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Working Paper

Beauty is in the eye of the beholder: The effect of corporate tax avoidance on the cost of bank loans

Bank of Finland Research Discussion Papers, No. 3/2014

Provided in Cooperation with:
Bank of Finland, Helsinki

Suggested Citation: Hasan, Iftekhar; Wu, Qiang; Zhang, Hao; Hoi, Chun-Keung (Stan) (2014) : Beauty is in the eye of the beholder: The effect of corporate tax avoidance on the cost of bank loans, Bank of Finland Research Discussion Papers, No. 3/2014, ISBN 978-952-6699-65-3, Bank of Finland, Helsinki,
https://nbn-resolving.de/urn:nbn:fi:bof-20140807160

This Version is available at:
https://hdl.handle.net/10419/212278

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Beauty is in the eye of the beholder:
The effect of corporate tax avoidance on the cost of bank loans

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Abstract: We find that firms with greater tax avoidance incur higher spreads when obtaining bank loans. This finding is robust in a battery of sensitivity analyses and in two quasi-experimental settings including the implementation of Financial Accounting Standards Board Interpretation No. 48 and the revelation of past tax sheltering activity. Firms with greater tax avoidance also incur more stringent non-price loan terms, incur higher at-issue bond spreads, and prefer bank loans over public bonds when obtaining debt financing. Overall, these findings indicate that banks perceive tax avoidance as engendering significant risks.

JEL Classification: G21; H26

Keywords: Tax avoidance; Cost of bank loans; Information risk; Agency risk; Audit risk; FIN 48

1. Introduction

Recent studies have examined the economic consequences of tax avoidance on shareholders and found mixed results. For example, Desai and Dharmapala (2009) find a positive relation between tax avoidance and firm value for well-governed firms. In contrast, Hanlon and Slemrod (2009) find a negative stock market reaction to news concerning company involvement in tax shelters. An interpretation of these findings is that shareholders perceive tax avoidance practices as potentially value-enhancing but risk-engendering corporate activities (Rego and Wilson, 2012). Nevertheless, how debt holders perceive corporate tax avoidance has remained largely unexplored. This study explores economic consequences of tax avoidance from the perspective of debt holders by examining the empirical relation between tax avoidance and cost of bank loans.

Debt holders and shareholders have significantly different risk preferences and return expectations. Unlike shareholders, debt holders such as banks and bondholders have asymmetric payoffs; they generally receive fixed future income and face substantial downside risk. Although tax savings might accrue to shareholders, they do not necessarily benefit debt holders who are fixed claimants. For debt holders, the specter of risk exposure associated with tax avoidance could be more salient than the concomitant reward such as tax savings. Consequently, the debt market provides an ideal setting to examine the significance of risks engendered by tax avoidance activities.

We specifically focus on bank loans for two reasons. First, bank loans are the bulk of new financing for U.S. firms, even large public firms (e.g., Bharath, Sunder, and Sunder, 2008); therefore, it is of immense managerial and economic importance to understand the relation between corporate tax avoidance and cost of bank loans. Second, compared to arm's-length

investors including public bondholders, banks are more apt to price the risks and rewards of tax avoidance because banks typically maintain long-term relationships with borrowing firms and have access to the firm's proprietary information (e.g., Diamond, 1984; Fama, 1985; James, 1987). Accordingly, bank loans provide an ideal setting to examine how debt holders perceive the risk-reward tradeoff of tax avoidance.

On one hand, tax avoidance could generate tax savings (Mills, 1998) and reduce leverage (Graham and Tucker, 2006), providing up-side potential to banks and/or reducing default risk banks face. On the other hand, tax avoidance activities could increase the risk exposure of banks by increasing information risk (Balakrishnan, Blouin, and Guay, 2012), agency risk (Desai and Dharmapala, 2006), and the risk of being audited by tax authorities (Mills, 1998). These competing effects imply that tax avoidance could increase or decrease the cost of bank loans. However, if banks perceive avoidance-induced risks as more salient than the concomitant benefits, one would expect to observe an overall positive relation between tax avoidance and bank loan cost.

Using a comprehensive sample of around 17,000 bank loans issued to U.S. public firms in the period 1985-2009, we empirically examine the overall effect of tax avoidance on bank loan cost. Given our conceptual framework, we are interested in the effect of a broad spectrum of aggressive tax avoidance practices that induce risks, and not only the most extreme of these activities that could be deemed inappropriate by the Internal Revenue Service (IRS).[1] Hereafter, we refer to all of these risk-engendering tax planning practices as aggressive tax avoidance. We

[1] Aggressive tax avoidance activities include corporate-owned life insurance, transfer pricing, reincorporation in tax havens, offshore intellectual property havens, re-invoicing, offshore special purpose vehicles, etc. At the most extreme end, they also include illegal tax shelters and tax non-compliance. All of these activities engender risks for two reasons. First, they represent deliberate actions to exploit the varied interpretations of tax laws including using literal interpretations of the laws or abusing loopholes that exist in the statutes. Second, from the lender's perspective, the anticipated outcomes of any given observable aggressive tax practice are likely uncertain because tax laws can be changed and tax courts do not always have the same ruling on the same transaction—see, for instance, *United Parcel Service of America Inc. v. Commissioner* (Graham and Tucker, 2006: 574).

use various empirical measures to capture aggressive tax avoidance, including two book-tax differences (Manzon and Plesko, 2002; Frank, Lynch, and Rego, 2009) and the cash effective tax rate (Rego and Wilson, 2012). We measure bank loan cost using loan spread, which is defined as the basis points a borrower pays in excess of the London Interbank Offered Rate (LIBOR) or LIBOR equivalent for each dollar drawn down.

Across all three measures, we find a *positive* and significant relation between aggressive tax avoidance and loan spread after controlling for credit risk, firm performance, and other firm-level and loan-level factors that are found to impact bank loan spread in the literature. Our results are robust in a battery of sensitivity tests including when we use firm fixed-effect regressions to mitigate omitted variable bias and instrumental-variable two-stage regressions to address the endogeneity of tax avoidance.

More importantly, we find consistent results when we use two quasi-experimental settings to examine the effect of aggressive tax avoidance on bank loan cost. The first involves the implementation of Financial Accounting Standards Board (FASB) Interpretation No. 48, hereafter FIN 48. Using a difference-in-differences analysis, we find that firms that disclose a positive FIN 48 tax reserve during a three-year window immediately after FIN 48 incur significantly larger increases in loan spreads when compared to match firms that never report a positive FIN 48 tax reserve in that same period. This finding indicates that banks view the increased tax reserve disclosures pursuant to FIN 48 as informative about the firm's aggressive tax avoidance practices in terms of uncertain tax positions, and, consequently, banks increase loan spreads in borrowing firms that report a positive FIN 48 tax reserve.

In another quasi-experimental setting, we examine whether banks increase loan spread after a borrowing firm's involvement in tax sheltering activities became a publicly disclosed

news-event. Compared to loans obtained before the tax shelter news-event, companies pay higher spreads for loans they obtained after the news-event. Further, a difference-in-differences test shows that firms with tax shelter news have significantly larger increases in loan spreads after the news-events when compared to match firms without tax shelter news. To the extent that FIN 48 tax reserves and tax shelter news-events reflect aggressive tax avoidance, one may interpret the findings in these quasi-experimental settings as providing evidence of a positive, causal effect of aggressive tax avoidance on cost of bank loans.

If aggressive tax avoidance increases loan spread because it heightens the lenders' risk exposure, it should also affect non-price loan term, at-issue bond spread, and the firm's debt financing preference toward bank loans over public bonds (e.g., Bharath, Sunder, and Sunder, 2008). Indeed, we find that banks impose more stringent collateral and covenant requirements in loans issued to firms exhibiting greater tax avoidance. Using an exhaustive sample of bond-issuing firms during the same sampling period 1985-2009, we find that firms with greater aggressive tax avoidance incur higher yield spreads when issuing public bonds. Based on the combined sample of bond-issuing firms and loan-initiating firms over the same sampling period, we find that firms with greater tax avoidance prefer bank loans over public bonds when seeking debt financing.

Lastly, we explore possible channels through which tax avoidance influences cost of bank loans. We find that the documented positive association between aggressive tax avoidance and loan spread is particularly pronounced in those loans issued to firms with a higher information risk, a higher agency risk, or a higher probability of being audited by the IRS. We find no evidence of a negative association between tax avoidance and bank loan spread; this is

true even when the avoidance-induced benefits due to leverage reduction and/or financial slack enhancement are presumably dominant.

This study provides empirical findings that add to our understanding of the economic consequences of tax avoidance. Prior studies have mainly focused on the effect of tax avoidance on shareholders and have found mixed results (e.g., Desai and Dhamapala, 2009; Hanlon and Slemrod, 2009; Kim, Li, and Zhang, 2011). In contrast, we provide comprehensive and consistent evidence that a higher level of aggressive tax avoidance could lead to an increased cost of debt capital, including a higher private bank debt cost in terms of higher loan spreads and more restrictive non-price terms (covenants and collateral) as well as a higher public bond cost in terms of higher at-issue yield spreads.

Our findings contribute to two under-explored issues in the tax avoidance research. First, they advance the understanding of the "under-sheltering puzzle" (Weisbach, 2002; Desai and Dharmapala, 2006), which questions why some firms apparently do not avail themselves of tax avoidance opportunities while other firms engage in them actively. Our findings suggest that, all else equal, a tax-avoiding firm could incur a higher cost of debt, which, in turn, moderates the firm's incentive to engage in tax avoidance, providing a potential explanation for the "under-sheltering puzzle". Second, Hanlon and Heitzman (2010) call for more research to explore how *lenders*, investors and consumers perceive corporate tax avoidance activities. Our study answers their call, and our findings imply that debt holders, including banks and bond holders, view corporate tax avoidance negatively.

2. Literature review and hypothesis development

2.1. Incremental contribution in relation to contemporary studies

Lim (2011) and Lisowsky, Mescall, Novack, and Pittman (2012) find a negative association between tax avoidance and total interest expense of all outstanding debts of the firm. However, their findings do not *per se* reveal how lenders view corporate tax avoidance for two reasons. First, their empirical method does not directly examine how lenders price borrowers' risks in incremental borrowing decisions such as loan initiations and bond issuances, which arguably provide the most powerful setting for the analysis (Hadlock and James, 2002; Denis and Mihov, 2003). Second, a firm's debt financing choice (i.e., the relative use of loans versus bonds) could affect its interest expense, potentially confounding the empirical association between total interest expense and tax avoidance. For instance, Bharath, Sunder, and Sunder (2008) find that borrowers with a higher information risk prefer loans over bonds; and, holding other factors constant, banks offer lower incremental interest spreads to borrowers with the same level of information risk when compared to bond investors. If tax avoidance induces risks, the negative association documented by Lim (2011) and Lisowsky, Mescall, Novack, and Pittman (2012) could also arise as firms with greater tax avoidance, due to the increase in avoidance-induced risks, rely more heavily on loans as opposed to bonds while banks charge these firms a lower incremental interest spread for the same level of risk.[2]

Given these criticisms, researchers have used incremental borrowing decisions to more directly explore lenders' view of tax avoidance activities. But, the two contemporary studies that employ this approach have found contradictory results. Shevlin, Urcan, and Vasvari (2013) find that bond yield spreads at issuance are positively associated with tax avoidance. In contrast, Kim,

[2] Further, lenders can fine tune the risk-return tradeoff with the borrowers by setting terms for not only the interest cost of debt, but also collateral, covenants, maturity, etc. Therefore, interest cost could be affected by other debt features. While one can control for the effects of other debt features in the setting involving incremental borrowing decisions, it is difficult to isolate their effects on interest expenses of outstanding debts, which are affected by past and present borrowing decisions. In this sense, any analysis that relates interest expenses to tax avoidance could be subject to significant omitted variable bias. Moreover, focusing on the interest cost alone will likely misestimate the total cost borne by the borrowers since lenders can use other debt features to mitigate avoidance-induced risks.

Li, and Li (2010) find that firms with an extremely high level of tax avoidance have a lower bank loan spread.

Of the two studies, the findings in Shevlin, Urcan, and Vasvari (2013) are more in line with the preponderance of the evidence in other related studies that examine either debt contracting or tax avoidance. For instance, there is ample evidence that 1) lenders in general increase interest spreads when lending to borrowers with greater risks (e.g., Bharath, Sunder, and Sunder, 2008); and 2) the firm's various stakeholders seek to limit the firm's avoidance practices because they view tax avoidance negatively (e.g., Chen, Chen, Cheng, and Shevlin, 2010; Chyz, Leung, Li, and Rui, 2013). Nevertheless, it remains an open question whether banks also view tax avoidance activities negatively; and, more specifically, it remains unclear whether the overall effect of tax avoidance on bank loan cost is positive or negative (e.g., Ayers, Laplante, and McGuire, 2010).

In this study, we present comprehensive and robust evidence that banks perceive tax avoidance negatively and impose higher bank loan cost when lending to firms with greater aggressive tax avoidance. We go beyond Shevlin, Urcan, and Vasvari (2013) to provide empirical findings illustrating the multi-faceted effects of tax avoidance on debt contracting. In particular, we find that 1) banks use both price and non-price loan terms to mitigate avoidance-induced risks; 2) banks are less sensitive than public bond investors in pricing avoidance-induced risks into interest spreads; and 3) firms with greater tax avoidance prefer bank loans over public bonds when seeking debt financing. These findings show that both banks and public bond investors price avoidance-induced risks into debt contracts. The insight is important as it shows that the cost of debt capital is uniformly increasing in aggressive tax

avoidance, regardless of whether the firm seeks debt financing from the private bank loan market or the public bond market.[3]

2.2. Risks engendered by tax avoidance

Option theory suggests that fixed and residual claimants in a firm have conflicting interests over firm risk (Barnea, Haugen, and Senbet, 1981). Like other fixed claimants, banks are particularly sensitive to risk because the position of lending banks resembles that of the seller of a call option—banks bear the consequences of a higher risk but they do not necessarily share the reward. Accordingly, banks could be particularly sensitive to the risks engendered by tax avoidance activities. Next, we summarize the literature on three major types of risks engendered by aggressive tax avoidance.

2.2.1. Tax avoidance and information risk

A higher level of tax avoidance could exacerbate information risk by reducing firm information quality because tax avoidance activities are necessarily complex, obfuscated, and opaque to minimize the risk of detection by the tax authorities (Desai and Dharmapala 2006) and managers of tax avoiding firms are hesitant to provide detailed disclosures about their avoidance activities for fear of providing a roadmap to the tax authorities. Moreover, tax avoidance

[3] Our results call into question the generalizability of the findings of Kim, Li, and Li (2010), hereafter KLL. KLL use the long-run tax rate measure (Dyreng, Hanlon, and Maydew, 2008) as a measure of aggressive tax avoidance. Dyreng, Hanlon, and Maydew (2008) caution that firms with data needed for the long-run tax rate measure tend to tilt toward the heaviest taxpayers among corporations. Accordingly, a potential issue of KLL is that their sample could be skewed toward firms that are very heavy taxpayers, which, in turn, could bias their analysis toward observing a negative effect of tax avoidance on bank loan cost. Indeed, KLL report a mean 5-year long-run ETR of 44% for their sample, which is substantially higher than the statutory tax rate of 35%. If the anticipated marginal benefits of tax avoidance from tax savings and leverage reduction ever exceed the anticipated marginal costs associated with increased risks, it is most likely to occur among firms that are heavy taxpayers. Therefore, it is questionable whether KLL's results would hold in a more general population of firms that do not tilt toward the heaviest taxpayers among corporations. Specifically, if sample selection is a key factor driving the differing results in KLL, one would expect our results to become weaker if we use KLL's sampling strategy. Indeed, we find that our results are weaker when we perform the analyses using firms with long-run tax rate exceeding the sample median.

activities could enhance the manager's ability to mask, justify, and hide "bad news hoarding activities for extend periods" (Kim, Li, and Zhang, 2011) and to manipulate earnings (Desai and Dharmapala, 2006). Further, banks are particularly keen on timely disclosure of bad news that negatively affects firm value (Watts, 2003). Accordingly, banks could be disproportionately concerned with the "bad news hoarding" behavior accompanying tax avoidance activities.

Consistent with these arguments, there is evidence that tax avoidance is negatively associated with earnings persistence (e.g., Hanlon, 2005) and positively associated with discretionary accruals (Frank, Lynch, and Rego, 2009). Further, Balakrishnan, Blouin, and Guay (2012) and Hope, Ma, and Thomas (2013) use different empirical measures to capture firm information quality and find consistent evidence that corporate tax avoidance reduces the transparency of a firm's information environment. Taken together, the preceding arguments and findings suggest that banks should anticipate higher levels of tax avoidance to indicate greater information risk in the firm.

2.2.2. Tax avoidance and agency risk

The analytical model of Desai and Dharmapala (2006) suggests that there is a positive feedback effect between corporate tax avoidance and managerial actions that divert corporate resources for the manager's private benefits (i.e., managerial rent diversion). Several studies confirm the existence of such a positive feedback effect in U.S. firms. Desai and Dharmapala (2009) find that the average effect of tax avoidance on firm value is not significant, but it is significantly positive in well-governed firms. This finding indicates that a positive feedback effect is present in U.S. firms, but good corporate governance can mitigate it. Chen, Chen, Cheng, and Shevlin (2010), Chyz, Leung, Li, and Rui (2013), and Khurana and Moser (2013)

respectively find that family firms, firms with a higher labor unionization rate, and firms with long-term institutional investors have lower levels of tax avoidance. These findings imply that small minority shareholders, labor unions, and institutional investors anticipate a strong positive feedback effect between corporate tax avoidance and managerial rent diversion, and, consequently, they seek to constrain managers' ability to engage in aggressive tax avoidance activities. Based on these prior studies, it is reasonable to posit that banks also expect higher levels of tax avoidance to increase their exposure to the risk of managerial rent diversion (i.e., agency risk) in the firm.

2.2.3. Tax avoidance and IRS audit risk

IRS audit risk refers to the probability of incurring significant direct and indirect costs if a firm's tax positions are challenged by tax authorities. Mills (1998) and Mills and Sansing (2000) find that tax avoidance as captured by book-tax differences is positively associated with IRS audit risk.

Direct costs include litigation and other expenses of mounting a defense against tax authority challenges, back taxes, potentially hefty penalties imposed by tax authorities, and more rigorous scrutiny from tax authorities in the long run (e.g., blacklisted by the IRS). Indirect costs include political costs and potential damage to the firm's reputation. Anecdotal evidence indicates that direct costs could be quite substantial. For example, GlaxoSmithKline P.L.C. settled with the IRS with a $3.4 billion payment for transfer pricing practices that seek to avoid taxes (Wall Street Journal, 2006).[4] Moreover, Wilson (2009) finds that the direct costs alone

[4] AstraZeneca P.L.C. paid $1.1 billion to settle a similar dispute with the IRS in 2011. Merck & Co. settled several disputed tax issues including its use of minority equity interest financing transactions with the IRS in 2007 by paying a settlement amount of $2.3 billion including back taxes, penalties, and interest. In addition, foreign and state jurisdictions have also attempted to collect back taxes from U.S. firms. For example, the tax authority in France has

could potentially offset the tax savings from tax shelters. Using a sample of actual tax shelter cases, Wilson (2009) reports a median tax savings of $66.5 million and a median combined cost of legal fees and IRS penalties of $64 million.

Because IRS audit and detection generally lag the design and implementation of the tax planning strategies, banks might anticipate current and past tax avoidance activities to increase the uncertainty of the firm's future tax and other liabilities, which, in turn, leads banks to anticipate greater uncertainty in the firm's future after-tax cash flow. Anecdotal evidence suggests that tax disputes with the IRS could lead to credit downgrades. For example, Fitch Ratings downgraded the credit rating of Merck & Co., Inc. to AA two days after the company resolved a tax dispute with the IRS for $2.3 billion on February 14, 2007, citing that free cash flow generation will be dampened by the cash outflow for the settlement of IRS dispute.[5] Collectively, the preceding arguments and evidence imply that banks should anticipate higher levels of tax avoidance to increase IRS audit risk.

2.3. Tax savings and leverage reduction induced by tax avoidance

Tax avoidance activities could also increase a firm's tax savings and decrease its reliance on leverage. Given a statutory tax rate of 35%, the government could take up to one-third of a firm's pre-tax profits. Potential tax savings from aggressive avoidance strategies could be quite large. For instance, Mills, Erickson, and Maydew (1998) find that an additional $1 investment in tax planning results in a $4 reduction in tax liabilities. If avoidance-induced tax savings increase

sued Amazon for $252 million and Google for $1.7 billion in Euros in back taxes and penalties for tax avoidance practices.

[5] There are other incidences of credit downgrades induced by tax disputes. On June 30, 2009, Moody's downgraded Edison's senior unsecured notes to Ba3 citing a substantially weakened credit quality and an increase probability of a financial covenant breach due to the company's recent settlement with the IRS. In July 2004, Moody's downgraded the long term ratings of Schering-Plough, explaining that the IRS settlement and the associated large cash outflows were part of the reasons leading to the downgrade.

after-tax cash flow, they can enhance a firm's financial slack. But, there is little empirical evidence to support this conjecture.[6] In any case, banks are less likely to share the firm's upside potential due to their fixed claimant status; and, consequently, banks could be less inclined to price the benefit of potential tax savings into bank loans.

Firms can use either debt or other corporate activities including tax avoidance activities to create tax shields for corporate income. There is evidence that debt tax shields and non-debt tax shields are substitutes (e.g., DeAngelo and Masulis, 1980). In particular, Graham and Tucker (2006) find that debt tax shields and non-debt tax shields from tax sheltering activities are substitutes. If a strong avoidance-debt-substitution effect exists, firms with greater tax avoidance could have a lower leverage, which could lead to a lower default probability and a lower cost of debt.[7]

2.4. Hypothesis

Prior studies (e.g., Graham, Li, and Qiu, 2008; Bharath, Sunder, and Sunder, 2008) show that banks assess the risks they face in each lending decision and price a higher perceived risk into bank loans by increasing the spread. Accordingly, if banks perceive aggressive tax avoidance practices as engendering significant risks, one would expect banks to demand a higher loan spread if the borrower is more tax aggressive. Nevertheless, tax avoidance could also

[6] For instance, Dhaliwal, Huang, Moser, and Pereira (2012) find that tax avoidance does not increase financial slack as captured by a firm's cash holding. Using a sample of firms that issued public bonds, Shevlin, Urcan, and Vasvari (2013) find that firms with greater tax avoidance have lower future cash flows.

[7] However, prior studies offer no consensus concerning the generalization of a strong avoidance-debt-substitution effect. Graham and Tucker (2006) find evidence in support of an avoidance-debt-substitution effect. However, there is also evidence that such an effect is present in a limited class of firms. Dhaliwal, Trezevant, and Wang (1992) provide evidence that the avoidance-debt-substitution effect is present in firms facing a high probability of losing their current deductibility of all tax shields (i.e. firms near "tax exhaustion"). Further, Bradley, Jarrell, and Kim (1984) find that non-debt tax shields and leverage (debt-to-value ratios) are positively related, casting doubt on the existence of a significant avoidance-debt-substitution effect. Based on these findings, we conclude that there is weak support for a strong avoidance-induced leverage effect.

generate tax savings providing upside potential to banks and decrease leverage reducing the default risk banks face; and, these opposing effects could lower the cost of bank loans.

As fixed claimants, banks are exposed to the risks of tax avoidance but they do not necessarily share the corresponding reward such as tax savings. This implies that the incremental risk exposure due to aggressive tax avoidance practices could be particularly salient for banks, leading to the following hypothesis.

H1: *Aggressive tax avoidance practices are positively associated with bank loan spreads.*

3. Research design, sample selection and summary statistics

This section presents our empirical measures for aggressive tax avoidance, describes the main empirical model and the sample selection procedure, and presents the summary statistics.

3.1. Measures of aggressive tax avoidance

Given our conceptual framework, we are interested in the effect of a broad spectrum of aggressive tax planning practices that induce risks. We use three measures to capture aggressive tax avoidance. These measures also reflect, but they are not specifically designed to capture, the most extreme subset of aggressive tax avoidance that can be considered as "pushing the envelope of tax law" (Hanlon and Heitzman, 2010: 137)—hereafter, tax aggressiveness.[8]

We use the Manzon and Plesko (2002) book-tax difference, BT, as the first measure of aggressive tax avoidance. Appendix A provides detailed information of all variables used in this

[8] In this study, we use FIN 48 disclosures of uncertain tax positions and tax shelter news to capture tax aggressiveness. We note that our tax aggressiveness measures do not necessarily reflect illegal tax shelters or tax noncompliance, which involve the use of sham transactions lacking economic and/or business purposes. To measure non-compliance and illegal shelters, prior research has used actual incidences of IRS audit adjustments (e.g., Mills, 1998; Mills and Sansing, 2000) and tax sheltering information obtained from the firm's tax return on Form 8886 or IRS Schedule M-3 (e.g, Lisowsky, Robinson, and Schmidt, 2013). However, these procedures require access to confidential IRS data and therefore they limit the studies to analyzing small samples. Moreover, empirical analyses based on these measures may be subject to selection bias and endogeneity issues (Hanlon and Heitzman, 2010).

study, including BT and other tax avoidance measures we discuss below. When using the Desai and Dharmapala (2006) adjusted book-tax difference measure as an alternative measure, we find results quantitatively equivalent to those based on the BT measure; we do not report these results.

Frank, Lynch, and Rego (2009) argue that book-tax differences have both a temporary and a permanent component. They find that it is the permanent component of book-tax differences—which we denote as DTAX in this study—that is significantly related to actual cases of tax sheltering. Rego and Wilson (2012) and Lennox, Lisowky, and Pittman (2013) use DTAX to capture more extreme aggressive tax avoidance that likely engenders greater risks. We use DTAX as the second measure of aggressive tax avoidance.

Lastly, we also use cash effective tax rate, CETR, to capture consequences of broad tax avoidance practices. Consistent with Rego and Wilson (2012), CETR is defined as cash tax paid (TXPD) divided by pre-tax book income (PI) less special items (SPI). For ease of interpretation, we multiply CETR by -1 and use the transformed variable, TA_CETR, as the last aggressive tax avoidance measure. By definition, a higher TA_CETR implies more aggressive tax avoidance.

There is evidence that the chosen measures reflect a broad spectrum of aggressive tax avoidance. Mills (1998) finds that firms with large book-tax differences are more likely to be audited by the IRS and have larger proposed audit adjustments. Wilson (2009) finds that book-tax differences are larger for firms accused of engaging in tax shelters than for a matched sample of non-accused firms. Frank, Lynch, and Rego (2009) find that book-tax differences, particularly DTAX, reflect managerial aggressiveness toward other corporate policies such as financial reporting. More generally, Comprix, Graham, and Moore (2011) find that firms with higher book-tax differences have greater divergence of opinion among investors, indicating that book-tax differences reflect greater uncertainty from the investor's perspective. On the other

hand, there is evidence that tax rates reflect aggressive tax avoidance such as transfer pricing (e.g., Jacob, 1996) and offshore tax havens (Dyreng and Lindsey, 2009).[9]

In any case, all three chosen measures have been used widely in the extant tax avoidance literature (e.g., Chen, Chen, Cheng, and Shevlin, 2010; Chyz, Leung, Li, and Rui, 2013; Hoi, Wu, and Zhang, 2013).[10] We use various tax avoidance measures to triangulate our results because each measure has its limitations (Hanlon and Heitzman, 2010). However, if results across all three measures are consistent, one can be more confident that they are robust.

3.2. Baseline regression model

We use the following empirical model to test our hypothesis:

$$\text{Log(loan spread}_t) = f\ (\text{tax avoidance}_{t-1},\ \text{firm attributes}_{t-1},\ \text{loan characteristics}_t,\ \text{industry effects, and year effects}); \quad (1)$$

where Log(loan spread$_t$) is the natural logarithm of the amount of loan interest payment in basis points over LIBOR or LIBOR equivalent for each dollar drawn down (i.e., the all-in spread) for the loan facility a firm obtains in year *t*. Tax avoidance$_{t-1}$ is the three tax avoidance measures for that same firm in year *t-1*. We compute tax avoidance measures and firm attributes using *lagged* information from the year *immediately prior to* the inception of the loan facility to partially mitigate potential endogeneity issues. We omit the subscripts hereafter to ease the exposition.

[9] Transfer pricing practices have become top enforcement priorities of the IRS in recent years. Large settlements of transfer pricing disputes include Motorola in 2004 ($500 million), GlaxoSmithKline in 2006 ($3.4 billion), Western Union in 2011 ($1.2 billion), etc. In response to the increasing use of offshore tax havens, the U.S. Congress held a series of hearings in 2012 and 2013 to examine corporate tax reform and the impact of offshore tax havens on base erosion and profit shifting by multinationals such as Apple Inc., Microsoft, Hewlett-Packard, etc.

[10] Nevertheless, a drawback is that these measures could capture avoidance practices that entail limited or no risk (e.g., buying tax-exempt bonds); and, to that extent, the significance of our results could be biased downward. We address this concern by using alternative measures that are intended to capture more aggressive tax avoidance that likely engender greater risks. The Internet Appendix reports these results. In addition, we also address the concern that our measures do not precisely capture tax aggressiveness. In Section 4.3 and 4.4, we use FIN 48 tax reserves and news of past incidences of tax shelters to capture the effect of tax aggressiveness more precisely. Overall, we find that our results are robust in all of these analyses.

Following Graham, Li, and Qiu (2008), we include a number of variables to control for the effects of firm size, leverage, asset structure, cash holding, profitability, growth potential, earnings volatility, and default probability. In addition, we also control for the effects of loan size, loan maturity, and loan syndication. Lastly, we include dummy variables to control for loan purposes, loan types, debt rating, year effects and two-digit SIC industry effects in the regression models. Appendix A provides detailed information concerning variable definitions and constructions.

3.3. Sample selection

We estimate the model in Eq. (1) using data from two sources. We obtain information for loan facilities of U.S. firms from the Thomson Reuters LPC DealScan database, hereafter DealScan. We obtain the corresponding financial information for the borrowing firms from Standard & Poor's Compustat database. DealScan provides comprehensive coverage of U.S. loan facilities from 1985 onward. It reports detailed loan data including spread, size, maturity, collateral, covenants, types, purposes, syndication structure, debt rating, and identities of the lending banks. DealScan collects the loan information from SEC filings and from voluntary disclosures provided by participating banks.

The basic unit of loans is a lending facility. A firm can obtain multiple facilities with the same loan package in a contract year, and loan terms could differ across these facilities. As a consequence, we treat each facility-year as a distinct observation. We match the same firm-year information to multiple facility-year observations if a firm obtains multiple facilities in a year. We merge the two datasets using the DealScan-Compustat link file provided by Michael Roberts (Chava and Roberts, 2008). After removing observations with incomplete DealScan or Compustat information, we obtain a final sample of 16,824 loan-facilities for 3,896 unique

borrowing firms for the period 1985-2009. At the firm-year level, we have up to 10,723 firm-year observations.

3.4. Summary statistics and correlations

Table 1, Panel A, reports sample statistics on firm attributes and measures that capture aggressive tax avoidance. These statistics are based on 10,723 firm-year observations. There are fewer observations for DTAX due to additional data requirements for computing this measure. The mean values of BT and DTAX are 0.012 and 0.011, respectively. The mean value of TA_CETR is -0.268, suggesting a 26.8% average cash effective tax rate. These sample statistics and other sample statistics for firm attributes are in the range of those reported in earlier studies such as Chen, Chen, Cheng, and Shevlin (2010) and Dyreng, Hanlon, and Maydew (2010).

[Insert Table 1 here]

Panel A also presents sample statistics for the 16,824 loan facilities. On average, the loan spread and the loan size are 167 basis points and $487 million, respectively. The average maturity is about 44 months, and the average number of covenants is around 4.4. About 82% of the sample loans are syndicated. Of those loans for which collateral information is available, a majority (around 70%) have a collateral requirement. These loan characteristics are similar to those reported in Graham, Li, and Qiu (2008) and Francis, Hasan, Koetter, and Wu (2012).

Panel B reports Pearson correlations. Tax avoidance measures are positively and significantly correlated; these correlations are in line with those reported in earlier studies (e.g., Frank, Lynch, and Rego, 2009; Chen, Chen, Cheng, and Shevlin, 2010; Rego and Wilson, 2012). We also find that bank loan spreads are significantly and positively correlated with all tax

avoidance measures. As expected, all control variables are systematically associated with bank loan spreads and many are also correlated with the tax avoidance measures.

4. The relation between tax avoidance and the cost of bank loans

4.1. Baseline regression results

Table 2 presents the results of the baseline model based on ordinary least squares (OLS) regressions with firm-clustered, heteroskedasticity-robust standard errors. We adjust standard errors for within-firm clustering because firms can obtain multiple facilities in the same loan package in a given contract year, and the loan terms obtained by the same firm in the same year could be correlated. The coefficients on BT, DTAX, and TA_CETR are positive and significant at the 1% level across all models; they are 0.219, 0.150, and 0.137, respectively. These results show that firms with higher tax avoidance incur higher bank loan cost after controlling for firm and loan characteristics.

[Insert Table 2 here]

Based on the TA_CETR estimate, a one-percentage-point increase in tax avoidance raises loan spread by around 0.137%. Given that the average loan spread of the sample firms is 167 basis points, a one-standard-deviation increase of TA_CETR (about 21.3 percentage-points) is associated with a 4.87 basis points (4.87=0.00137×167×21.3) increase of loan spread. Since the mean sample loan size is about $487 million and the average loan's time to maturity is around 4 years (see Table 1 Panel A), a one-standard-deviation increase in tax avoidance as captured by TA_CETR is associated with about $1 million (0.95 = 487×0.000487×4) additional total interest cost. The effect of tax avoidance on bank loan cost is economically significant and largely comparable to those reported in prior studies. For example, Bharath, Sunder, and Sunder (2008)

find that a one-standard-deviation increase of accounting quality results in a 6.65 basis points decrease in bank loan spread. Francis, Hasan, Koetter, and Wu (2012) find that a one-standard-deviation increase of board independence results in a 5.50 basis points decrease in bank loan spread.

The coefficients on the control variables are generally consistent with those reported in the extant literature (e.g., Graham, Li, and Qiu, 2008; Francis, Hasan, Koetter, and Wu, 2012). Firms with few assets, volatile earnings, high leverage, high distress risk, few tangible assets, and few valuable growth opportunities incur higher cost of bank loans. In addition, short-term loans have higher spreads and syndicated loans have lower spreads.

Overall, the results from the baseline model show that tax avoidance and bank loan cost are positively associated. These findings suggest that banks perceive tax avoidance as inducing significant risks, and they consequently penalize firms with greater tax avoidance with higher loan spreads. The results are supportive of our hypothesis.

4.2. Sensitivity tests

4.2.1. Endogenous corporate tax avoidance

All else equal, a higher debt cost might incentivize a firm to use alternative methods including undertaking aggressive tax avoidance to fund operations. This could create a potential feedback effect (i.e., reverse causality) from bank loan cost to tax avoidance, making it difficult to extract a causal inference from a positive association between bank loan cost and tax avoidance.

We use instrumental-variable two-stage regressions to directly account for the endogeneity of tax avoidance. In the first-stage regression, we predict tax avoidance using an

OLS regression that contains two instruments and all firm-level control variables from the baseline model. Since we have three distinct tax avoidance measures, we run three separate first-stage regressions, one for each tax avoidance measure. In the second stage, we estimate the baseline model after replacing each of the three tax avoidance measures with the corresponding fitted tax avoidance measures from the first-stage regressions.

We use religiosity as the first instrument for tax avoidance because Boone, Khurana, and Rama (2013) find that firms headquartered in more religious localities are less likely to avoid taxes. We define the level of religiosity as the fraction of population in the county of the firm's corporate headquarter that claims affiliation with an organized religion, as reported in various surveys of the Association of Religion Data Archives (ARDA).[11] A firm's involvement in tax avoidance could also depend on the tax avoidance practices of its peers in that industry. Accordingly, the second instrument is the median value of the respective tax avoidance measure in the two-digit SIC industry for which the firm belongs, excluding the firm's own tax avoidance.[12]

Table 3, Panel A, presents the second-stage regression results. The coefficients on the fitted tax avoidance variables are positive and significant. These findings indicate that the potential endogeneity issue does not seriously affect the empirical results of the baseline model.

4.2.2. Omitted variable bias

[11] We obtain the data from the "Churches and Church Membership" files from the 1980, 1990, and 2000 ARDA surveys. Following Boone, Khurana, and Rama (2013) these data are linearly interpolated to generate data for the missing years in our sample period, including those from 1985 to 1989, from 1991 to 1999, and from 2001 to 2009.

[12] Given our empirical setting, a valid instrument should be related to tax avoidance but uncorrelated with cost of bank loans. We find that the two instruments are indeed significantly correlated with each of the tax avoidance measures in the first-stage regressions, but they are uncorrelated with bank loan spreads if we include them in the second-stage regressions.

Although the baseline model includes common determinants of loan spreads such as firm performance and default risk, it might still omit unknown firm characteristics. To ease this concern, we run firm fixed-effect regressions to control for the influence of unknown firm-level factors. We report the results in Table 3, Panel B. The firm fixed-effect regression results echo the results from the baseline model. In particular, all three measures of tax avoidance are significantly and positively related to loan spreads, suggesting that the baseline regression results are not plagued by serious omitted firm-level factors. In addition, we also run a lead-bank fixed effect regression and find that the baseline regression results hold; these results are not tabulated.

4.2.3. Other sensitivity tests

The baseline regression results are robust in a battery of other sensitivity tests including adding controls for corporate governance, adding controls for managerial aggressiveness, using median regressions to mitigate the effects of extreme observations, using alternative measures to capture extremely aggressive tax avoidance practices, using the alternative estimation procedures such as the Fama-MacBeth (1973) regression method, etc. The Internet Appendix presents and discusses all these sensitivity analyses in details.

4.3. Evidence from FIN 48

4.3.1. Background information

FIN 48 was enacted in June 2006 and became effective for all publicly listed companies with fiscal year beginning after December 15, 2006. It represents a drastic and abrupt change in accounting and disclosure of the tax reserve for uncertain tax positions (i.e., tax positions that may or may not be sustained upon IRS audit). The tax reserves disclosed pursuant to FIN 48 are

termed uncertain tax benefits, henceforth UTB. There is evidence that UTB reflect tax aggressiveness (e.g., Lisowsky, Robinson, and Schmidt, 2013).

Before FIN 48, companies used varied methods to estimate UTB, which led to scant and opaque UTB disclosures (Gleason and Mills, 2002; Blouin, Gleason, Mills, and Sikes, 2010) and disclosures that were not necessarily comparable across firms.[13] By way of comparison, FIN 48 1) provides a clear standard for UTB accounting; 2) requires all firms to apply the same standard to all open uncertain tax positions; and 3) requires all firms with open uncertain tax positions to provide annual disclosure of the levels and the changes in UTB.

4.3.2. Changes in bank loan spread after the implementation of FIN 48

There is evidence that the implementation of FIN 48 has improved the consistency and comparability of UTB disclosures (Blouin and Robinson, 2012). However, FIN 48 does not affect all firms' UTB disclosures equally because firms do not all undertake uncertain tax positions. FIN 48 likely has a significant effect on firms undertaking uncertain tax positions to avoid taxes. Before FIN 48, these firms might not disclose UTB and other related information about those positions (Gleason and Mills, 2002); however, these same firms are mandated to provide full disclosure after FIN 48. In contrast, FIN 48 likely causes little change in UTB disclosures among firms that do not undertake uncertain tax positions because these firms naturally have no UTB to disclose either before or after FIN 48.

[13] Methods used by firms prior to FIN 48 include SFAS 109, *Accounting for Income Taxes* (FASB, 1992), and SFAS 5, *Accounting for Contingencies* (FASB, 1975). According to FIN 48 Summary (FASB 2006), for instance, SFAS 109 "contains no specific guidance on how to address uncertainty in accounting for income tax assets and liabilities. As a result, diverse accounting practices have developed resulting in inconsistency in the criteria used to recognize, derecognize, and measure benefits related to income taxes. The diversity in practice (regarding uncertain tax positions) has resulted in noncomparability in reporting income tax assets and liabilities."

As a consequence, FIN 48 provides a quasi-experiment to examine the change in bank loan cost across two sets of firms: treatment firms and match firms. Treatment firms are those that undertake uncertain tax positions to avoid taxes and thus they are more likely to report a UTB pursuant to FIN 48; specifically, we define a treatment firm as a firm that reports a positive UTB level in *any given year* after FIN 48. Match firms are unaffected by FIN 48; we define a match firm as one that does not report a positive UTB in *any given year* after FIN 48.[14] All else equal, if banks use FIN 48 disclosures to infer a firm's tax aggressiveness in terms of uncertain tax positions, one would expect treatment firms to have larger increases in bank loan spreads after the implementation of FIN 48 when compared to match firms.

We test this conjecture using a loan-year sample spanning two three-year periods before (2003-2005) and after (2007-2009) the adoption of FIN 48. We leave out loans initiated in 2006 because FIN 48 was enacted and implemented during that year.

We use a propensity-score matching method to identify a match firm for each treatment firm. Affected_Firms is a dummy variable that equals one if a firm ever discloses a positive UTB level over the period 2007-2009; it equals zero otherwise. We estimate a logistic regression using Affected_Firms as the dependent variable and using data after FIN 48 implementation for the period 2007-2009. The independent variables include those factors that Rego and Wilson (2012) use to explain variations in UTB levels. The logistic regression generates the likelihood that a firm discloses a positive UTB pursuant to FIN 48. Using the predicted propensity score from this logistic regression, we then match, without replacement, each treatment firm (a firm with Affected_Firms = 1) with a match firm (another firm with Affected_Firms = 0) using the closest

[14] Firms with positive UTB balances are sometimes coded as having missing UTB or a zero UTB balance in Compustat. To overcome this problem, we use DirectEdgar and hand-collected information from SEC 10-K filings to verify those firms in our sample that have missing or zero UTB balances in Compustat. We are able to verify that 3,279 firms have a positive UTB balance and 1,526 firms have no UTB balance over the period 2007-2009. We use this sample to perform the ensuing FIN 48 analyses.

propensity score. To obtain closer matches, we use the caliper matching method and match within a caliper of 10%, where caliper refers to the difference in the predicted probabilities between the treatment and match firms. We are able to identify 312 matched pairs of treatment-match firms. Next, we obtain the corresponding loan-year observations for these 312 matched pairs of firms. Since we intend to perform a difference-in-differences estimation we require both treatment and match firms in each matched pair to have at least one loan-facility in each of the two periods 2003-2005 and 2007-2009. This reduces the final testing sample to 161 matched pairs with 917 loan facilities. There is no significant difference in key firm characteristics between the treatment firms and match firms. Of the 917 loan facilities, 505 are initiated before FIN 48 and 412 are initiated after FIN 48. We use a dummy variable, Post_FIN_48_Loans, to indicate those loans initiated after FIN 48. Post_FIN_48_Loans equals one if a loan is initiated between 2007 and 2009; it equals zero if a loan is initiated between 2003 and 2005.

We use a modified specification of the baseline model to conduct a difference-in-differences test. We replace the tax avoidance measures with Affected_Firms, Post_FIN_48_Loans, and the interaction variable, Affected_Firms × Post_FIN_48_Loans. We are particularly interested in the coefficient of the interaction variable because it captures the difference-in-differences estimate in bank loan spreads between treatment and match firms across the two periods straddling the implementation of FIN 48. Table 4, Model 1, reports the results. The coefficient on the interaction variable is 0.184 and is significant at the 1% level. This finding suggests that firms affected by FIN 48 (treatment firms) have significantly higher

increases in loan spreads for loans they obtained after the implementation of FIN 48 when compared to match firms that are unaffected by FIN 48.[15]

FIN 48 could cause an exogenous increase in the treatment firm's UTB disclosures. Our result suggests that banks use the increased UTB disclosures in treatment firms to infer the firm's tax aggressiveness in terms of uncertain tax positions, and consequently banks increase loan spreads in treatment firms after the implementation of FIN 48. This finding could be viewed as providing evidence of a causal effect of aggressive tax avoidance on bank loan cost.

[Insert Table 4 here]

4.3.3. Using FIN 48 tax reserves to capture tax aggressiveness

Consistent with Lisowsky, Robinson, and Schmidt (2013), we also use the logarithm of UTB balances, Log(UTB), to capture a firm's tax aggressiveness. We define Log(UTB) as the natural logarithm of (1+TXTUBEND), where TXTUBEND is the end-of-year UTB balance in Compustat. We use hand-collected information from SEC 10-K filings to verify and complement the UTB data from Compustat.

We estimate the baseline model using Log(UTB) as the test variable in place of the tax avoidance measures. Table 4, Model 2, reports the results. The sample includes all loans issued in 2008 and 2009; the test variable, Log(UTB), is as of 2007 for loans issued in 2008 and as of 2008 for loans issued in 2009. The coefficient on Log(UTB) is significantly positive. To the

[15] We conduct a robustness check using a reduced sample that excludes firms that report any tax reserves before FIN 48. The idea is to examine whether the result is affected by those firms that disclosed a UTB before FIN 48. We search footnotes of SEC 10-K/10-Q filings for tax reserve disclosures prior to FIN 48 using key words such as "tax reserve," "contingent tax liability," "tax cushion," "uncertain tax benefit," "SFAS No. 5," and "SFA No. 109." We exclude a matched pair if either the treatment or the match firm had a pre-FIN 48 tax reserve disclosure. We drop a total of 15 matched pairs, around 10% of the sample. The fact that few firms disclosed tax reserves prior to FIN 48 is not surprising and is consistent with the evidence in other FIN 48 studies such as Gleason and Mills (2002). We find that the interaction variable in the difference-in-differences test remains positive and significant in this alternative sample.

extent that the level of UTB captures tax aggressiveness, these results indicate that extremely aggressive tax avoidance is systematically and positively related to bank loan cost, providing corroborating evidence for the baseline regression results.

4.4. Evidence from firms with news of tax sheltering activities

Hanlon and Slemrod (2009) find that stock market participants react negatively to news of firm involvement in tax shelters, indicating that tax shelter news conveys incremental information about the firm's tax aggressiveness or provides insight into the nature of the firm's taxpaying culture. Based on this finding, one would expect banks to increase loan spreads after the news of a firm's involvement in tax shelters.

Hanlon and Slemrod (2009) identify a comprehensive sample of 108 news-events concerning company involvement in tax shelters during the period 1990-2004. We use this sample for our tax-shelter news analysis.[16] Each news-event in the sample is either a press description of company involvement in a tax sheltering transaction or a government enforcement action. Consistent with Graham, Li, and Qiu (2008), we only use the first news-event if a company has multiple news-events in the sample.[17] This procedure leaves 97 firms with one unique news-event per firm.

To examine how a tax shelter news-event influences a firm's bank loan cost, we compare the spreads of loans obtained before the news-event against the spreads of loans initiated after the news-event. Accordingly, a firm in the final sample must have at least one loan in the DealScan database during both the pre- and post-event periods. Among the 97 firms, we drop

[16] We thank Michelle Hanlon and Joel Slemrod for providing the data.

[17] Our intention is to compare the pre-event cost of debt against the post-event cost of debt. Keeping more than one event for a firm could create overlapping event windows that confound the analysis. In particular, the pre-event window of a later event could overlap the post-event window of an earlier tax shelter news-event. Using only the first news-event effectively eliminates the possibilities of overlapping event windows.

another 40 firms because DealScan loan data are missing in either the pre- or the post-event period. The final sample contains 57 firms with 895 loans, 418 (477) of which are initiated before (after) the firm's tax shelter news-event.[18]

We use a dummy variable, Post_News_Loans, to indicate loan facilities after the news-event. Post_News_Loans equals one if the firm obtained the loan facility after its tax shelter news-event; it equals zero if the firm obtained the loan facility before its tax shelter news-event. In Table 5, Model 1, we estimate the unconditional average effect associated with the news-events on bank loan cost by regressing loan spreads on Post_News_Loans using the full sample of 895 loans. The coefficient on Post_News_Loans is 0.381 and it is significant at the 1% level. Since the average loan spread in the sample is 95 basis points, this estimate implies that banks *on average* increase loan spread by 36.2 basis points after a borrower's tax shelter activity was publicly scrutinized in a news-event (36.2=0.381×95×1).

[Insert Table 5 here]

In Model 2, we provide an estimate of the conditional average effect. In particular, we include all control variables as specified in the baseline model, including firm attributes, loan characteristics, industry effects, and year effects. We continue to use Post_News_Loans as the test variable. The coefficient on Post_News_Loans remains positive and statistically significant.

In Model 3, we use a difference-in-differences approach to provide a more precise estimate of the marginal effect of tax shelter news on bank loan cost. We follow the same procedure described in Section 4.3.2, except that in this case we use the variable, Shelter_News_Firms, to capture the treatment firms. Shelter_News_Firms equals one if a firm ever experiences a shelter news-event; it equals zero otherwise. All available Compustat firms in

[18] We also use an alternative sample that limits loan observations to a five-year period surrounding the news-events in both the pre-event window and the post event-window. This sample contains 537 loans. We find that the results are qualitatively unchanged in this sample.

the same news-event year are included in the matching procedure. We estimate the propensity score of a shelter-news event with a logistic regression using Shelter_News_Firms as the dependent variable. The independent variables include all factors that are used by Wilson (2009) to predict the likelihood that a firm engages in a tax shelter transaction. This step generates the likelihood that a firm's tax-sheltering activities are publicly disclosed in a news-event. Using the predicted propensity score from this logistic regression, we match, without replacement, each treatment firm (a firm with Shelter_News_Firms = 1) with a match firm (another firm with Shelter_News_Firms = 0) using the closest propensity score. As before, we require both treatment and match firms in each matched pair to have at least one loan-facility before and after the news-event. The final sample contains 1,052 loans initiated by 57 unique matched pairs. Among these loans, 534 (518) are initiated before (after) the firm's tax shelter news-event.

We conduct the difference-in-differences test using a modified specification of the baseline model by replacing the tax avoidance measures with Shelter_News_Firms, Post_News_Loans, and the interaction variable, Shelter_News_Firms × Post_News_Loans. Table 5, Model 3, reports the results. The coefficient on the interaction variable is significantly positive. This suggests that firms affected by tax shelter news (treatment firms) have significantly higher increases in bank loan spreads after tax shelter news when compared to match firms without tax shelter news. To the extent that the news-events are exogenous, one may interpret this finding as providing additional evidence of a causal effect of tax avoidance on bank loan cost as follows. Tax shelter news provides banks incremental information about the firm's tax aggressiveness, which, in turn, causes banks to increase the firm's loan spreads after its tax sheltering activities became a publicly disclosed news-event.

5. Evidence from non-price loan terms, public bond yields, and choice of debt financing

5.1. Effects of tax avoidance on non-price loan terms

Aside from setting loan spreads, banks could also adjust non-price loan terms such as collateral and covenant requirements to mitigate avoidance-induced risks (Rajan and Winton, 1995; Bharath, Sunder, and Sunder, 2008; Graham, Li, and Qiu, 2008). We use a dummy variable to capture the presence of a collateral requirement; Dummy(Security) equals one if a loan facility has a collateral requirement; it equals zero otherwise. We use logistic regressions to estimate the baseline model using Dummy(Security) as the dependent variable. Table 6, Panel A, presents the results. For brevity, we report the coefficients on the tax avoidance variables only. We find that the coefficients on the tax avoidance variables are all significantly positive.[19]

[Insert Table 6 here]

Following Graham, Li, and Qiu (2008), we use the natural logarithm of one plus total number of covenants, denoted as Log(1 + Covenant), to capture the intensity of covenant requirement in a loan facility. We use OLS regressions to estimate the baseline model using Log(1 + Covenant) as the dependent variable. Table 6, Panel B, reports the results. In two of the three models, the coefficients on the tax avoidance variables are positive and significant at the conventional level.

Taken together, these results indicate that banks tighten collateral and covenant requirements when lending to firms that exhibit greater tax avoidance. This implies that banks view tax avoidance as increasing the risks they face, and therefore banks impose more stringent non-price loan terms to mitigate the heightened risks when lending to tax aggressive firms.

[19] The estimates on the control variables suggest that firms with larger size, lower leverage, higher ROA, lower earnings volatility, and higher creditworthiness (i.e., higher Z-score) are less likely to pledge collateral. These results are consistent with those in Graham, Li, and Qiu (2008).

5.2. Effects of tax avoidance on cost of public bonds and choice of debt financing

Bharath, Sunder, and Sunder (2008) find that 1) information risk increases cost of bank debts and cost of public bonds, but its incremental effect on the interest spreads of public bonds is significantly larger than that of the bank loans; and 2) firms with a higher information risk rely more heavily on bank loans as opposed to public bonds. Accordingly, if tax avoidance increases cost of bank loans because it heightens the lender's risk exposure, it should also increase the cost of public bonds and tilt the firm's debt financing preference toward bank loans over public bonds.

We explore the effect of tax avoidance on the cost of public bonds as follows. We use an exhaustive sample of public bonds issued over the period 1985-2008 for which we can compute the corresponding tax avoidance measures. We use data from the Securities Data Corporation (SDC) New Issues database to construct the requisite variables for the analyses. We modify the baseline model 1) by using Log(At-issue Yield Spread) as the dependent variable; and 2) by replacing loan characteristic variables with public bond characteristic variables.[20] We define at-issue yield spread as the difference between the yield to maturity on a coupon-paying corporate bond and the corresponding yield on a coupon-paying government bond with the same maturity date.

Table 7 presents the OLS regression results. Across all models, the coefficients on the tax avoidance variables are all positive and significant, indicating a positive relation between aggressive tax avoidance and cost of public bonds. More importantly, the coefficients in Table 7 are up to 3.3 times larger than those in Table 2, indicating that tax avoidance has significantly larger incremental effects on interest spreads of bonds than on those of the bank loans.

[20] We use five variables to capture public bond characteristics. Log(Bond size) is the natural logarithm of issue proceeds of a bond. Log(Bond maturity) is the natural logarithm of a bond's months to maturity. Dummy(Callable) is an indicator variable equal to one if a bond is a callable bond and zero otherwise. Dummy(Private) is an indicator variable equal to one if a bond is issued through a private placement and zero otherwise. Dummy(Senior) is an indicator variable equal to one if a bond is a senior bond and zero otherwise.

[Insert Table 7 here]

Table 8 examines the effects of aggressive tax avoidance on firm debt-financing preference for bank loans over public bonds. We construct a sample of firms that either issued public bonds or obtained bank loans in a given year over the period 1985-2009 by combining the two samples, bank loans and public bonds, used in previous analyses. We drop the observation if a firm issued bonds and bank loans simultaneously in the same year. Dummy(Loan) equals one if a firm accesses debt from the bank loan market; it equals zero if a firm chooses the public bond market. We use logistic regressions with Dummy(Loan) as the dependent variable to estimate how tax avoidance affects the probability that a firm chooses to obtain debt financing from the bank loan market rather than the public bond market. The model specification is based on the regression equation in Table 4 of Bharath, Sunder, and Sunder (2008) and our estimates on the control variables are generally consistent with those in Bharath, Sunder, and Sunder (2008). More importantly, Table 8 shows that the coefficients on the tax avoidance variables are all significantly positive, indicating the firms that exhibit greater tax avoidance prefer to access debt from the bank loan market rather than the public bond market.

[Insert Table 8 here]

Taken together, the findings on bank loan spreads, at-issue bond yields, non-price loan terms, and firm debt financing preference for bank loans over public bonds paint a fairly complete picture of how aggressive tax avoidance affects a firm's cost of debt capital in general. The results, consistent with Bharath, Sunder, and Sunder (2008), show that aggressive tax avoidance has multi-faceted effects on debt contracting and it uniformly increases the cost of debt capital, regardless of whether the firm seeks debt financing from private bank loan market or public bond market.

6. Exploring the channels

6.1. Exploring the effect of various risk factors

Desai and Dharmapala (2009) find that the effect of avoidance-induced agency risk is more severe in firms with poor corporate governance. Accordingly, if agency risk is a priced factor in bank loan spread, one would expect the positive relation between tax avoidance and bank loan cost to be more prominent in poorly governed firms. We use the Gompers, Ishii, and Metrick (2003) G-index to capture the quality of corporate governance. The dummy variable, HIGH, indicates poorly governed firms (i.e., high-agency-risk firms) with a G-index that is higher than the sample median. The variable, LOW, captures low-agency-risk or well-governed firms and it equals one minus HIGH. We create two interaction terms between tax avoidance measures and these dummy variables, HIGH and LOW. The idea is to delineate the effects of tax avoidance in high-agency-risk firms as opposed to low-agency-risk firms. We modify the baseline model by 1) replacing the tax avoidance measure with the interactions terms, Tax avoidance × HIGH and Tax avoidance × LOW; and 2) adding the dummy variable, HIGH as an additional independent variable. As before, we estimate the revised model using OLS regressions with clustered standard errors. Table 9, Panel A, presents the results of this analysis.

Likewise, banks should be more sensitive to information risk and IRS audit risk when lending to firms with greater levels of these risks. Following Bharath, Sunder, and Sunder (2008) and Guedhami and Pittman (2008), we use 1) abnormal discretionary accruals based on the modified Jones (1991) model (Dechow, Sloan, and Sweeney, 1995) to capture firm information risk; and (2) the threat of a face-to-face IRS audit as reported by Transactional Records Access

Clearinghouse (TRAC) to capture the IRS audit probability.[21] Following the same procedures described above, we classify high-information-risk firms (high-audit-risk firms) as those with a level of discretionary accruals (IRS audit risk) that is higher than the sample median. To be parsimonious, in panels B and C, we use the dummy variable, HIGH, to indicate high-information-risk firms and high-audit-risk firms, respectively. In both panels, the variable, LOW, captures the low-information-risk and low-audit-risk firms, respectively. We also follow the same procedure to revise the baseline model. Table 9, Panel B and Panel C, present the results of these analyses.

Across all panels, we find that the coefficients on the tax avoidance measures are all positive; in other words, there is no evidence of a negative avoidance-spread relation. In particular, the coefficients ($ß_1$) on the interaction term, Tax avoidance × HIGH, are statistically significant in all cases, indicating a positive tax avoidance effect on bank loan spreads in high-agency-risk, high-audit-risk, and high-information-risk firms. The coefficients ($ß_2$) on the other interaction term, Tax avoidance × LOW, are generally insignificant. Of the nine coefficients on $ß_2$, only two are statistically significant at the conventional level. More to the point, we reject the null hypothesis that these interaction terms are equal (i.e., $ß_1 = ß_2$) in six of nine cases based on the Chow test. These empirical regularities indicate that the avoidance-induced risks are plausible channels through which tax avoidance affects bank loan cost.

[Insert Table 9 here]

6.2. Exploring the wealth and leverage effects

[21] TRAC reports on face-to-face IRS audit probabilities between 1992 and 2006 for firms sorted into six groups based on asset size. An IRS audit probability is the number of corporate tax return audits completed by the IRS in fiscal year *t* for a given asset size group divided by the number of corporate tax returns received in the previous calendar year for the same asset size group.

We also explore potential wealth and leverage effects; we present and discuss these results in the Internet Appendix. We find no evidence of a negative association between tax avoidance and bank loan spread even when the avoidance-induced benefits due to leverage reduction or financial slack enhancement are presumably dominant.

7. Tax avoidance surrounding first-time loan initiations

If lenders view tax avoidance negatively and seek to price the risks in bank loans, managers of borrowing firms could "window dress" by reducing tax avoidance before and increasing it after loan initiation. However, the savings in incremental borrowing cost due to "window dressing" are likely tempered because banks are well-informed and it is beneficial for the firm to maintain a long-term banking relation. We find no evidence of significant changes in the levels of tax avoidance one or two years prior to loan initiations; these results are not tabulated. In contrast, we find that firms on average have lower levels of tax avoidance in the three-year period after a first-time loan initiation.

We focus on the effect of first-time loan initiations on subsequent tax avoidance practices. The analysis is based on a sample of firms from Dealscan that obtained a bank loan for the first time over the period 1985-2009. Annual data from three years before to three years after the loan initiations are used. We use a three-year window in the pre- and the post-initiation periods because the average loan maturity in our sample is 44 months. The dummy variable, POST, equals one if the observation is during the three-year period after the first-time loan initiation; it equals zero if the observation is during the three-year period before the first-time loan initiation. The model specification is based on Chen, Chen, Cheng, and Shevlin (2010); it controls for major factors affecting tax avoidance such as firm size, asset structure, firm performance, growth,

leverage, operating losses, foreign income, etc. We also include industry and year dummies in the regressions.

Table 10, Panel A, reports the results from the regressions on each of the three tax avoidance measures. The coefficients on the test variable, POST, are negative and significant in two of three models, indicating that firms on average have lower levels of tax avoidance in the three-year period after a first-time loan initiation.

[Insert Table 10 here]

Banks could exert even greater influences on corporate tax avoidance activities if they make a relatively larger investment in the firm. Accordingly, we examine the documented association again using a sub-sample of firms with relative loan size that exceeds the sample median value. Relative loan size is the ratio of the amount borrowed in the first-time loan over the firm's total assets. The results reported in Panel B show that the effect of loan initiations on subsequent tax avoidance is even more prominent in the subsample where banks can exert greater influences (i.e., where the relative loan size is above the sample median value)—the coefficients on POST are negative and significant in all models and the economic significances are all higher than those in Panel A using the full sample.

These empirical regularities can afford two alternative interpretations: 1) banks restrict tax avoidance practices after loan initiations; and 2) firms voluntarily reduce tax avoidance practices so as to bond themselves to banks in hopes of building a long-term borrowing-lending relation. Although it is difficult to differentiate between these alternative interpretations, we note that both revolve around the idea that banks perceive tax avoidance negatively.

8. Conclusion

We provide comprehensive empirical evidence that firms exhibiting greater corporate tax avoidance incur higher bank loan cost. We examine this relation using a broad range of aggressive tax avoidance measures. The results suggest that banks perceive tax avoidance activities as engendering significant risks and accordingly banks charge higher loan spreads when lending to firms with greater tax avoidance.

We conduct difference-in-differences analyses to provide evidence of a positive tax avoidance effect on bank loan cost in two quasi-experimental settings. We use an abrupt change in financial reporting and disclosure rules, FIN 48, as the first quasi-experiment. We find that firms whose tax reserve disclosures were affected by FIN 48 have significantly larger increases in loan spreads during the three-year period immediately after FIN 48 when compared to match firms whose tax reserve disclosures were not affected by FIN 48. In addition, we use publicly disclosed tax shelter news as another exogenous event that provides incremental information about the firm's tax aggressiveness. We find that firms with a news-event have significantly larger increases in loan spreads after the news-event when compared to match firms without a news-event.

We find corroborating evidence that firms with greater tax avoidance incur more stringent collateral/covenant requirements in bank loan contracting; they face significantly higher yield spreads when issuing public bonds; and they prefer bank loans over public bonds when seeking debt financing. We also find that the documented positive relation between tax avoidance and bank loan spread is particularly pronounced in firms with higher information risk, higher agency risk, or higher IRS audit risk. Yet, we find no evidence that other effects due to leverage reduction or financial slack improvement have a significant influence on loan spreads, even in subsamples where the purported effects are presumably prevalent.

Taken together, these results provide direct evidence on how debt holders, including banks and public bond investors, perceive corporate tax avoidance. They indicate that debt holders generally perceive corporate tax avoidance activities as engendering significant risks, identify the effects of avoidance-induced risks on bank loan cost, and add to our understanding of the economic consequences of tax avoidance. Moreover, since debt capital, particularly bank loans, is an important funding source for U.S. corporations, our results suggest that the debt costs associated with avoidance-induced risks could moderate a firm's incentive to engage in tax avoidance, providing a fresh explanation for the "under-sheltering puzzle" (Weisbach, 2002; Desai and Dharmapala, 2006).

Appendix A

Table A.1. Variable definition

Data for tax avoidance measures and firm attributes are from Standard and Poor's Compustat database. Loan data are from Thomson Reuters LPC DealScan database.

Variable	Definition
Measures of aggressive tax avoidance:	
BT	Manzon-Plesko (2002) book-tax difference (BT) is defined as (US domestic financial income – US domestic taxable income – Income taxes (State) – Income taxes (Other) – Equity in Earnings)/lagged assets = (PIDOM – TXFED/Statutory tax rate – TXS – TXO – ESUB)/AT_{t-1}.
DTAX	Frank, Lynch, and Rego (2009) discretionary permanent book-tax difference for firm *i* in year *t*. $DTAX_{i,t}$ is the $\varepsilon_{i,t}$ from the following regression estimated by two-digit SIC code and fiscal year: $PERMDIFF_{i,t} = \beta 0 + \beta 1\ INTANG_{i,t} + \beta 2\ UNCON_{i,t} + \beta 3\ MI_{i,t} + \beta 4\ CSTE_{i,t} + \beta 5\ \Delta NOL_{i,t} + \beta 6\ LAGPERM_{i,t} + \varepsilon_{i,t}$; Where: $PERMDIFF_{i,t} = BI_{i,t} - [(CFTE_{i,t} + CFOR_{i,t}) / STR_{i,t}] - (DTE_{i,t} / STR_{i,t})$; $BI_{i,t}$= pre-tax book income (PI) for firm *i* in year *t*; $CFTE_{i,t}$= current federal tax expense (TXFED) for firm *i* in year *t*; $CFOR_{i,t}$ = current foreign tax expense (TXFO) for firm *i* in year *t*; $DTE_{i,t}$= deferred tax expense (TXDI) for firm *i* in year *t*; $STR_{i,t}$ = statutory tax rate in year *t*; $INTANG_{i,t}$ = goodwill and other intangibles (INTAN) for firm *i* in year *t*; $UNCON_{i,t}$ = income (loss) reported under the equity method (ESUB) for firm *i* in year *t*; $MI_{i,t}$ = income (loss) attributable to minority interest (MII) for firm *i* in year *t*; $CSTE_{i,t}$ = current state income tax expense (TXS) for firm *i* in year *t*; $\Delta NOL_{i,t}$ = change in net operating loss carry forwards (TLCF) for firm *i* in year *t*; and $LAGPERM_{i,t}$ = one-year lagged PERMDIFF for firm *i* in year *t*. Following Frank, Lynch, and Rego (2009), we handle missing values as follows. If minority interest (MII), current foreign tax expense (TXFO), income from unconsolidated entities (ESUB), or current state tax expense (TXS) is missing on Compustat, we set MI, CFOR, UNCON, or CSTE, respectively, to zero. If current federal tax expense (TXFED) is missing on Compustat, we set the value of CFTE to: total tax expense (TXT) less current foreign tax expense (TXFO) less current state tax expense (TXS) less deferred tax expense (TXDI). If information for goodwill and other intangibles (INTANG) is missing on Compustat, we set the value for INTANG to 0. If INTANG = "C", then we set the value of INTANG to that for goodwill (GDWL).
TA_CETR	(-1) times cash effective tax rate, where cash effective tax rate (CETR) is defined as cash tax paid (TXPD) divided by pre-tax book income (PI) less special items (SPI). Cash effective tax rate is set as missing when the denominator is zero or negative. We truncate cash effective tax rate to the range [0, 1].

Firm attributes:

Log(Assets)	The natural logarithm of a firm's total assets (AT).
Leverage	The sum of long-term debt (DLTT) and debt in current liabilities (LCT) scaled by total assets (AT).
Tangibility	Net property, plant and equity (PPENT) scaled by total assets (AT).
Cash holding	Cash and marketable securities (CHE) divided by total assets (AT).
ROA	Operating income before depreciation (OIBDP) scaled by total assets (AT).
M/B	Market-to-book ratio is measured as market value of equity (PRCC_F × CSHO), scaled by book value of equity (CEQ).
Sales growth	The percentage growth rate of sales (SALE) from two years prior to the year immediately before the year of loan inception.
Earnings volatility	The standard deviation of quarterly earnings in the previous five years.
Z-Score	Modified Altman's (1968) Z-score = (1.2 working capital + 1.4 retained earnings + 3.3 EBIT + 0.999 sales)/total assets = (1.2 WCAP +1.4 RE + 3.3 PI + 0.999 SALE)/AT. We follow Graham, Li, and Qiu (2008) to use this modified Z-score, which does not include the ratio of market value of equity to book value of total debt, because a similar term, market-to-book (M/B), enters our baseline regressions as a separate control variable.

Loan characteristics:

Spread	Loan spread is measured as all-in spread drawn in the DealScan database. All-in spread drawn is defined as the amount the borrower pays *in basis points* over LIBOR or LIBOR equivalent for each dollar drawn down.
Loan size	Total amount of a specific loan facility (in million US $).
Loan maturity	Number of months to maturity of a specific loan facility.
Dummy(Syndication)	Equals to one if the loan is syndicated, and zero otherwise.
Covenant	Total number of covenants in a loan facility.
Dummy(Security)	Equals to one if the loan has collateral requirement, and zero otherwise.
Loan purpose dummies	Dummy variables for loan purposes, including corporate purposes, debt repayment, working capital, acquisitions, backup loans, debt repayment and miscellaneous, etc.
Loan type dummies	Dummy variables for loan types, including term loan, revolver greater than one year, revolver less than 1 year, 364-day facility, and bridge loans and miscellaneous, etc.
Debt rating dummies	Dummy variables for S&P senior debt rating, such as AAA, AA, A, etc.

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Table 1
Summary statistics

The data set contains 16,824 loan-year observations and 10,723 firm-year observations for the period 1985–2009. Panel A presents the descriptive statistics for tax avoidance variables and firm attribute variables at the firm-year level, and loan characteristics variables at the loan-year level. Panel B reports the correlation matrix. Appendix A provides detailed definitions and measurements for all variables.

Panel A: Summary statistics

Variables	N	Mean	S.D.	P25	P50	P75
Tax avoidance measures						
BT	10,231	0.012	0.059	-0.009	0.011	0.034
DTAX	6,486	0.011	0.121	-0.022	0.002	0.036
TA_CETR	10,042	-0.268	0.213	-0.361	-0.245	-0.115
Firm attributes						
Log(Assets)	10,723	6.514	1.910	5.144	6.463	7.824
Leverage	10,723	0.270	0.169	0.140	0.269	0.384
Tangibility	10,723	0.414	0.376	0.169	0.314	0.569
Cash holding	10,723	0.081	0.109	0.013	0.037	0.105
ROA	10,723	0.067	0.093	0.027	0.057	0.098
M/B	10,723	2.845	3.028	1.408	2.143	3.387
Sales growth	10,723	0.252	0.838	0.031	0.123	0.289
Earnings volatility	10,723	0.594	1.471	0.147	0.286	0.570
Z-Score	10,723	1.865	1.086	1.097	1.795	2.495
Loan characteristics						
Spread	16,824	167	121	65	150	250
Loan size	16,824	487	1,130	40	150	475
Loan maturity	16,824	44	25	24	48	60
Dummy(Syndication)	16,824	0.818	0.389	1.000	1.000	1.000
Covenant	16,824	4.364	4.251	0.000	4.000	8.000
Dummy(Security)	12,580	0.697	0.460	0.000	1.000	1.000

Panel B: Pearson correlations

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1	BT															
2	DTAX	0.157														
		(0.000)														
3	TA_CETR	0.348	0.070													
		(0.000)	(0.000)													
4	Log (Size)	0.197	-0.016	0.014												
		(0.000)	(0.015)	(0.011)												
5	Leverage	-0.116	-0.026	0.044	0.029											
		(0.000)	(0.000)	(0.000)	(0.000)											
6	Tangibility	-0.092	-0.029	0.090	0.004	0.076										
		(0.000)	(0.000)	(0.000)	(0.411)	(0.000)										
7	Cash holding	-0.263	0.007	0.001	-0.183	-0.232	-0.079									
		(0.000)	(0.318)	(0.954)	(0.000)	(0.000)	(0.000)									
8	ROA	0.720	0.199	0.050	0.138	-0.186	0.036	-0.105								
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)								
9	M/B	-0.022	0.019	0.019	0.031	-0.080	-0.005	0.120	0.061							
		(0.000)	(0.010)	(0.002)	(0.000)	(0.000)	(0.372)	(0.000)	(0.000)							
10	Sale growth	-0.204	-0.051	0.059	-0.094	0.001	0.285	0.090	-0.107	0.066						
		(0.000)	(0.000)	(0.000)	(0.000)	(0.910)	(0.000)	(0.000)	(0.000)	(0.000)						
11	Earnings volatility	-0.043	-0.001	0.019	0.076	0.084	-0.003	-0.015	-0.028	-0.060	-0.012					
		(0.000)	(0.867)	(0.001)	(0.000)	(0.000)	(0.579)	(0.001)	(0.000)	(0.000)	(0.010)					
12	Z-Score	-0.400	-0.001	-0.126	-0.032	-0.311	-0.194	-0.068	0.481	-0.002	-0.116	-0.090				
		(0.000)	(0.913)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.693)	(0.000)	(0.000)				
13	Log (Spread)	0.180	0.026	0.068	-0.560	0.193	0.023	0.095	-0.207	-0.121	0.076	0.066	-0.219			
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)			
14	Loan size	0.181	-0.010	0.001	0.794	0.146	0.031	-0.244	0.126	0.031	-0.080	0.084	-0.014	-0.394		
		(0.000)	(0.149)	(0.881)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.020)	(0.000)		
15	Loan maturity	0.073	0.006	-0.009	0.065	0.153	0.066	-0.117	0.056	-0.024	0.006	0.053	-0.006	0.045	0.219	
		(0.000)	(0.373)	(0.096)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.183)	(0.000)	(0.334)	(0.000)	(0.000)	
16	Dummy (Syndication)	0.120	0.011	0.027	0.406	0.045	-0.006	-0.167	0.070	0.009	-0.066	0.050	-0.012	-0.216	0.552	0.081
		(0.000)	(0.119)	(0.000)	(0.000)	(0.000)	(0.198)	(0.000)	(0.000)	(0.092)	(0.000)	(0.000)	(0.032)	(0.000)	(0.000)	(0.000)

Table 2

Baseline regressions: The relation between tax avoidance and bank loan cost

The table presents the regression results of the baseline model using the full sample of 16,824 loan-year observations for the period 1985–2009. The dependent variable is Log(Spread) for the loan facility a firm obtained in year *t*. Tax avoidance measures and controls for firm attributes are based on Compustat data from the year immediately prior to the loan inception (i.e., year *t*-1). Loan characteristic variables are based on contemporaneous data from Dealscan in year *t*. All variables are defined in Appendix A. For brevity, we omit the subscripts in the table below. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	Log(Spread)	Log(Spread)	Log(Spread)
Tax avoidance measures			
BT	0.219***		
	(2.63)		
DTAX		0.150***	
		(2.83)	
TA_CETR			0.137***
			(4.92)
Firm attributes			
Log(Assets)	-0.184***	-0.190***	-0.206***
	(-14.17)	(-10.71)	(-19.43)
Leverage	0.819***	0.847***	0.821***
	(16.47)	(13.85)	(16.16)
Tangibility	-0.043**	-0.041*	-0.075***
	(-2.36)	(-1.86)	(-3.26)
Cash holding	0.296***	0.310***	0.464***
	(4.83)	(4.14)	(6.80)
ROA	-0.304***	-0.409***	-0.327***
	(-4.77)	(-5.20)	(-4.44)
M/B	-0.010***	-0.010***	-0.010***
	(-5.06)	(-4.05)	(-4.16)
Sales growth	0.018***	0.035***	0.053***
	(2.95)	(3.93)	(5.36)
Earnings volatility	0.022***	0.024***	0.019***
	(6.15)	(4.71)	(5.09)
Z-Score	-0.070***	-0.053***	-0.083***
	(-9.51)	(-5.24)	(-9.54)
Loan characteristics			
Log(Loan size)	-0.031**	-0.013	-0.004
	(-2.49)	(-0.76)	(-0.38)
Log(Loan maturity)	-0.088***	-0.122***	-0.093***
	(-7.31)	(-7.01)	(-7.23)
Dummy(Syndication)	-0.119***	-0.102***	-0.119***
	(-6.52)	(-4.35)	(-6.09)
Credit rating, loan purposes, and loan types	Y	Y	Y
Other controls			
Industry and year effects	Y	Y	Y
Observations	16,824	10,470	16,506
Adjusted R-squared	0.654	0.640	0.644

Table 3

Sensitivity analyses: The effects of endogenous corporate tax avoidance and omitted variable

Panel A of the table presents the second-stage regression results from an instrumental-variable two-stage regression procedure. The sample contains all 16,824 loan-year observations for the period 1985–2009 used in the baseline regressions. In the first-stage regressions, the dependent variables are the respective tax avoidance measures, and the independent variables include two instrumental variables (the level of religiosity where the firm's headquarter is located and median values of tax avoidance measures in two-digit SIC industries, excluding the firm's own avoidance) and all firm-level controls from the baseline model (firm attributes and industry and year dummies). In the second stage, we estimate the baseline model after replacing each of the three tax avoidance measures with the corresponding fitted avoidance measures from the first-stage regressions. Panel B of the table reports the firm fixed-effect regression results, where firm fixed-effects are used in place of the industry effects and all other controls are included. All variables are defined in Appendix A. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics or *z*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Panel A: Instrumental-variable two-stage regressions

Variables	Log(Spread)	Log(Spread)	Log(Spread)
Fitted BT	1.083**		
	(2.01)		
Fitted DTAX		1.811***	
		(2.92)	
Fitted TA_CETR			0.415***
			(3.97)
All control variables	Y	Y	Y
Observations	10,180	6,427	10,001
Adjusted R-squared	0.669	0.637	0.658

Panel B: Firm fixed-effect regressions

Variables	Log(Spread)	Log(Spread)	Log(Spread)
BT	0.169**		
	(2.25)		
DTAX		0.119**	
		(2.26)	
TA_CETR			0.093***
			(4.05)
All control variables except industry effects	Y	Y	Y
Firm fixed-effects	Y	Y	Y
Observations	16,824	10,470	16,506
Adjusted R-squared	0.775	0.766	0.770

Table 4
Evidence from a quasi-experiment–FIN 48

The table presents the results of the following regression models.

Model 1: Log($spread_t$) = f (Affected_Firms, Post_FIN_48_Loans, Affected_Firms × Post_FIN_48_Loans, control variables).

Model 2: Log($spread_t$) = f (Log(UTB_{t-1}), control variables).

Control variables are as specified in the baseline model including firm attributes (Log(Assets), leverage, tangibility, cash holding, ROA, M/B, sales growth, earning volatility, and Z-Score), loan characteristics (Log(Loan size), Log(Loan maturity), Dummy(Syndication), and dummy variables for loan types, loan purposes, and debt ratings), year dummies, and industry dummies. These variables are defined in Appendix A. Model 1 uses a sample of 161 matched pairs of firms and 917 corresponding loan facilities during the three-year period before and the three-year period after the implementation of FIN 48 in 2006. Post_FIN_48_Loans equals one if a loan is initiated during the period 2007-2009; it equals zero if a loan is initiated in the period 2003-2005. Affected_Firms equals one if the firm ever reported a positive UTB during the period 2007-2009 and it equals zero otherwise. A propensity-score matching procedure based on logistic regressions with Affected_Firms as the dependent variable is used to obtain the propensity scores. Model 2 uses loan-year observations in 2008 and 2009. Log(UTB) is the natural logarithm of (1+TXTUBEND). For loans initiated in 2008/2009, TXTUBEND is the unrecognized tax benefit balance of the borrowing firm at the end of the year in 2007/2008. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	Log(Spread)	Log(Spread)
	Model 1	Model 2
Post_FIN_48_Loans	0.335***	
	(3.32)	
Affected_Firms	-0.042	
	(-0.80)	
Post_FIN_48_Loans × Affected_Firms	0.184***	
	(2.65)	
Log (UTB)		0.033**
		(2.29)
Log(Assets)	-0.066**	-0.164***
	(-2.43)	(-5.89)
Leverage	0.706***	0.549***
	(5.76)	(4.07)
Tangibility	-0.025	-0.053
	(-0.55)	(-0.85)
Cash holding	0.084	-0.680***
	(0.43)	(-3.16)
ROA	-0.104	0.234
	(-0.72)	(1.19)
M/B	-0.007*	-0.012**
	(-1.74)	(-1.99)
Sales growth	0.001	0.100*
	(0.02)	(1.89)
Earnings volatility	0.001	0.034***
	(0.11)	(2.96)
Z-Score	-0.050***	-0.107***
	(-2.77)	(-4.60)
Log(Loan size)	-0.094***	-0.024
	(-3.14)	(-1.03)
Log(Loan maturity)	0.027	-0.070*
	(0.72)	(-1.91)
Dummy(Syndication)	0.025	0.209
	(0.40)	(1.50)
Debt rating, loan purposes, loan types, industry and year effects	Y	Y
Observations	917	1,412
Adjusted R-squared	0.617	0.722

Table 5
News of tax sheltering and cost of bank loans

The table presents the results of three regression models. Model 1 presents the estimates from a regression of Log(Spread$_t$) on Post_News_Loans. The sample consists of 895 loan facilities for 57 unique firms with one tax shelter news-event during the period 1990-2004. Post_News_Loans equals one if the firm obtained the loan facility after its news-event; it equals zero if the firm obtained the loan before its news-event. Model 2 includes control variables as specified in the baseline model including firm attributes (Log(Assets), leverage, tangibility, cash holding, ROA, M/B, sales growth, earning volatility, and Z-Score), loan characteristics (Log(Loan size), Log(Loan maturity), Dummy(Syndication), and dummy variables for loan types, loan purposes, and debt ratings), year dummies, and industry dummies. These variables are defined in Appendix A. The additional data requirement reduces sample size to 625 loan facilities. Model 3 is based on loan-year observations from a matched sample of firms with comparable likelihood of being affected by a tax shelter news-event. The regression model is

Log(spread$_t$) = f (Post_News_Loans, Shelter_News_Firms, Post_News_Loans × Shelter_News_Firms, control variables);

where Post_News_Loans and control variables are as defined above. Shelter_News_Firms equals one if a firm has a tax shelter news-event and it equals zero otherwise. A propensity-score matching procedure based on logistic regressions with Shelter_News_Firms as the dependent variable is used to obtain the matches. The matched sample contains 1,052 loan facilities before and after the news-event from 57 matched pairs. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	Log(Spread)	Log(Spread)	Log(Spread)
	Model 1	Model 2	Model 3
Post_News_Loans	0.381***	0.235***	-0.082
	(5.71)	(3.13)	(-1.32)
Shelter_News_Firms			0.015
			(0.28)
Post_News_Loans × Shelter_News_Firms			0.180**
			(2.33)
Log(Assets)		-0.171***	-0.252***
		(-4.48)	(-9.80)
Leverage		1.049***	0.706***
		(3.83)	(3.68)
Tangibility		0.649***	-0.015
		(2.94)	(-0.15)
Cash holding		2.245***	1.098***
		(6.40)	(4.73)
ROA		-2.010***	-0.843***
		(-4.26)	(-2.67)
M/B		-0.020***	-0.021***
		(-2.81)	(-3.29)
Sales growth		0.219**	0.163**
		(2.43)	(2.50)
Earnings volatility		0.069**	0.055***
		(2.28)	(3.88)
Z-Score		-0.011	-0.055
		(-0.20)	(-1.61)
Log(Loan size)		-0.028	0.010
		(-1.00)	(0.41)
Log(Loan maturity)		-0.092*	-0.076*
		(-1.89)	(-1.85)
Dummy(Syndication)		-0.274***	-0.084
		(-2.72)	(-0.94)
Debt rating, loan purposes, loan types, industry and year effects	N	Y	Y
Observations	895	625	1,052
Adjusted R-squared	0.034	0.742	0.721

Table 6

Tax avoidance and non-price loan terms

The table presents the results of two analyses using dependent variables reflecting either collateral or covenant requirement in a loan facility a firm obtained in year *t*. Dummy(Security) equals one if a facility has collateral requirement, and zero otherwise. Log(1+Covenant) is the natural logarithm of one plus the total number of covenants in a loan facility. The independent variables are as specified in the baseline model and as defined in Appendix A. Tax avoidance measures are BT, DTAX, and TA_CETR. All control variables include firm attributes (Log(Assets), leverage, tangibility, cash holding, ROA, M/B, sales growth, earning volatility, and Z-Score), loan characteristics (Log(Loan size), Log(Loan maturity), Dummy(Syndication), and dummy variables for loan types, loan purposes, and debt ratings), year dummies, and industry dummies. Tax avoidance and firm attributes are based on Compustat data from the year immediately prior to the loan inception (i.e., year *t*-1). Loan attributes and the dependent variables are based on contemporaneous data from Dealscan in year *t*. Panel A reports that logitistic regression results with Dummy(Security) as the dependent variable. The sample consists of 12,580 loan-year observations for which collateral information is available. Panel B reports the OLS regression results with Log(1+Covenant) as the dependent variable. The sample consists of 19,521 loan-year observations for which covenant information is available. For brevity, only estimates for tax avoidance measures are reported. Standard errors are adjusted for heteroskedasticity and within firm clustering. *z*-statistics or *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Panel A: Likelihood of a collateral requirement

Variables	Dummy(Security)	Dummy(Security)	Dummy(Security)
BT	0.686*		
	(1.68)		
DTAX		1.248***	
		(3.83)	
TA_CETR			0.553***
			(4.44)
All control variables	Y	Y	Y
Observations	12,580	7,737	12,138
Pseudo R-squared	0.376	0.378	0.354

Panel B: Total number of loan covenants

Variables	Log (1+Covenant)	Log (1+Covenant)	Log (1+Covenant)
BT	0.371***		
	(4.86)		
DTAX		0.064	
		(1.08)	
TA_CETR			0.043*
			(1.82)
All control variables	Y	Y	Y
Observations	19,521	12,203	19,026
Adjusted R-squared	0.472	0.499	0.451

Table 7

Tax avoidance and the cost of bonds

The table presents the regression results of the following regression models:

Log(At-issue Yield Spread$_t$) = f (tax avoidance$_{t-1}$, firm attributes$_{t-1}$, bond characteristics$_t$, year and industry dummies);

The dependent variable is the natural logarithm of at-issue bond yield spread, which is the difference between the yield to maturity on a coupon paying corporate bond and the yield to maturity on a coupon paying government bond with the same maturity date. Yield spread and bond characteristic variables are based on contemporaneous data from the SDC New Issues database. Tax avoidance measures are BT, DTAX, and TA_CETR. Control variable include firm attributes (Log(Assets), leverage, tangibility, cash holding, ROA, M/B, sales growth, earning volatility, and Z-Score), year dummies, and industry dummies. Tax avoidance and firm attributes are based on Compustat data from the year immediately prior to the loan inception. These variables are defined in Appendix A. Controls for bond characteristics are included. Log(Bond size) is the natural logarithm of issue proceeds of a bond. Log(Bond maturity) is the natural logarithm of bond's months to maturity. Dummy(Callable) is an indicator variable that equals to one if a bond is a callable bond and zero otherwise. Dummy(Private) equals to one if a bond is issued through a private placement and zero otherwise. Dummy(Senior) equals to one if a bond is a senior bond and zero otherwise. Dummy variables for bond ratings are also included. The sample consists of 3,684 bond-year observations for the period 1985–2009. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	Log(At-issue Yield Spread)	Log(At-issue Yield Spread)	Log(At-issue Yield Spread)
BT	0.603**		
	(2.25)		
DTAX		0.494**	
		(2.54)	
TA_CETR			0.151***
			(2.72)
Log(Assets)	-0.191***	-0.185***	-0.181***
	(-20.25)	(-14.95)	(-20.41)
Leverage	0.379***	0.479***	0.360***
	(5.03)	(4.77)	(4.74)
Tangibility	-0.049	0.011	-0.031
	(-1.04)	(0.17)	(-0.61)
Cash holding	0.829***	0.594**	0.844***
	(4.83)	(2.52)	(4.77)
ROA	-2.490***	-2.421***	-2.537***
	(-10.05)	(-9.58)	(-10.79)
M/B	-0.009***	-0.007	-0.012***
	(-3.08)	(-1.63)	(-3.75)
Sales growth	0.108***	0.070	0.118***
	(3.31)	(1.60)	(3.61)
Earnings volatility	0.025**	0.032**	0.036***
	(2.19)	(2.53)	(3.14)
Z-Score	-0.065***	-0.038*	-0.055***
	(-3.90)	(-1.89)	(-3.37)
Log (Bond size)	0.047***	0.041***	0.038***
	(6.82)	(5.07)	(6.06)
Log (Bond maturity)	0.242***	0.282***	0.246***
	(18.35)	(18.49)	(19.30)
Dummy (Callable)	0.434***	0.445***	0.433***
	(13.83)	(14.56)	(14.04)
Dummy (Private)	-0.169**	-0.263***	-0.223***
	(-2.09)	(-2.87)	(-3.02)
Dummy (Senior)	-0.550***	-0.404***	-0.591***
	(-10.70)	(-6.21)	(-12.28)
Bond rating, industry and year effects	Y	Y	Y
Observations	3,428	2,476	3,684
Adjusted R-squared	0.562	0.575	0.553

Table 8

The impact of tax avoidance on the choice between bonds and bank loans

The table presents the results of the following logistic regression models:

Dummy(Loan)$_t$ = f (Tax avoidance$_{t-1}$, firm attributes, year and industry dummies);

where Dummy(Loan) equals one if a firm accesses debt from the bank loan market in a given year; it equals zero if a firm chooses to issue public bonds. Tax avoidance measures (BT, DTAX, and TA_CETR) and firm attributes (Log(Assets), leverage, tangibility, M/B, Z-Score, discretionary accruals, capital market access) are based on Compustat data from the year immediately prior to the loan inception or bond issuance. Industry and year dummies are also included in the model. Discretionary accruals are computed using the modified cross-sectional Jones model (Jones, 1991) as described in Dechow, Sloan, and Sweeney (1995). Capital market access is an indicator variable that equals one for a firm has accessed the bond market previously, and equals zero otherwise. Other variables are defined in Appendix A. The sample consists of a comprehensive sample of firms that either issued public bonds or obtained bank loans in a given year over the period 1985-2009. Bond issuances and loan initiations data are from SDC New Issues database and DealScan, respectively. The firm-year observation is excluded if a firm issued bonds and banks loans simultaneously in the same year. Standard errors are adjusted for heteroskedasticity and within firm clustering. *z*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	Dummy (Loan)	Dummy (Loan)	Dummy (Loan)
BT	1.262***		
	(3.45)		
DTAX		0.310***	
		(2.93)	
TA_CETR			0.209*
			(1.74)
Log(Assets)	-0.536***	-0.532***	-0.473***
	(-24.49)	(-17.94)	(-29.92)
Leverage	-0.521***	-0.575***	-1.025***
	(-4.59)	(-4.24)	(-7.52)
Tangibility	-0.394***	-0.314***	-0.283***
	(-5.11)	(-3.03)	(-3.94)
M/B	-0.012	-0.023*	-0.017**
	(-1.49)	(-1.75)	(-2.27)
Z-Score	0.126***	0.322***	0.297***
	(3.16)	(7.52)	(7.43)
Discretionary accruals	-0.397	-0.592	-0.730**
	(-1.20)	(-1.37)	(-2.30)
Capital market access	-1.190***	-1.874**	-1.327***
	(-2.81)	(-2.46)	(-2.98)
Industry and year effect	Y	Y	Y
Observations	16,808	8,417	16,205
Pseudo R-squared	0.161	0.184	0.175

Table 9

Effect of information/agency/IRS audit risk on bank loan cost

The table presents the results of three alternative specifications of the baseline model where the effects of tax avoidance are contingent on information, agency, and IRS audit risks. The regression models are:

$\text{Log(Spread)}_t = f(\text{Tax avoidance}_{t-1} \times \text{HIGH}_{t-1}, \text{Tax avoidance}_{t-1} \times \text{LOW}_{t-1}, \text{HIGH}_{t-1}, \text{Control variables})$.

Control variables include firm attributes, loan characteristics, industry dummies, and year dummies as specified in the baseline model. The tax avoidance measures and firm attributes are based on Compustat data from the year immediately prior to the loan inception. Firm attributes include Log(Assets), leverage, tangibility, cash holding, ROA, M/B, sales growth, earning volatility, and Z-Score. Loan characteristic variables are based on contemporaneous data from Dealscan, including Log(Loan size), Log(Loan maturity), Dummy(Syndication), and dummy variables for loan types, loan purposes, and debt ratings. These variables are defined in Appendix A. The sample consists of 16,824 loan-year observations for the period 1985–2009. In Panel A, HIGH equals one if the firm's discretionary accruals exceeds the sample median value in that year; it equals 0 otherwise. Discretionary accruals are computed using the modified cross-sectional Jones model (Jones, 1991) as described in Dechow, Sloan, and Sweeney (1995). In Panel B, HIGH equals one if the firm's G-index is above the sample median; it equals zero otherwise. G-index is Gompers, Ishii, and Metrick (2003) corporate governance index. In Panel C, HIGH equals one for firms with IRS audit probability exceeding the sample median and equals zero otherwise. IRS audit probability is computed using data from Transactional Records Access Clearinghouse (TRAC) website and measures the likelihood that a firm will be subject to an IRS audit. In all panels, LOW equals one minus HIGH. For brevity, only estimates for the interaction variables are tabulated. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Dependent variable: Log(Spread)			
Variables	Tax avoidance variables		
	BT	DTAX	TA_CETR
Panel A: HIGH indicates high agency risk firms with G-index above sample median			
Tax avoidance × HIGH ($ß_1$)	0.736***	0.360**	0.126**
	(3.58)	(2.41)	(2.49)
Tax avoidance × LOW ($ß_2$)	0.245	0.249**	0.055
	(1.20)	(2.01)	(0.89)
All control variables	Y	Y	Y
Observations	4,529	2,835	4,912
Adjusted R-squared	0.682	0.701	0.670
F (*p*-value) for test: $ß_1 = ß_2$	3.63 (0.06)	0.33 (0.56)	0.83 (0.36)
Panel B: HIGH indicates high information risk firms with discretionary accruals above sample median			
Tax avoidance × HIGH ($ß_1$)	0.407***	0.165**	0.211***
	(4.52)	(2.46)	(7.07)
Tax avoidance × LOW ($ß_2$)	0.220**	0.093	0.043
	(2.69)	(1.28)	(1.45)
All control variables	Y	Y	Y
Observations	14,158	8,773	14,266
Adjusted R-squared	0.617	0.596	0.603
F (*p*-value) for test: $ß_1 = ß_2$	3.36 (0.07)	0.54 (0.36)	16.30 (0.00)
Panel C: HIGH indicates high audit risk firms with face-to-face IRS audit probability above sample median			
Tax avoidance × HIGH ($ß_1$)	0.510***	0.241***	0.250***
	(4.57)	(3.08)	(8.17)
Tax avoidance × LOW ($ß_2$)	0.107	0.072	0.029
	(1.55)	(1.36)	(1.06)
All control variables	Y	Y	Y
Observations	14,406	8,617	14,487
Adjusted R-squared	0.675	0.664	0.662
F (*p*-value) for test: $ß_1 = ß_2$	9.95 (0.00)	3.26 (0.07)	29.51 (0.00)

Table 10
Tax avoidance around the first loan initiation

The full sample consists of 18,928 firm-years observations for firms that borrow for the first time during the period 1985-2009. Firm-year observations consist of the three years before and three years after the year of the first loan initiation. Loan initiation data are from Dealscan. The table presents results from the following regressions:

Tax Avoidance$_t$ = f (POST$_t$, firm attributes$_t$, year and industry dummies);

where the dependent variables are the tax avoidance measures (BT, DTAX, and TA_CETR). POST is a dummy variable that equals one if the firm-year observation is during the three-year period after the first-time loan initiation; it equals zero if the observation is during the three-year period before the loan initiation. Firm attributes include natural logarithm of market value of equity (Size); the ratio of long-term debt scaled by lagged total assets (leverage); an indicator variable coded as one if loss carry forward is positive as of the beginning of the year t (NOL); the change in NOL scaled by lagged total assets (ΔNOL); intangible assets scaled by lagged total assets (Intangibility); the ratio of property, plant, and equipment scaled by lagged total assets (Fixed Assets); and foreign income scaled by lagged total assets (Foreign income). Other firm attribute variables (ROA and M/B) are defined in Appendix A. Panel A presents the regression results for the entire sample. Panel B reports the results for a subset of firms with relative loan size that is above the sample median value. Relative loan size is the loan amount divided by the firm's total assets. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	BT	DTAX	TA_CETR
Panel A: All firms obtained a bank loan for the first time over the period 1985-2009			
POST	-0.003**	-0.005*	-0.001
	(-2.21)	(-1.91)	(-0.09)
Size	0.001***	-0.001**	-0.001
	(4.49)	(-2.18)	(-0.94)
ROA	0.172***	-0.235***	-0.308***
	(13.63)	(-11.09)	(-6.83)
Leverage	-0.006*	-0.001	0.016*
	(-1.96)	(-0.09)	(1.74)
M/B	0.001***	0.001	0.002***
	(5.09)	(1.60)	(4.32)
NOL	0.022***	0.015***	0.091***
	(13.15)	(5.32)	(17.89)
ΔNOL	-0.005*	-0.011**	-0.024***
	(-1.87)	(-2.48)	(-3.47)
Intangibility	0.020***	0.058***	-0.040***
	(5.43)	(8.27)	(-3.89)
Fixed Assets	0.058***	0.012**	0.079***
	(19.34)	(2.17)	(8.84)
Foreign Income	0.025	0.164***	0.203***
	(1.19)	(3.84)	(3.10)
Industry and year dummies	Y	Y	Y
Observations	18,928	14,417	14,135
Adjusted R-squared	0.100	0.047	0.091
Panel B: Firms with above-median relative loan size			
POST	-0.006**	-0.009**	-0.016***
	(-2.46)	(-2.14)	(-2.66)
All control variables	Y	Y	Y
Industry and year dummies	Y	Y	Y
Observations	9,221	7,109	6,894
Adjusted R-squared	0.101	0.052	0.113

Internet Appendix for "Beauty is in the eye of the beholder: The effect of corporate tax avoidance on the cost of bank loans"

This Internet Appendix presents results of additional sensitivity analyses and other tests discussed but not tabulated in our paper titled, "Beauty is in the eye of the beholder: The effect of corporate tax avoidance on the cost of bank loans."

1. Sensitivity analyses

1.1. Adding controls for managerial aggressiveness

Aggressive tax avoidance could also reflect managerial aggressiveness toward SEC regulations, accounting standards, and other corporate policies (e.g., Frank, Lynch, and Rego, 2009; Lennox, Lisowsky, and Pittman, 2013). Accordingly, we add additional control variables to the baseline model to isolate the effects of managerial aggressiveness. We use the incidence of Accounting and Auditing Enforcement Releases (Dechow, Sloan, and Sweeney, 1996) to measure managerial aggressiveness toward SEC regulations because AAERs are SEC enforcement actions brought against firms pursuant to Section 13(a) of the Securities Exchange Act of 1934. We use discretionary accruals to proxy for aggressiveness toward GAAP financial reporting standards (Frank, Lynch, and Rego, 2009). Following Schrand and Zechman (2011), we use a summary measure to capture managerial aggressiveness toward acquisition, financing, and investment policies.[22] We report the results of this analysis in Table IA.1, Panel A. For

[22] Acquisition aggressiveness is a scenario where the ratio of the firm's net acquisition to lagged total assets in a given year exceeds the corresponding two-digit SIC industry median in that year. Financing aggressiveness is a scenario where the firm has either convertible debt or preferred stock in its capital structure in a given year. Another aspect of financing aggressiveness is a situation where the firm pays no dividends. Investment aggressiveness is a situation where the firm has overinvestment in assets. Following Schrand and Zechman (2011), we estimate overinvestment in assets using the residual of a regression of total asset growth on sales growth based on industry-years. Investment aggressiveness is a scenario where the firm's estimated overinvestment residual from that regression is greater than zero. We also measure capital expenditure aggressiveness as a situation where the ratio of the firm's capital expenditures to lagged total assets in a given year exceeds the corresponding two-digit SIC

brevity, we only report the coefficients of the relevant test variables and the tax avoidance variables. We follow the same reporting practice throughout this Internet Appendix. We find that the coefficients on all three measures of managerial aggressiveness are positive; and, all are statistically significant. More importantly, we continue to find a positive relation between the three tax avoidance measures and loan spreads after controlling for managerial aggressiveness toward other corporate policies.

[Insert Table IA.1 here]

1.2. Additional control for corporate governance

We conduct an additional test to mitigate the concern that corporate governance might affect the relation between tax avoidance and bank loan costs. Following Desai and Dharmapala (2009), we use institutional ownership to isolate the effects of corporate governance. Institutional ownership (13f) data are from the Thomson Reuters Ownership database. Institutional ownership is the fraction of a firm's shares owned by institutional investors. Higher institutional ownership indicates better corporate governance.

Table IA.1, Panel B, presents the results. Consistent with prior literature, we find that bank loan spreads are higher in firms with lower institutional ownership. Nevertheless, across all specifications, the coefficients on the tax avoidance variables remain positive and their statistical significance levels are generally unaffected by the inclusion of additional control for corporate governance. These findings show that corporate tax avoidance has an incremental effect on bank loan spread beyond those captured by corporate governance.

industry median in that year. Other managerial aggressiveness is a dummy variable that equals one if a firm exhibits aggressiveness in three or more of the aforementioned measures in a given year; it equals zero otherwise.

1.3. Firm and lead bank two-way clustering

Loans underwritten by the same lead banks may be correlated. Treating correlated loan facilities as independent observations could overstate the statistical significance of the regression coefficients. To ease this concern, we employ a firm and lead bank two-way clustering method to adjust standard errors when estimating the baseline model. Table IA.1, Panel C, reports the results. The results echo those in the baseline regressions. We find that all the coefficients on the three tax avoidance measures remain statistically significant.

1.4. Median regressions

We further investigate the possibility that a few extreme observations may drive our results using median regressions. The results shown in Panel D of Table IA.1 are quantitatively similar to the baseline regression results in Table 2 in our study, indicating that outliers do not drive our main results.

2. Alternative measures of aggressive tax avoidance

A firm's tax planning could be viewed as more or less extreme if it deviates from some benchmark of a "normal" level of tax planning in the industry. Based on this idea, we follow Balakrishnan, Blouin, and Guay (2012) to use industry-adjusted tax avoidance measures to capture more extreme aggressive tax planning activities. We define an industry as firms with the same two-digit SIC codes in a given year. Industry-adjusted tax avoidance is the firm's own tax avoidance minus the corresponding industry median value in the same year. Table IA.2, Panel A, presents the regression results. The results show that industry-adjusted tax avoidance measures are all significantly and positively related to loan spreads, indicating that banks increase loan spreads in borrowing firms with more extreme aggressive tax avoidance.

[Insert Table IA.2 here]

Following Donohoe and Knechel (2013), we use dummy variables to capture firms with the most extreme aggressive tax avoidance in relation to their industrial counterparts in a given year. The dummy variable, Dummy(BT), takes the value of one if a firm's BT is in the top quintile of the BT distribution of the two-digit SIC code industry in a given year, and zero otherwise. Dummy variables for other tax avoidance measures, Dummy(DTAX) and Dummy(TA_CETR), are constructed in the same fashion. Table IA.2, Panel B, reports the results. Coefficients on Dummy(BT), Dummy(DTAX), and Dummy(TA_CETR) are all positive and significant, implying that banks charge higher loan spreads when lending to borrowers with the most extreme aggressive tax avoidance.

We also find consistent results when we perform the analyses using long-run tax rates (Dyreng, Halon, and Maydew, 2008) and using the presence of subsidiaries in tax haven countries as an alternative measure of aggressive tax avoidance (Balakrishnan, Blouin, and Guay, 2012; Dyreng and Lindsey, 2009; Hope, Ma, and Thomas, 2013). These results are not tabulated.[23]

Guenther, Matsunaga, and Williams (2012) argue that the variability of a firm's tax rates over time provides incremental information about the riskiness of a firm's tax positions. Consistent with this argument, they find a positive relation between future stock return volatility in year t+1 and the volatility of CETR as captured by the standard deviation of annual CETR over the time period year t-4 to year t. This finding suggests that volatility of CETR is a viable alternative for the level of CETR. By the same token, the volatility of other tax avoidance measures such as BT and DTAX could also provide additional information about the firm's tax

[23] We use a three-year window and a five-year window to measure long-run tax rates and find similar results. The data for the presence of subsidiaries in tax haven countries are obtained from Scott Dyreng. These data are based on Exhibit 21 of the annual reports. We find that the presence of subsidiaries in tax haven countries is significantly and positively associated with loan spreads.

practices. Accordingly, we examine the relation between tax avoidance volatility measures and bank loan cost. Since we measure cost of bank loans at year *t*, we use a rolling five-year window from year *t*-5 to year *t*-1 to construct each volatility measure. We denote the tax avoidance volatility measures as SD_BT, SD_DTAX, and SD_CETR. We estimate the baseline model again after replacing BT, DTAX and CETR with SD_BT, SD_DTAX, and SD_CETR, respectively. Table IA.2, Panel C, presents the regression results. The results show that the tax avoidance volatility measures are all significantly and positively related to loan spreads measured in year *t*, indicating that banks increase loan spreads in borrowing firms with more volatile tax planning strategies.

3. Additional robustness tests

3.1. Alternative sampling methods

We use a loan facility as the unit of analysis and we treat each loan facility as an independent observation. However, a borrower can obtain multiple loan facilities in the same year, and these facilities need not be independent from each other. Treating correlated loan facilities as independent observations could bias our estimates. Beyond firm-level clustering, following Francis, Hasan, Koetter, and Wu (2012), we address this concern by performing regressions on a reduced sample that includes only the largest facility per firm per year if a firm has multiple facilities in a given year. More specifically, we perform two separate analyses using this reduced sample. First, we estimate the baseline model using OLS regressions based on this reduced sample. Second, because the OLS estimates could be biased due to cross-sectional dependence of regression errors, we also use the Fama-MacBeth (1973) regression method to estimate the baseline model. In Table IA.3, Panel A and Panel B present the OLS regression results and the Fama-MacBeth regression results, respectively. In both panels and across all three

specifications, the coefficients on tax avoidance measures remain positive and retain their significance.

[Insert Table IA.3 here]

The firm-year panel data regressions might still be influenced by serial correlation in variables across years. We thus construct an even smaller reduced sample by focusing on the first bank loan the firm obtained during the sample period of 1985–2009, and if the firm has multiple facilities in its first loan then we use the largest facility obtained by the firm in its first loan. We estimate the baseline regression model again using this firm-level cross-sectional sample. Panel C of Table IA.3 shows that the coefficients of tax avoidance remain significantly positive across all regressions.

3.2. Other robustness tests

There is a significant tax law change within our sample period (i.e., SFAS 109 Accounting for Income Taxes in year 1993). The regulation change could influence the consistency of our tax-avoidance measures. We examine this issue by conducting a subsample analysis based on observations during post-1993 period; we find that our results hold. Our sample period also contains a drastic financial crisis during 2008-2009. To examine whether the crisis affects our results, we exclude observations during the post-2007 period and estimate the baseline model again using the reduced sample. In addition, our sample also includes loans issued to utility and finance companies. Loan pricing for these highly regulated firms could be different. Accordingly, we exclude loans issued to utility and finance firms and estimate the baseline regression model again. In all cases, our findings continue to hold and remain quantitatively unchanged across all three specifications with different tax avoidance measures. For brevity, we do not tabulate the findings for these robustness analyses.

In summary, all sensitivity and robustness tests provide results that are consistent with the main findings in Table 2 reported in our study and confirm a robust and significantly positive relation between corporate tax avoidance and the cost of bank loans.

4. Exploring the wealth and leverage effects

Tax avoidance activities could generate significant tax savings or reduce leverage, inducing a wealth effect or a leverage effect that *decreases* bank loan cost. These effects are discussed in Section 2.3 in our study. A strong wealth effect or leverage effect could lead to a *negative* avoidance-spread relation. In this section, we investigate whether a negative avoidance-spread relation exists in some firms where the purported relation is more likely to occur.

If banks benefit from avoidance-induced tax savings at all, they are most likely to place a higher value on such a benefit in firms facing a tighter financial constraint. We use the Kaplan and Zingales (1997) measure, hereafter KZ score, to measure the tightness of a firm's financial constraint. A higher KZ score indicates a tighter financial constraint. Accordingly, the avoidance-induced wealth effect should be more prominent in firms with a higher KZ score.

On the other hand, non-debt tax shields from tax avoidance activities could crowd out interest tax shields from debts (e.g., Graham and Tucker, 2006). Firms facing a particularly strong crowding-out effect could substitute corporate tax avoidance with debt, leading to a more prominent leverage effect. There is evidence that the crowding-out effect dominates in firms that are near tax exhaustion as captured by the presence of a positive tax loss carry forward (MacKie-Mason, 1990; Dhaliwal, Trezevant, and Wang, 1992). Accordingly, we anticipate a more prominent leverage effect among firms that report a positive tax loss carry forward (i.e., a positive TLCF).

We classify high-wealth-effect firms as those with a level of KZ score that is higher than the sample median. We classify high-leverage-effect firms as those with a positive TLCF in the year immediately prior to the loan inception. We revise the baseline model using the same procedure as described in Section 6.1 in our study. Table IA.4 reports the regression results.

In both panels and across all tax avoidance measures, we find that the coefficients on the tax avoidance measures are all positive; in other words, we continue to find no evidence of a negative avoidance-spread relation. In particular, the coefficients on the interaction term, Tax avoidance × HIGH, are all positive; and they are statistically positive and significant in three of six cases. This pattern of empirical regularities provides no evidence of a negative avoidance-spread relation that a strong leverage effect or a strong wealth effect predicts.

[Insert Table IA.4 here]

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Table IA.1
The effects of managerial aggressiveness, corporate governance, and omitted variable bias

The table presents the results of several sensitivity analyses of the baseline model. The full sample consists of 16,824 loan-year observations for the period 1985–2009. The dependent variable is Log(Spread). Tax avoidance measures (BT, DTAX, and TA_CETR) and all control variables are as specified in the baseline model including firm attributes (Log(Assets), leverage, tangibility, cash holding, ROA, M/B, sales growth, earning volatility, and Z-Score), loan characteristics (Log(Loan size), Log(Loan maturity), Dummy(Syndication), and dummy variables for loan types, loan purposes, and debt ratings), year dummies, and industry dummies. These variables are defined in Appendix A. Panel A presents the results with three additional controls for managerial aggressiveness. Discretionary accruals are computed using the modified cross-sectional Jones model (Jones, 1991) as described in Dechow, Sloan, and Sweeney (1995). AAER is a dummy variable that equals 1 if the firm is subject to a SEC enforcement action in a given year, and equals 0 otherwise. Other managerial aggressiveness is a summary measure that captures managerial aggressiveness toward acquisition, financing, and investment policies (Schrand and Zechman, 2011). Panel B reports regression results after adding Institutional Ownership to the baseline model as an additional control variable. Institutional ownership (13f) data are from Thomson Reuters Ownership Database. Institutional ownership is defined as the fraction of a firm's shares owned by institutional investors. Panel C reports regression results with standard errors adjusted for heteroskedasticity and clustered at firm and lead-bank level. Panel D reports median regression results. *t*-statistics or *z*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	Log(Spread)	Log(Spread)	Log(Spread)
Panel A: Adding controls for managerial aggressiveness			
BT	0.402***		
	(5.59)		
DTAX		0.101**	
		(2.01)	
TA_CETR			0.139***
			(6.47)
Discretionary accruals	0.303***	0.169***	0.307***
	(6.70)	(2.80)	(6.55)
AAER	0.091**	0.112**	0.077*
	(2.32)	(2.38)	(1.96)
Other managerial aggressiveness	0.066***	0.070***	0.039***
	(6.35)	(5.19)	(3.85)
All control variables	Y	Y	Y
Observations	14,158	8,773	14,266
Adjusted R-squared	0.592	0.598	0.605
Panel B: Adding control variable for institutional ownership			
BT	0.241***		
	(2.79)		
DTAX		0.158***	
		(2.87)	
TA_CETR			0.135***
			(4.67)
Institutional ownership	-0.103***	-0.143***	-0.068**
	(-3.07)	(-3.24)	(-2.03)
All other control variables included	Y	Y	Y
Observations	16,078	10,017	15,826
Adjusted R-squared	0.659	0.646	0.644

Variables	Log(Spread)	Log(Spread)	Log(Spread)
Panel C: Firm and lead-bank two-way clustering			
BT	0.219**		
	(2.57)		
DTAX		0.150***	
		(2.66)	
TA_CETR			0.137***
			(5.01)
All control variables included	Y	Y	Y
Observations	16,824	10,470	16,506
Adjusted R-squared	0.654	0.640	0.644
Panel D: Median regressions			
BT	0.182**		
	(2.55)		
DTAX		0.102*	
		(1.97)	
TA_CETR			0.159***
			(6.76)
All control variables included	Y	Y	Y
Observations	16,824	10,470	16,506
Pseudo R-squared	0.446	0.452	0.437

Table IA.2
Alternative measures of tax avoidance

The table presents the results of several analyses using the baseline model with alternative tax avoidance measures. The dependent variable is Log(Spread) and all control variables are as specified in the baseline model including firm attributes (Log(Assets), leverage, tangibility, cash holding, ROA, M/B, sales growth, earning volatility, and Z-Score), loan characteristics (Log(Loan size), Log(Loan maturity), Dummy(Syndication), and dummy variables for loan types, loan purposes, and debt ratings), year dummies, and industry dummies. All alternative tax avoidance measures and controls for firm attributes are based on Compustat data from the year immediately prior to the loan inception. Loan characteristic variables are based on contemporaneous data from Dealscan. These variables are defined in Appendix A. The sample consists of 16,824 loan-year observations for the period 1985–2009. Panel A presents the results using industry-adjusted tax avoidance as the alternative measure. Industry-adjusted avoidance is the firm's own avoidance minus the corresponding industry median value in the same year. Panel B reports the results using top-quintile tax-avoidance dummy, which is defined as a dummy variable that equals one if the value of a firm's tax avoidance is in the top quintile of the distribution in a given year within the same two-digit SIC codes, and zero otherwise. Panel C uses tax avoidance volatility as the alternative tax avoidance measures. Tax avoidance volatility is calculated as the standard deviation of the respective annual tax-avoidance measure over the period from year $t-5$ to $t-1$. The additional data requirement reduces sample sizes in this analysis. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	Log(Spread)	Log(Spread)	Log(Spread)
Panel A: Using industry-adjusted tax avoidance measures			
Adjusted(BT)	0.183**		
	(2.38)		
Adjusted(DTAX)		0.186***	
		(2.78)	
Adjusted(TA_CETR)			0.132***
			(4.82)
All control variables	Y	Y	Y
Observations	16,824	10,470	16,506
Adjusted R-squared	0.656	0.641	0.646
Panel B: Using top-quintile dummy to capture extreme tax avoidance			
Dummy (BT)	0.031***		
	(3.04)		
Dummy (DTAX)		0.080***	
		(6.11)	
Dummy (TA_CETR)			0.135***
			(12.77)
All control variables	Y	Y	Y
Observations	16,824	10,470	16,506
Adjusted R-squared	0.656	0.642	0.649
Panel C: Using tax avoidance volatility measures			
SD_BT	0.272***		
	(6.98)		
SD_DTAX		0.031**	
		(2.02)	
SD_CETR			0.417***
			(6.04)
All control variables	Y	Y	Y
Observations	9,192	9,192	8,930
Adjusted R-squared	0.702	0.698	0.705

Table IA.3
Firm-year level and firm level analysis on the relation between tax avoidance and the cost of bank loans

Panels A and B present the regression results of the baseline model for a sample of firm-year observations during 1985–2009. Panel A presents the OLS regression results. Panel B presents the Fama-MacBeth regression results. We also construct a reduced sample by focusing on the first bank loan borrowed by firms during the sample period of 1985–2009. Panel C presents the OLS regression results of the baseline model using this firm-level cross-sectional sample. All variables are defined in Appendix A. For brevity, this table only presents the estimates of tax avoidance measures. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Variables	Log(Spread)	Log(Spread)	Log(Spread)
Panel A: Firm-year level OLS regressions			
BT	0.247***		
	(3.05)		
DTAX		0.110**	
		(2.10)	
TA_CETR			0.137***
			(5.08)
All control variables included	Y	Y	Y
Observations	10,231	6,486	10,042
Adjusted R-squared	0.668	0.660	0.651
Panel B: Fama-MacBeth regressions			
BT	0.423***		
	(3.72)		
DTAX		0.289*	
		(1.97)	
TA_CETR			0.108**
			(2.47)
All control variables included	Y	Y	Y
Observations	10,231	6,486	10,042
Adjusted R-squared	0.597	0.599	0.574
Panel C: First-time borrowing cross-sectional regressions			
BT	0.290*		
	(1.72)		
DTAX		0.313***	
		(2.69)	
TA_CETR			0.158***
			(2.66)
All control variables included	Y	Y	Y
Observations	1,930	1,268	1,820
Adjusted R-squared	0.630	0.606	0.603

Table IA.4
Effects of financial slack enhancement and leverage reduction on bank loan cost

The table presents the results of two alternative specifications of the baseline model where the effects of tax avoidance are contingent on financial slack enhancement and leverage reduction. The regression models are:

$\text{Log(Spread)}_t = f(\text{Tax avoidance}_{t-1} \times \text{HIGH}_{t-1}, \text{Tax avoidance}_{t-1} \times \text{LOW}_{t-1}, \text{HIGH}_{t-1}, \text{control variables})$.

Control variables include firm attributes, loan characteristics, industry dummies, and year dummies as specified in the baseline model. The tax avoidance measures and firm attributes are based on Compustat data from the year immediately prior to the loan inception. Firm attributes include Log(Assets), leverage, tangibility, cash holding, ROA, M/B, sales growth, earning volatility, and Z-Score. Loan characteristic variables are based on contemporaneous data from Dealscan, including Log(Loan size), Log(Loan maturity), Dummy(Syndication), and dummy variables for loan types, loan purposes, and debt ratings. These variables are defined in Appendix A. The sample consists of 16,824 loan-year observations for the period 1985–2009. In Panel A, HIGH equals one if the firm's KZ score (Kaplan and Zingales 1997) is above the sample median in that year; it equals zero otherwise. In Panel B, HIGH equals one if the firm has a positive tax loss carry forward (TLCF) in the year prior to the loan inception; it equals zero otherwise. In both panels, LOW equals one minus HIGH. For brevity, only estimates for the interaction variables are tabulated. All variables are defined in Appendix A. Standard errors are adjusted for heteroskedasticity and within firm clustering. *t*-statistics are in parentheses. Significance at the 10%, 5%, and 1% levels are indicated by *, **, and ***, respectively.

Dependent Variable: Log(Spread)			
Variables	Tax avoidance variables		
	BT	DTAX	TA_CETR
Panel A: HIGH indicates high wealth effect as captured by above sample median KZ score			
Tax avoidance × HIGH ($ß_1$)	0.105	0.071	0.052*
	(1.48)	(1.15)	(1.94)
Tax avoidance × LOW ($ß_2$)	0.312***	0.231***	0.193***
	(4.41)	(3.82)	(7.20)
All control variables	Y	Y	Y
Observations	16,755	10,433	16,431
Adjusted R-squared	0.660	0.645	0.650
F (*p*-value) for test: $ß_1 = ß_2$	6.69 (0.01)	3.52 (0.06)	13.96 (0.00)
Panel B: HIGH indicates high leverage effect as captured by a positive TLCF in the year prior to loan inception			
Tax avoidance × HIGH ($ß_1$)	0.151**	0.083	0.122***
	(1.99)	(1.12)	(5.32)
Tax avoidance × LOW ($ß_2$)	0.229***	0.180***	0.136***
	(3.42)	(3.36)	(3.79)
All control variables	Y	Y	Y
Observations	16,824	10,470	16,506
Adjusted R-squared	0.657	0.644	0.647
F (*p*-value) for test: $ß_1 = ß_2$	0.94 (0.33)	1.13 (0.29)	0.11 (0.74)

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ISBN 978-952-6699-65-3, ISSN 1456-6184, online