stock prices. After the financial crisis, all of the identified components of deferred tax assets have a negative association with prices. While the possible interpretation of reported deferred tax assets associated with net operating loss carryforwards (DNOLPS) and loan loss reserves (DLLRPS) might become negative in times of financial hardship, the observation that 'other' deferred tax assets (NDTAPS) also has a negative association with stock prices is more difficult to rationalize. It is possible that this element of deferred tax assets includes additional assets that were written down because of the negative economic news conveyed during the crisis.

It is also possible that the interpretation of reported deferred tax assets differs for large banks if these banks have reduced default probabilities. The possibility that large banks might expect government assistance if they run into trouble is referred to as a government "too-big-to-fail" policy (TBTF). If a bank's future is essentially guaranteed, there is an increased likelihood that the value inherent in reported deferred tax assets will be realized. We partition the sample into large (top quintile based on rankings by total assets) and small banks.

For small banks, we find that elements of deferred taxes that are viewed positively in the pre-financial crisis period are interpreted differently in the post-bailout period. When partitioned into the three components discussed above, only the deferred taxes associated with net operating loss carryforwards (DNOLPS) have a negative association with stock prices before the financial crisis. After the crisis event, all three components of deferred tax assets have a negative association with bank stock prices. In contrast, we find that reported deferred tax assets have little association with bank stock prices for large banks. This reduced association with prices can be interpreted as support for a continuing TBTF policy, suggesting the market expected the government to act in a manner consistent with a policy of TBTF during this period and ascribed a reduced probability of default for large

banks as a result. However, even for the larger banks, we find no evidence that the net deferred tax assets are viewed as assets during a period of crisis. Finally, we found no significant impact of the suspension of Section 382 restrictions on our results. We suggest that future research might attempt to replicate our study for industrial firms during a period of crisis to see if prior results hold in a post-crisis environment for industrial firms.

References

Akhigbe A, Martin A, Whyte A (2016) Dodd-Frank and risk in the financial services industry. Rev Quant Finance Account 47(2):395–417

Amir E, Sougiannis T (1999) Analysts' interpretation and investors' valuation of tax carryforwards. Contemp Account Res 16(1):1–33

Amir E, Kirshenheiter M, Willard K (1997) The valuation of deferred taxes. Contemp Account Res 14(4):597–622

Beatty A, Liao S (2011) Do delays in expected loss recognition affect banks' willingness to lend? J Account Econ 52:1–20

Berger A, Bouwman C (2013) How does capital affect bank performance during financial crises? J Financ Econ 109:146–176

Blaylock B, Shevlin T, Wilson R (2012) Tax avoidance, large positive temporary book-tax differences, and earnings persistence. Account Rev 87(1):91–120

Cyree K, Griffiths M, Winters D (2017) Implications of a TAF program stigma for lenders: the case of publicly traded banks versus private banks. Rev Quant Finance Account 49(2):545–567

Feltham G, Olson J (1995) Valuation and clean surplus accounting for operating and financial activities. Contemp Account Res 11(2):689–731

Guenther D, Sansing R (2000) Valuation of the firm in the presence of temporary book-tax differences: the role of deferred tax assets and liabilities. Account Rev 75(1):1–12

Hayn C (1995) The information content of losses. J Account Econ 20(2):125–153

Li X, Tripe D, Malone C (2017) Measuring bank risk: an exploration of Z-score. Massey University. Working paper

Mamun A, Tannous G (2018) Did the regulatory changes of 1999 and 2001 affect income smoothing behavior of US banks. Rev Quant Finance Account 50:1–27

Miller G, Skinner D (1998) Determinants of the valuation allowance for deferred tax assets under SFAS no. 109. Account Rev 73(2):213–233

O'Hara M, Shaw W (1990) Deposit insurance and wealth effects: the value of being 'too big to fail'. J Finance 45(5):1587–1600

Poterba J, Rao N, Seidman J (2011) Deferred tax positions and incentives for corporate behavior around corporate tax changes. Natl Tax J 64(1):27–58

Skinner D (2008) The rise of deferred tax assets in Japan: the role of deferred tax accounting in the Japanese banking crisis. J Account Econ 46:218–239