Tax Incentives in Corporate Acquisitions

by

Hamza Warraich

A thesis
presented to the University of Waterloo
in fulfillment of the
thesis requirement for the degree of
Doctor of Philosophy
in
Accounting

Waterloo, Ontario, Canada, 2021

EXAMINING COMMITTEE MEMBERSHIP

The following served on the Examining Committee for this thesis. The decision of the Examining Committee is by majority vote.

External Examiner	John Robinson Professor, Mays School of Business, Texas A&M University
Supervisor(s)	Andrew Bauer Associate Professor, School of Accounting and Finance, University of Waterloo Kenneth Klassen Professor, School of Accounting and Finance, University of Waterloo
Internal Member	Tu Nguyen Assistant Professor, School of Accounting and Finance, University of Waterloo Kaishu Wu Assistant Professor, School of Accounting and Finance, University of Waterloo
Internal-external Member	Shavin Malhotra Professor, Conrad School of Entrepreneurship and Business, University of Waterloo

AUTHOR'S DECLARATION

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

ABSTRACT

In this dissertation, I examine tax incentives in corporate acquisitions. Reported tax losses or net operating losses (NOLs) under the United States (U.S.) income tax law have grown considerably in recent years. Yet, there is limited empirical evidence on whether target firms' NOL carry-forward (NOLC), which is a potential tax asset, affects merger and acquisition (M&A) activity. I re-examine two open empirical questions in the literature for which there is limited or no empirical evidence. First, does the acquirer compensate the target's shareholders for the target's NOLC? I predict and find that the association between the target's NOLC and acquisition premium is increasing in the acquirer's marginal tax rate. Second, does the target's NOLC affect how the acquisition is financed? Consistent with capital structure theory on the substitutability of debt and non-debt tax shields, I find that the probability of debt financing is relatively lower in deals in which the target has an NOLC. In accordance with the Scholes-Wolfson framework, of "all taxes, all parties, and all costs", a key insight in this dissertation is that the tax and non-tax attributes of the target and acquirer firm interact to determine the available tax incentive and thus the optimal level of tax-planning.

This dissertation also provides new insight into the distortionary effect of tax policy. NOLC-related tax incentives in corporate acquisitions are governed by Section 382 of the *Internal Revenue Code*. §382 imposes a loss limitation on firms' tax attributes following an ownership change, effectively reducing the net present value (NPV) of the tax assets. Empirically, I document that the uncertainty inherent in the applicability of §382 rules increases the likelihood that a deal is cancelled. In addition, I find that §382 is an important determinant in the medium of exchange and that the applicability of loss limitation rules is a plausible explanation for the well-documented aggregate trend in the decline in the propensity of all-stock deals. My findings suggest that §382

creates serious and unintended distortions in the merger decision, the effects of which are economically large.

ACKNOWLEDGEMENTS

I extend my gratitude to my advisors, Andy Bauer and Ken Klassen, for their mentorship, support, and encouragement throughout my doctoral studies. I gratefully acknowledge helpful comments from my committee members Shavin Malhotra, Tu Nguyen, and Kaishu Wu. I thank John R. Robinson for acting as my external examiner and for providing me with invaluable feedback. I also thank the University of Waterloo faculty and PhD students for their helpful comments during the various stages of this dissertation. Finally, I am grateful for the financial support of the Chartered Professional Accountants of Ontario.

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

Chapter 1. Introduction

1.1 Motivation and Summary of Thesis

A central question in corporate finance is whether tax incentives are of first-order importance in corporate decisions. In this dissertation, I examine the M&A setting and provide new evidence on whether and to what extent taxes influence capital structure and corporate investment decisions, and consequently firm value.

Prior work that has examined the effect of taxes on M&A decisions has largely concluded that while the acquiring firm's tax status significantly influences acquisition structure and pricing, the tax attributes of the target firm, particularly its federal net operating loss carry-forward (NOLC), do not matter in most corporate acquisitions (e.g., Auerbach and Reishus 1988c; Erickson 1998; Dhaliwal et al. 2005). The inability to establish this link empirically suggests that acquirers forgo potentially valuable tax assets. This is puzzling because it goes against conventional wisdom and practitioner experience, and because it suggests that costly legislative efforts to prevent loss trafficking may be unnecessary.

The percentage of U.S. public firms that report an NOLC, as well as the amount of NOLC reported, has increased significantly over the last few decades.[1] In their review of the empirical tax literature, Hanlon and Heitzman (2010) speculate that NOLCs were relatively small in earlier study periods, and that recent growth in these potential tax assets may provide an opportunity to detect an effect that prior studies were not able to. Erickson (1998) estimates that conditional on reporting a positive federal NOLC, the median target firm in his sample that was acquired between 1985 and

[1] Using a stratified sample of tax return data from the population of C corporations for tax years 1994-2004, Cooper and Knittel (2006; 2010) find that approximately 50% of firms report an NOLC and that the average gross amount reported tripled from $100 million in 1993 to $300 million in 2004. In a more recent study, Heitzman and Lester (2021) find that between 2010 and 2015 nearly 90% of the largest public U.S. firms reported a federal NOLC with a mean (median) gross value of $474 ($99) million.

1988 reported $2.6 million. The corresponding estimate in my sample for acquisitions announced between 1995 and 2016 is $42.6 million. The significant increase in reported tax losses provide an opportunity to not only revise prior beliefs, but also to produce new evidence on whether, to what extent, and how NOLCs matter in corporate acquisitions.

In examining tax incentives associated with firms' tax attributes, the M&A setting differs significantly from other investment (such as capital expenditures) due to the imposition of loss limitation rules under Section 382 of the *Internal Revenue Code* as amended under the Tax Reform Act of 1986. §382 allows for the target's NOLC to transfer to the acquirer, but it imposes a limit on the amount of the NOLC that can be used in each subsequent tax year. The annual §382 limit, referred to as the loss limit, is deal-specific and can substantially reduce the post-acquisition value of the NOLC.

I begin by re-examining two anomalies in the literature. The literature on taxes and asset pricing examines the association between NOLCs and acquisition pricing. In a seminal study, Hayn (1989) documents that for a sample of acquisitions announced between 1970 and 1985, acquirer and target firm acquisition announcement returns are positively associated with targets' short-lived federal NOLC (i.e., the portion that will expire within 2 years). She concludes that the transfer of the NOLC increases the probability that the future tax benefit of the NOLC will be realized thereby creating shareholder-wealth for both parties. Subsequent studies, unable to document this effect in more recent samples of acquisitions, conclude that the Tax Reform Act of 1986 introduced stricter restrictions on acquiring firms' ability to utilize acquired NOLCs post-acquisition and that this has largely eliminated the potential tax benefit (e.g., Henning, Shaw, and Stock 2000; Chiang, Stammerjohan, and Englebrecht 2014).

My first set of tests focus on acquisition premium and announcement returns. I predict a positive association between the target's NOLC and acquisition premium that is conditional on the acquirer's expectation of future income, as captured by its marginal tax rate (MTR).[2] I estimate that a fully taxable acquirer (with an MTR of 35%) pays a premium of $0.031 per dollar of the target's gross NOLC, on average. By contrast, I do not observe a significant premium in deals in which the acquirer is not taxable.

The imposition of §382 loss-limitation rules reduces the NPV of NOLCs in practically all acquisitions. Thus, the transfer of an NOLC from the target to the acquirer creates shareholder-wealth only if the post-acquisition value of the tax-benefit to the acquirer exceeds the pre-acquisition value to the target. I rely on financial accounting disclosure to induce cross-sectional variation in the NOLC tax-benefit previously capitalized in target firms' price. Accounting Standards Codification Section 740 (ASC 740) requires managers to estimate the future realization of an NOLC based on expectations of future income and to offset the tax-effected amount of the NOLC recorded in the deferred tax asset with a valuation allowance (VA) to the extent that it is "more likely than not" that the tax asset will expire unrealized. In an efficient market, the disclosure of a VA leads to a downward price adjustment (e.g., Kumar and Visvanathan 2003).

In deals in which the acquirer is fully taxable (with an MTR of 35%) and the target has not fully offset its NOLC with a VA, I find that both the acquirer and the target firm generate significantly negative acquisition announcement abnormal returns. In addition, for this subsample of deals, I estimate an acquisition premium of $0.126 per dollar of the target's gross NOLC. I interpret this as the acquirer partially compensating the target shareholders for the loss of the tax-

[2] I define premium as the excess of the offer price over target's trading price, scaled by the target's trading price. Trading price is measured four weeks prior to the transaction announcement date.

benefit that the target firm would have realized absent the merger. These results suggest that loss in the value of the target's NOLC due to §382 is shared between the two parties.

In deals in which the acquirer is fully taxable (with an MTR of 35%) and the target has fully offset its NOLC with a VA, I estimate an acquisition premium of $0.026 per dollar of the target's gross NOLC, suggesting that the acquirer obtains the NOLC at a steep discount. This is corroborated by the acquirer generating a significantly positive acquisition announcement abnormal return. Though the announcement return to the target is insignificant, I find that a benefit accrues to the target via a reversal of the VA discount in the months leading up to the acquisition. The transfer of the tax asset to an acquirer that is better able to use it creates shareholder-wealth for both parties.

Taken together, my findings suggest that there is cross-sectional heterogeneity in the valuation of NOLCs and that the valuation-allowance provides a credible signal of the NOLC's pre-acquisition capitalization.

A second stream of literature builds on capital structure theory (Miller and Modgiliani 1958; 1963), and examines the effect of target firms' NOLC on the method of acquisition financing. The trade-off theory predicts that interest deductions and other investment-related tax shields are substitutable (DeAngelo and Masulis 1980). In the acquisition setting, this implies that the acquirer trades-off the present value of the target's NOLC against potential interest deductions from financing the acquisition with debt. Prior studies, unable to establish this empirically, have concluded that acquirers' willingness to forgo the potential tax-benefit suggests that target firms' NOLCs do not matter in corporate acquisitions (e.g., Erickson 1998; Dhaliwal et al. 2005).

My second set of tests focus on the trade-off theory. I predict that the probability of at least partial debt financing is relatively lower in acquisitions in which the target has an NOLC. My

estimate suggests that the target having an NOLC decreases the relative probability of a partially debt-financed acquisition by 6.4 percentage points. I conduct numerous sensitivity tests. First, because the trade-off theory is most applicable to tax constrained firms, I condition the test on the acquirer's marginal tax rate. I find that the NOLC-debt trade-off is increasing in the acquirer's MTR. Second, restricting the sample to cash-for-stock taxable deals, I find that, conditional on the target having an NOLC, the probability of a 100% debt-financed acquisition is 33 percentage points lower relative to a deal that is financed 100% with internal cash.

I further document that the NOLC-debt trade-off is strongest in the presence of financing frictions. During the 2007-2008 credit crisis, the supply curve for bank credit shifted inward and the composition of corporate debt shifted from private to public. By early 2008, the cost of public debt exceeded the cost of new bank loans (De Fiore and Uhlig 2015). I find that, conditional on making an acquisition, firms that relied on bond markets were significantly more likely to choose a target with an NOLC. This provides additional support for the theory that debt and non-debt tax-shields are substitutable.

In my third set of tests, I examine the effect of loss limitation rules imposed under §382 of the *Internal Revenue Code* on the probability of deal completion. The loss-limit is computed as the fair market value (MV) of the target corporation on the date of ownership change multiplied by the federal long-term tax-exempt rate (FLTR).[3] The applicable loss-limit is not known with certainty on the date of the offer which precedes the ownership change date. The implication is that the loss-limit may change between the date of the offer and the date that the transaction closes. My tests provide several insights.

[3] The federal long-term tax-exempt rate (FLTR), published monthly by the IRS, is intended to mimic the rate of long-term municipal bonds.

I document that deals are less likely to be completed if the loss limit becomes unfavorable and that this effect is more pronounced in deals in which the target has a larger NOLC. In a deal in which the target has an NOLC of $50 ($100) million, a drop in the loss limit reduces the probability of deal completion by 15 (20) percentage points. These estimates correspond roughly with the mean (median) deal in the sample, suggesting that the economic effect is large. By contrast, an increase in the loss limit does not significantly affect the likelihood of completion, suggesting that changes in the loss limit are asymmetric with respect to increases and decreases.

I then document two ways in which the acquiring firm can offset the negative tax consequences of a drop in the loss limit. First, using data on public bond-issuance, I document that the effect of a drop in the loss-limit on the likelihood of deal completion is offset if the acquirer issues additional debt between the offer and completion dates. This provides further evidence that tax shields are substitutable and that the NOLC-debt trade-off occurs in private and public debt markets. Second, I document acquirers' incentive to time the completion of the deal to coincide with a more favorable loss-limit. Specifically, I find that deals are more likely to close within 1-month of the initial offer if the initial loss-limit is relatively large.

In my fourth set of tests, I examine the effect of §382 loss limitations on acquirers' tax attributes. Under §382, the triggering event is a change in ownership. While this is typically always triggered for the target firm, it is only sometimes triggered for the acquiring firm. The §382 loss limit is imposed on the acquirer's NOLC only if the acquirer finances the acquisition with its own stock and the value of the stock is large enough to trigger a significant ownership change. Accordingly, an acquirer has discretion as to whether the §382 rules will be applicable.

Empirically, I document that acquirers with NOLCs are less likely to pay with stock if there is potential for triggering an ownership change. Conditional on paying with stock, I find that deals

are more likely to be cancelled if the loss limit drops between the announcement and closing dates. An increase in the loss limit has no material effect. Finally, I document that the previously studied aggregate trend in the decline of all-stock deals in the early 2000s coincides with an increase in the percent of acquirers with NOLCs. This suggests that the tax disincentive for stock payment is economically large.

1.2 Contribution to Academic Literature and Tax Policy

This dissertation contributes to several streams of literature. My study fits best within the literature on the role of tax incentives in corporate acquisitions. In accordance with the Scholes-Wolfson paradigm, of "all taxes, all parties, and all costs", a key insight in my paper is that the tax and non-tax attributes of the target and acquirer interact in determining acquisition premium and financing, and the probability of deal completion. My findings provide insight into the "black box" of tax planning, and produce evidence on how "parties coordinate and share the benefits of tax planning" (Dyreng and Maydew 2018, 6).

My findings provide new insight into the debate on the value-relevance of accounting for income taxes. In their review of the literature, Graham, Raedy, and Shackelford (2013; 431) note that the extant prior evidence, based on relatively small samples, produces mixed results and this limits external validity. The authors assert that "additional research is warranted to determine whether the market prices the deferred tax accounts, including the valuation allowance". Like Dhaliwal et al. (2013), I document that valuation allowance (VA) disclosures are credible. Additionally, like Wagner, Zeckhauser, and Ziegler (2018), I document that federal NOLCs are capitalized in stock prices. My key contribution, however, is at the intersection of these two findings. I document that the amount of NOLC capitalized in stock prices varies cross-sectionally

with the VA. This evidence is of relevance to future studies examining the effect of taxes on asset prices, a topic in which accounting research has stagnated (Dyreng and Maydew 2018).

My findings also shed new light on capital structure literature. The trade-off theory predicts that debt and non-debt tax shields are substitutable (e.g., Miller and Modgiliani 1958, 1963; DeAngelo and Masulis 1980). Yet, studies have been unable to establish that acquirers trade-off acquisition financing-related interest deductions with the tax benefits of acquired NOLCs (e.g., Erickson 1998; Dhaliwal et al. 2005). Although puzzling, this result is consistent with studies that historically have not been able to establish an association between tax status and debt policy in various settings. This had led some to question the validity of the trade-off theory (e.g., Myers 1984). Fama (2011) remains skeptical and argues that "the big open challenge in corporate finance is to produce evidence on how taxes affect … optimal financing decisions." More recent studies, using exogenous variation in tax status, have been able to establish the effect of tax status on debt policy (e.g., Doidge and Dyck 2013; Heider and Ljungqvist 2014). Nonetheless, my setting differs from these studies in that it examines acquisition-related debt financing and taxes are often considered to be of "third-order" importance in investment decisions (Myers et al. 1998).[4]

Finally, my study contributes to a large literature that examines the determinants of the choice of payment in mergers and acquisitions. The literature has recognized various important determinants, such as asymmetric information, agency costs, capital structure, and the capital gains tax liability. Despite these factors, there is still considerable unexplained variance in the determinants of the medium of exchange (e.g., Boone, Lie, and Liu 2014). I provide a previously unexplored explanation for the well-documented trend beginning in the late 1990s and early 2000s in which the propensity of all-stock deals declined in favor of all-cash deals. I find that this trend

[4] Because M&A debt financing is an incremental debt policy decision, my study does not suffer from the well-known endogenous nature of marginal tax rates and debt policy discussed by Graham, Lemmon, and Schallheim (1998).

coincides with the increase in the percent of firms reporting an NOLC, suggesting that acquirers' tax incentives significantly affect the method of payment in corporate acquisitions. Though this tax explanation has received little attention in the literature, my evidence suggests that its contribution to the decline in all-stock deals is large.

From a policy standpoint, it is important to understand not only whether a policy has had its intended effect, but also whether it has had unintended consequences. §382 is highly controversial with critics arguing that it imposes significant costs on corporations. In implementing §382, congress intended to deter tax-motivated acquisitions.[5] Such transactions are undesirable because they violate the principle of tax neutrality, which holds that taxes should neither induce nor impede investment. Paradoxically, my evidence suggests that loss-limitation rules create at least two potential distortions in the merger decision.

First, the requirement that the loss-limit be computed as of the date of ownership change creates uncertainty on the actual applicable loss-limit and this penalizes an acquirer that engages in tax-planning within the spirit of the tax law. The acquirer is forced to either time the closing of the deal to coincide with a favorable loss limit, or to incur additional costs associated with debt-issuance to re-balance its optimal tax plan. Forgoing these strategies, a drop in the loss-limit impedes investment.

A second, and potentially costlier, unintended consequence of §382 is that it reduces the acquirer's incentive to pay with stock. Deals with stock consideration can potentially trigger an ownership change in the acquirer's stock and thereby impose loss limitation rules on the acquirer's NOLC. This is particularly costly if the acquirer has a large NOLC and the applicable loss limit

[5] As defined in §269 of the Internal Revenue Code, a tax-motivated acquisition is an acquisition that is made to evade or avoid income tax. The most common form, often referred to as "loss trafficking", occurs if a profitable firm acquires a loss firm for the purpose of obtaining the tax-benefit of the loss firm's NOLC.

declines. My finding that the aggregate trend in the decline of all-stock deals coincides the increase in the percent of acquirers with NOLCs suggests that the §382 distortion on investment is potentially large.

Although Congress has long concluded that taxes motivate acquisitions, my evidence does not support this. My finding of an asymmetric effect of loss limit changes on deal completion is counter to the tax-motivation for acquisitions.

1.3 Thesis Organization

This dissertation is organized as follows. Chapter 2 discusses the treatment of NOLCs for tax and financial reporting purposes and the tax laws applicable in corporate acquisitions. Chapter 3 provides a literature review of studies that examine the effect of NOLCs on acquisition pricing. Chapter 4 provides a review of the tax and non-tax benefits and costs in the acquisition of free-standing C corporations within the Scholes-Wolfson framework of tax planning. Chapter 5 develops my two main hypotheses on the effect of the target's NOLC on acquisition premium and financing. Chapter 6 discusses the research design and sample selection procedure. Chapter 7 reports results from the empirical tests of hypotheses 1 and 2. Chapter 8 provides a discussion and tests of the effect of loss limitation rules on the timing and completion of deals. Chapter 9 provides additional tests related to the acquirer's NOLC. Finally, Chapter 10 summarizes the main conclusions of this dissertation.

Chapter 2. Institutional Details

2.1 Introduction

This chapter discusses the institutional details on net operating losses. Sections 2.2 and 2.3 discuss the treatment of net operating losses for tax and financial reporting purposes, respectively. In section 2.4 I discuss the tax implication of net operating losses in mergers and acquisitions. Section 2.5 concludes with a summary of the chapter.

2.2 The Treatment of Net Operating Losses under the Federal Tax Law

The U.S. tax system treats gains and losses asymmetrically. If a corporation's taxable income in a given year exceeds its allowable deductions, then the corporation is taxed on its net income at the statutory corporate tax rate. If net income is negative, the corporation does not receive an immediate refund equal to the tax value of its loss. Instead, section 172 of the *Internal Revenue Code* stipulates that the corporation can either carry back the loss to a preceding tax year and obtain a tax refund if it had taxable income in that year and paid income taxes, or carry forward the loss to offset taxable income in a subsequent tax year. A loss that is carried forward does not earn interest, cannot be adjusted for inflation, and may expire unused.

The NOL carryover rules have evolved over the years. As of 1981, tax losses could be carried back three years and forward 15 years. The rules in place during the majority of my sample period, which were implemented in 1997 under the *Tax Relief Act of 1997*, allow losses to be carried back two years and forward 20 years.[6] Any NOL that is not used within the carryover period permanently expires.[7]

[6] The rules were overhauled in 2017 under the *Tax Cuts and Jobs Act* (TCJA) such that NOLs generated in tax years after 2017 can no longer be carried back and instead they can be carried forward indefinitely. Moreover, while historically firms could use NOLs to reduce 100% of their taxable income, the new rules limit the deduction of NOLs to 80% of taxable income.

[7] In recessionary periods, Congress has enacted legislation to temporarily extend the carry back window (Dobridge 2016). The Job Creation and Worker Assistance Act of 2002 allowed a five-year carry-back of losses incurred in 2001

2.3 The Treatment of Net Operating Losses for Financial Reporting Purposes

If a firm incurs a tax loss in the current year, and it does not have sufficient taxable income in prior years to carry the loss back, it records the future tax benefit of the NOL in its deferred tax asset equal to the amount of the gross NOL multiplied by the statutory corporate tax rate.[8] Due to differences between financial reporting and tax rules, the gross and tax-effected (or net) NOL may not be perfectly correlated. The two measures can differ, for instance, due to the different treatment of write-offs and discontinued operations.[9]

Once recorded, the nominal dollar amount of the tax-effected NOL in the deferred tax asset cannot later be adjusted. However, provisions of Statement of Financial Accounting Standards No. 109 (SFAS No. 109), now part of Accounting Standards Codification Section 740 (ASC 740), require firms to offset the reported tax-effected amount of the NOL carry-forward with a valuation allowance (VA) to the extent that it is "more likely than not" that the tax asset will expire unrealized. Recording a VA requires that managers estimate the future realization of the NOLC based on expectations of future income. GAAP lists four sources of income that managers should consider in estimating the valuation allowance (Graham et al. 2012): 1) future reversals of existing taxable temporary differences, 2) future taxable income, 3) taxable income in carryback periods, and 4) the existence of tax-planning strategies.

2.4 The Treatment of Net Operating Losses in Mergers and Acquisitions

The medium of exchange (or method of payment) determines the tax status of the acquisition structure (i.e., taxable versus tax-free to target firm shareholders). The IRS presumes all acquisitions to be taxable unless certain conditions are met. Generally, for an acquisition to be

and 2002. The Worker, Homeowner, and Business Assistance Act of 2009 allowed a five-year carry-back of losses incurred in 2008 and 2009.

[8] Firms typically report the gross NOL carryforward in the tax footnotes to the annual 10-k report.

[9] See Auerbach and Poterba (1987) for further discussion.

classified as tax-free under Section 368(a)(1)(B), 100% of the consideration used in the acquisition must be voting stock (either common or preferred) of the acquirer with the exception of cash paid in lieu of fractional shares. Additionally, the acquirer must obtain 80% control of the target (Scholes et al. 2014, 417-418).[10]

Appendix A summarizes the tax effects of the five basic structures used in the acquisition of freestanding C corporations.[11] This appendix and the related discussion are adapted from Scholes et al. (2014) and from Erickson (2000). The acquisition of a C corporation can be structured as either a taxable asset purchase or a tax-free stock purchase.[12] In some transactions, the acquirer and target can jointly make a section 338(h)(10) election to treat a tax-free stock purchase as a taxable asset purchase for tax purposes.

The Tax Reform Act of 1986 (TRA 86) introduced important changes to the tax treatment of acquisitions. Prior to the TRA 86, all five structures were commonly used in acquisitions of free-standing C corporations and the tax status of the acquisition determined whether the target's NOLC transferred to the acquirer. An NOLC generally always transferred to the acquirer in tax-free stock acquisitions, but only sometimes in taxable cash acquisitions. Post TRA 86 acquisitions of free-standing C corporations are generally structured as either tax-free stock acquisitions, tax-free asset acquisitions, or taxable stock acquisitions without a §338 election. Although they differ with respect to target shareholders' capital gains tax liability, all three structures allow for the targets' NOLC to transfer to the acquirer subject to restrictions (Scholes et al. 2014).[13]

[10] Mixed cash-stock offers can be treated as either taxable or tax-free depending on the portion of each type of payment and other characteristics of the deal (Scholes et al. 2014).

[11] The costs and benefits of these acquisition structures have evolved over time due to regulation and market forces. I provide a detailed discussion in Chapter 4.

[12] Unless stated otherwise, I use the terms "tax status", "taxable", and "tax-free" throughout this dissertation to refer to the acquisition's tax implication to the target firm's shareholders.

[13] Some exceptions apply. For instance, §269 of the *Internal Revenue Code* (the successor to section 129 initially enacted by congress under the *Revenue Act of 1943*) disallows any tax benefit obtained in an acquisition if the principal purpose of the acquisition is evasion or avoidance of federal income tax.

Section 382 of the *Internal Revenue Code* restricts the use of a corporation's tax losses if the corporation undergoes an ownership change. Although initially enacted by congress in 1954, the current version of §382 was implemented under the Tax Reform Act of 1986 (TRA 86). An ownership change is defined as any increase greater than 50 percentage points in the corporation's stock over a three-year period by shareholders who own 5 percent for more of the corporation's stock. If an ownership change is deemed to have occurred, then §382 limits the acquirer's ability to utilize the target's pre-ownership change NOLC to offset post ownership change income.[14] In each post-acquisition tax year, the acquirer can use the target's NOLC to offset taxable income subject to the lesser of i) the target's NOLC and ii) the fair market value (MV) of the target at the time of ownership change multiplied by the adjusted federal long-term tax-exempt rate (FLTR).[15] Taking into account the annual loss-limit, any amount of the NOLC that cannot be used within 20-year carryforward period permanently expires.[16]

[14] The intended goal of §382 is to limit the use of loss carryovers following an ownership change to the amount of losses that would have been used by the loss corporation absent an ownership change. In other words, following an ownership change, the loss corporation's NOLC should only be allowed to offset income from the loss corporation's pool of capital existing on the date of ownership change. For example, if the loss corporation's shareholders hold 10% of the shares in the combined entity, the loss corporation's NOLC should offset only 10% of taxable income in the combined entity. See Hoenig (2014) for further discussion.

[15] §382 requires the use of an adjusted rate which equals the highest FLTR for the three-calendar month period ending with the month of the ownership change. The §382 formula attempts to impute a rate at which the loss corporation could have used its NOLs absent an ownership change if the corporation had instead sold all its assets and used the proceeds to purchase treasury bonds (Hoenig 2014).

[16] The discussion in this section provides a simplified case of a §382 limitation. There are additional factors that may affect the limitation amount. First, the §382 limitation may be increased if the target has net unrealized built-in gains. Second, in computing the target's fair market value, all class of shares and the related control rights must to be considered. Third, the above discussion assumes that only one §382 limitation applies and that it is triggered by the acquisition. In reality, an NOL may be subject to multiple §382 limitations as a result of prior ownership changes due not only to acquisitions, but also equity-issuance and recapitalization. Complete information on all prior ownership changes is necessary because if an NOL is subject to multiple §382 limitations, the most restrictive limitation applies. Finally, Section 382(c)(1) contains a 'continuity of business enterprise' requirement which requires that the new corporation continue the historic business of the old loss corporation at all times during the two-year period beginning on the ownership change date. If this requirement is not met, then the §382 loss limit is reduced to zero and applied retroactively. Any pre-change loss that has already been deducted is disallowed.

2.5 Conclusions

A tax loss, referred to as a net operating loss (NOL) under the United States (U.S.) Federal income tax law, arises when a business has more allowable tax deductions than it has taxable income. NOL carryover provisions in the *Internal Revenue Code* allow taxpayers to either carry back a loss to a preceding tax year and obtain a tax refund, if the taxpayer had taxable income in that year and paid income taxes, or to carry forward a loss to reduce taxable income in a subsequent tax year. To prevent businesses from trafficking in tax losses (i.e., acquiring a firm for the sole purpose of obtaining its NOLC), the tax code has rules that either eliminate the NOLC entirely or restrict its use following a change in ownership.

Chapter 3. The Pricing of Net Operating Losses in Acquisitions – Literature Review

3.1 Introduction

This chapter reviews the literature on the pricing of target firms' net operating losses in corporate acquisitions. A target firm's NOLC is valuable to a potential acquirer to the extent that the NOLC reduces the acquirer's future tax burden. In section 3.2, I discuss six studies that examine the pricing of targets' NOLCs in acquisitions. Section 3.3 concludes with a summary of the chapter.

3.2 Literature Review

The traditional approach to examining the valuation of a tax attribute in M&A transactions is to estimate a cross-sectional regression of target and/or acquirer acquisition announcement returns or acquisition premium. It is well-documented in the literature that announcement returns and premium are conditional on the target's pre-acquisition market capitalization. One instance in which a positive price response occurs is when 1) the target's price has previously been discounted by the market due to uncertainty relating to the target's future cash flows, and 2) the market anticipates that the merger will lead to synergies that are greater than if the target were to be acquired by the average acquiring firm (e.g., Laamanen 2007). By contrast, a negative premium or announcement return indicates that the pre-acquisition amount capitalized exceeds the post-acquisition value of the attribute. This does not necessarily require that the target be over-valued prior to the acquisition.

In the context of NOLC valuation, the imposition of §382 loss-limitation rules reduces the NPV of the NOLC in practically all acquisitions. Despite §382, however, an NOLC may generate a positive price response to the extent that the market had previously discounted it. Hayn (1989) argues that the extent to which a firm's NOLC is reflected in its price depends on investors' prior

probabilities that the firm will realize the tax benefits of the NOLC taking into account the expected timing of NOL use and the firm's marginal tax rate.

I identify six studies that examine the pricing of targets' NOLCs in acquisitions. Four studies examine announcement returns to transactions that occurred prior to the Tax Reform of 1986 (i.e., Haw, Pastena, and Lilien 1987; Plummer and Robinson 1990; Crawford and Lechner 1996; Hayn 1989). The two other studies (i.e., Henning, Shaw, and Stock 2000; Chiang, Stammerjohan, and Englebrecht 2014) use non-conventional measures of acquisition premium and examine post TRA 86 acquisitions. I discuss these studies below.

Haw, Pastena, and Lilien (1987) examine cumulative abnormal returns for a sample of 55 targets acquired between 1968 and 1979. Using the Altman Z-score, they classify firms as healthy and distressed. The authors report that distressed targets experience higher returns than non-distressed targets because of the greater potential revaluation of distressed targets' NOLC. The returns are generated up to 40 weeks prior to the acquisition announcement and are fully impounded by six weeks prior to the acquisition announcement. The authors conclude that the market revalues distressed firms with NOLCs in anticipation of the possibility of a future merger.

Crawford and Lechner (1996), using a sample of 305 acquisitions completed between 1971 and 1981, show that target firms' NOLCs are 1) positively associated with the likelihood of being acquired, and 2) negatively associated with target announcement period returns. The authors argue that acquisitions are anticipated and that the market impounds the information into the target's stock price well before the acquisition announcement.

Plummer and Robinson (1990) compare announcement abnormal returns for 29 targets with NOLCs against 29 matched targets without NOLCs. All deals are announced between 1970 and 1982. The authors find that targets' acquisition announcement returns are not significantly

different between the two subsamples. The authors also test for whether the market anticipates an acquisition and prices NOLs beforehand, as suggested by Haw et al. (1987) and Crawford and Lechner (1996), but do not find such an effect.

In her seminal work, Hayn (1989) examines acquirer and target firms' abnormal returns as a function of the target's NOLC for a sample of 181 tax-free acquisitions completed between 1970 and 1985. She finds that acquirer and target announcement returns are positive associated with the portion of the NOLC expiring within two years. The long-term portion of the NOLC (i.e., the portion not expiring within two-years) does not generate a significant price response. Hayn (1989) argues that the target is likely to use the long-term portion of its NOLC eventually even absent a merger. The acquisition creates value for the short-term NOLC because it creates an opportunity for the NOLC to be used whereas it may have expired unused otherwise. The magnitude of the coefficient on the short-lived NOLC is twice as large in the regression of target returns as compared to acquirer returns, suggesting that most of the expected tax benefit accrues to target shareholders.

As discussed in section 2.4, prior to the Tax Reform Act of 1986, NOLCs transferred to acquiring firms in tax-free acquisitions, but not in taxable acquisitions. In a robustness test, Hayn (1989) finds that target announcement-period returns are significantly negatively associated with the target's NOLC in taxable acquisitions. Hayn (1989, 141) argues that "the market partially capitalizes the value of this attribute prior to an acquisition announcement and lowers its assessment that the attribute will ever be used when a taxable acquisition is announced."

It is difficult to identify the exact source of the stark difference in findings between Hayn (1989) and the other three studies. The difference may be due to different samples and difference in the measurement of the NOLC benefit (e.g., short vs long term). Moreover, Hayn (1989, 126) refutes the argument that the market can predict and thus price the NOLC tax benefit prior to the

acquisition announcement. She argues, "the market does not appear to be adept at predicting potential takeover targets. As shown by Palepu (1986), target firms cannot be identified using publicly available information. Furthermore, even if an acquisition could be forecast, its tax status might be difficult to anticipate."[17]

The two studies conducted on post TRA 86 samples are unable to establish that targets' NOLCs are valued in corporate acquisitions and conclude that stricter loss limitation rules under Section 382 of the *Internal Revenue Code* (as amended under the Tax Reform Act of 1986), largely eliminate the tax benefit of the acquired NOLC. However, these studies are subject to potentially serious limitations.

Henning, Shaw, and Stock (2000) find that NOLCs are not associated with acquisition premium in a sample of 1071 acquisitions announced between 1990 and 1994. The authors measure acquisition premium as the ratio of purchase price to target book value of equity. This measure, which is essentially a price-to-book ratio, is not commonly used in the literature. In his discussion of the paper, Erickson (2000) outlines several additional limitations of this study. For instance, Henning et al.'s (2000) sample includes taxable acquisitions of freestanding C corporations and subsidiaries and divisions of C corporations. The taxation of acquisitions of subsidiaries and divisions differs materially from that of C corporations and the authors do not account for this. Moreover, Erickson (2000) argues that the sample composition contrasts with conventional wisdom because over 50% of the sample of taxable acquisitions of C corporations consists of step-up structures even though this structure is rare post TRA 86. Erickson (2000) concludes that there are material issues with the design and empirical analyses that make it difficult to interpret the results.

[17] Prior to TRA 86, for the market to fully incorporate the value of a potential target's NOLC, the market would have to anticipate whether the firm would be acquired in a taxable or tax-free acquisition.

Chiang, Stammerjohan, and Englebrecht (2014) find no association between targets' NOLCs and acquisition premium for a sample of 660 acquisitions that occurred between 1997 and 2006. However, following Hayn (1989), they decompose the NOLC into short-lived and long-lived components, and find that acquisition premium is positively associated with the short-lived component and negatively associated with the long-term component. The authors conclude that acquirers assign a significantly positive value only to the short-lived component of the NOLC because it must be used in the near future. A major limitation of Chiang et al. (2014) is that, like Henning et al. 2000, the authors' measure of acquisition premium is a price-to-book ratio, which is not commonly used in the literature and difficult to interpret. The authors recognize this limitation, and, in their conclusion, they state that the mean acquisition premium (ratio of offer price to target stock price four weeks prior to acquisition announcement) is not significantly different between subgroups of targets with and without NOLCs.

In summary, there is little evidence that NOLC tax benefits are priced in M&A transactions. Of the six studies, only Hayn (1989) finds positive announcement returns. Although robust, Hayn's (1989) results may not be generalizable after 1986 because the TRA of 86 introduced restrictive loss-limitation rules. Hayn (1989) acknowledges that an extension of her study to the post TRA 86 period will provide a powerful test of whether acquirers pay for NOLCs. However, post TRA 86 studies, as reviewed in this section, have been unable to confirm Hayn's (1989) findings. It is therefore an open empirical question as to whether targets' NOLCs are valued in acquisitions post TRA 86.

3.3 Conclusions

While there is some evidence that targets' NOLCs were valued in acquisitions prior to Tax Reform of 1986 (TRA 86), studies examining acquisitions subsequent to TRA 86 have not been able to produce evidence that NOLC benefits matter in corporate acquisitions. One explanation of this is that the more restrictive §382 rules introduced by TRA 86 have largely eliminated the potential tax benefit. In the next chapter, I discuss the NOLC-related trade-offs that exist in corporate acquisitions.

Chapter 4. The Tax and Non-Tax Benefits and Costs in the Acquisition of Free Standing C Corporations

4.1 Introduction

As discussed in the previous section, net operating loss carryforwards (NOLCs) are a potential tax benefit in corporate acquisitions. It is important to emphasize, however, that NOLCs constitute only one type of tax benefit, and that there are other sources of tax and non-tax benefits and costs that must be considered. In section 4.2, I introduce the Scholes-Wolfson framework of tax planning. In Sections 4.3 to 4.6 I discuss the sources of tax and non-tax benefits and costs in domestic acquisitions of free-standing C corporations. Section 4.7 concludes.

4.2 The Scholes-Wolfson Framework for Tax Planning

The Scholes-Wolfson paradigm provides a framework for the role of taxes in achieving organizational goals. The framework's key element is that tax minimization is not necessarily synonymous with effective tax planning. Rather, tax minimization is simply one element of the cost structure of a business, and the goal is to maximize the after-tax rate of return. The paradigm proposes that shareholder-wealth maximization requires a contractual perspective that involves three key themes (Scholes et al. 2014). For a proposed transaction, the tax planner must consider 1) all taxes (explicit and implicit), 2) the implications for all parties to the transaction, and 3) both the tax and non-tax costs. The paradigm implicitly assumes that if all taxes, all parties, and all costs can be identified and controlled, the observed tax behavior will be rational and predictable (Shackelford and Shevlin 2001).

In the spirit of Scholes-Wolfson, optimal tax planning is achieved only when the cost-benefit trade-offs of all parties are considered. Typically, there are five parties with a vested

interest in an M&A transaction, the management of both firms, the shareholders of both firms, and the tax authority. Each party faces its own unique set of trade-offs.

Taxes have the potential to influence many aspects of M&A transactions. Typically, there three types of potential tax benefits available in acquisitions: 1) increased use of tax carryforwards, 2) increased depreciation deductions from stepping up the tax basis of the target's assets, and 3) interest deductions associated with financing the acquisition with debt. There is also a potential tax cost: the capital gains tax liability imposed on the target's shareholders. In addition, there are various non-tax costs and benefits to consider.

A merger creates value only if the same benefit is not available, or too costly to obtain, absent the merger. Suppose a firm has an NOLC and the firm is not expected to generate taxable income in the near future. The firm may still be able to utilize its NOLC by selling depreciable assets that have appreciated in value and using the NOLC to offset the resulting tax. If the firm were able to fully utilize its NOLC in this manner, the full value of the NOLC would be reflected in its price and no value would be created by transferring the NOLC to another firm via a merger. Value is created only if the firm is not able to fully utilize its NOLC, and it is transferred to a firm that is better able to use it in the short-term (e.g., because it has a higher marginal tax rate).

In evaluating the benefit available in a merger, it is crucial to determine a) can this benefit be obtained absent a merger? and b) to what extent is the value of this benefit already incorporated into stock prices? It is important to note that a symmetrical argument exists for potential costs, such as target shareholders' capital gains liability. I provide a detailed discussion in the following sections.

4.3 Medium of Exchange and Acquisition Tax Status

The tax status of the acquisition is important not only because it dictates the type of tax benefits available in the acquisition, but also how those benefits are allocated between the parties to the transaction. Taxable acquisitions offer two types of benefits that are typically not available in tax-free acquisitions. First, taxable acquisitions allow for the payment to be financed via external debt and thus provide a tax benefit associated with the tax deductibility of interest. Second, some taxable acquisition structures allow for the target's assets to be stepped-up from historic cost to the purchase price (i.e., fair market value) and this induces a tax-benefit via higher future depreciation deductions.

However, taxable acquisitions also impose a major cost by triggering an immediate capital gains tax to the target firm's shareholders. Thus, effective tax planning requires that the discounted value of the NOLC and debt tax shields be considered in light of the immediate capital gains tax.

Prior to 1986, targets' NOLCs generally always transferred to the acquirer in a tax-free stock acquisition, but only sometimes in a taxable cash acquisition. The potential forgone NOL-related tax benefit imposed an additional cost on taxable cash acquisitions. Tax Reform Act of 1986 altered the tax incentive such that in post-1986 transactions, NOLCs transfer to the acquirer regardless of the acquisition's tax status (Scholes et al. 2014).[18]

Examining 318 pre-TRA 86 transactions that occurred between 1968 and 1983, Auerbach and Reishus (1987c) find no significant evidence that acquirers preserve targets' NOLC by opting for a tax-free structure. The authors conclude, "even where potential tax benefits have been identified, we have not yet found any evidence that they have played an important role in the

[18] NOLCs do not transfer in taxable acquisitions structured as asset acquisitions or stock acquisitions with a §338(h)(10) election. However, these two structures are rarely used in acquisitions of free standing C corporations. See Appendix A.

structure and frequency of mergers and acquisitions" (p. 81). This suggests that the tax and non-tax costs associated with tax-free stock acquisitions were greater than the potential NOLC tax benefit during this period.

Consistent with high cost of stock payment, it is well documented that stock offers generate significantly lower bidder deal-announcement returns than cash offers (e.g., Travlos 1987). Fuller, Netter, and Stegemoller (2002) find that public bidders for public targets generate, on average, a significant -1% five-day cumulative abnormal return on the announcement date. Decomposing returns based on the medium of exchange, the authors find that all-stock deals generate a significant -1.86% return, while cash and mixed deals do not generate a significant price response. In their sample, a 1% wealth-decline translates to a reduction in market capitalization of $5 ($50) million for the mean (median) acquirer, suggesting that stock offers destroy considerable bidder shareholder-wealth.

One explanation for the differential price response for stock relative to cash deals is that the medium of exchange reveals information about the true value of the parties to the transactions. Myers and Majluf (1984) argue that an equity issuance signals to the market that a firm is over-valued. In subsequent work, Hansen (1987) and Eckbo and Thorburn (2000) develop models in which the medium of exchange reveals information about the target's value. In these models, a stock offer signals potential overvaluation of the target. Hansen (1987, p. 76) argues that stock offers have a "contingency pricing effect" whereby target shareholders are forced to share the risk that the acquirer overpays. The implication is that stock offers destroy value because they signal potential adverse selection.

A second explanation suggests that stock offers impose costs on the acquiring firm's management by diluting ownership and increasing the probability of loss of control. Managers

have incentive to increase debt and use the proceeds to repurchase equity held by outside investors because this increases their probability of maintaining control over the firm (Harris and Raviv 1988; Stulz 1988). Amihud, Lev, and Travlos (1990) and Martin (1996) find a positive association between the acquirer's managerial ownership and the likelihood of a cash payment, suggesting that managers who value control prefer to pay cash for acquisitions to avoid ownership dilution and the possible loss of control. Though unfavorable to the acquirer's management, stock offers are preferred by the target's management because stock offers increase the likelihood of the targets' managements' job retention (Ghosh and Ruland 1998).

There is also a potential tax explanation for the negative acquirer wealth effects of stock offers. Stock issuance increases the acquirer's risk of triggering a §382 ownership change of its own stock. This is especially costly for an acquirer with a substantial loss carryforward. Erickson (1998) notes that several of the acquiring firms with NOLCs in his sample explicitly disclose that they are opting for taxable acquisitions to avoid the potential for §382 limitations on their tax attributes. Erickson, Ton, and Wang (2019) find that, conditional on the acquirer having an NOLC, stock payments generate significantly lower acquirer announcement returns than cash payments.

4.4 Capital Gains Tax Liability

The tax status of the acquisition determines the amount and timing of the payment of target shareholders' capital gains tax liability. The tax liability is computed as the excess of sale price over historic cost (i.e., the realized capital gain) multiplied by the applicable tax rate. In taxable acquisitions, target firms' shareholders pay capital gains tax on the realized gain on their shares immediately upon the transaction's closing. If the acquisition qualifies as tax-free, however, the recognition of the realized gain and the related tax liability is deferred until a subsequent taxable event. By triggering the capital gains tax liability, taxable acquisitions accelerate the tax payment

and this imposes a cost on the transaction because the target's shareholders lose the time value of money. In addition, if a shareholder's holding period is less than 12 months, then the realized capital gain is taxed at the higher tax rate on ordinary income.

The extent to which target shareholders' capital gains tax liability affects the structure and/or pricing of an acquisition depends on two conditions: 1) whether the tax liability can be avoided or deferred, and 2) the degree to which the tax liability is previously impounded in the target's stock price. Under either condition, the null is that capital gains taxes are irrelevant because of the existence of tax-advantaged vehicles.

To the extent that stock-for-stock tax-free acquisitions perfectly substitute for cash-for-stock taxable acquisitions, target shareholders' capital gains tax liability is not a significant cost of undertaking an acquisition. This equivalence assumption requires that each structure be associated with the same net-benefit. Ayers et al. (2007) find that an increase in the individual capital gains tax rate reduces the number of taxable acquisitions, but has no effect on the number of tax-free acquisitions, suggesting that the two structures are not perfect substitutes and that capital gains tax liabilities generally cannot be avoided.

There are competing theories on the effect of capital gains taxes on asset prices. The capitalization effect (i.e., the demand side argument) predicts that investors are willing to pay less for assets in which they have to pay capital gains taxes and this depresses asset prices (e.g., Lang and Shackelford 2000). The opposing theory, referred to as the lock-in effect (i.e., the supply-side argument), proposes that investors require higher prices to sell assets if they are subject to taxes, suggesting a positive association between the capital gains tax rate and asset prices (e.g., Klein 2001). Dai, Maydew, Shackelford, and Zhang (2008) provide evidence that the two effects co-exist, and the one that dominates depends on shifts in the asset's demand and supply curves.

Variation in cost basis and holding period among investors of an asset induce heterogeneous capital gains tax liabilities. Bradley et al. (1988) and Klein (1999) argue that this heterogeneity causes an upward sloping supply curve for the target's shares (i.e., the acquirer's offer price exceeds with the percentage of the target's stock that the acquirer seeks to own). The implication is that the target's pre-acquisition price reflects the cost of accelerating the capital gains tax only of the marginal seller, and that the acquisition premium must be large enough to compensate for the capital gains tax cost to the price-setting shareholder. The price-setting shareholder is the investor whose reservation price must be met to obtain control of the target firm.

Early literature conjectures that target shareholder taxes influence acquisition structure and pricing, but does not provide direct empirical evidence. Mandelker (1974) posits that the higher acquisition announcement returns to target shareholders relative to acquirer shareholders suggests that the acquirer compensates the target's shareholders for their capital gains tax liability. Other studies, observing higher target shareholder wealth-effects in cash deals relative to stock deals, conclude that target shareholders demand compensation for their tax liability (Wansley, Lane, and Yang 1983; Huang and Walkling 1987).

Brown and Ryngaert (1991) theorize that bidders with unfavorable private information about their equity prefer to pay with stock rather than cash to avoid compensating target shareholders for capital gains taxes. Despite the tax incentive, early studies were generally unable to establish direct evidence to support theoretical models that the magnitude of target shareholders' capital gains liability increases the likelihood of a tax-free stock-for-stock acquisition (e.g. Auerbach and Reischus 1998c; Erickson 1998).

One explanation for this is that it is difficult to compute an accurate measure of the capital gains tax liability. The computation requires four inputs: sale price, historic cost, holding period,

and the tax rate. Target shareholders' stock basis and holding period is not observable. Both Auerbach and Reischus (1998c) and Erickson (1998) assume a 2-year holding period. Anecdotally, however, it appears that the average holding period tends to be much longer. For instance, Landsman and Shackelford (1995) use proprietary data and find that the average holding period in the RJR Nabisco takeover was just under 10 years.

However, it is difficult to attribute the lack of evidence entirely to the short-holding period. The alternative explanation is that the average gain does not accurately capture the tax liability of the price-setting shareholder. This argument is consistent with an upward sloping supply curve for the target's shares (Bradley et al. 1988; Klein 1999). Ayers, Lefanowicz, and Robinson (2003; 2004) overcome this limitation by identifying shareholder capital gains using cross-temporal changes in the individual long-term capital gains rate and cross-sectional variation in target institutional ownership. The underlying assumption in the identification strategy is that institutional investors are often tax-exempt, and the more shares held by tax-exempt investors the less that the capital gains tax liability matters for obtaining control. The authors provide evidence that target shareholders' capital gains tax liabilities are positively associated with tax-free stock-for-stock acquisition structures (Ayers et al. 2004) and higher acquisition premium conditional on tax status (Ayers et al. 2003).

More recently, however, Hanlon et al. (2020) show that the effects documented by Ayers et al. (2003; 2004) are dominated by the CEO's tax liability, suggesting that CEO is the price-setting shareholder. A potential limitation is that the tests use a limited sample because CEO data available from Execucomp covers S&P 1500 firms only.

In summary, the empirical evidence suggests that the acquirer mostly bears the cost of target shareholder's capital gains tax liability. This induces a tax-incentive to structure the

transaction as a tax-free stock-for-stock acquisition because if the transaction is structured as a taxable cash-for-stock acquisition, the acquirer must offer a premium that is large enough to cover the capital gains tax liability of the price-setting shareholder. There remains ambiguity, however, on who the price-setting shareholder is.

4.5 Tax Benefit of Debt Financing

The method of financing identifies the acquirer's *source* of funds. Generally, the method of payment and method of financing are the same in stock-for-stock acquisitions. This is not the case, however, in cash-for-stock or cash-for-asset acquisitions because a cash payment can be financed with internal cash reserves and/or external borrowing.

The neoclassical investment model predicts that corporate financial decisions are irrelevant to firm value. Modigliani and Miller (1958) demonstrate that in frictionless capital markets the probability distribution of cash flows is independent of capital structure, implying that firm value equals the value of equity plus the value of debt, but that the proportions of debt and equity are irrelevant.[19] The MM theorem holds under the following assumptions: 1) zero transactions costs, 2) symmetric information, 3) complete contracting, 4) complete markets, and 5) absence of corporate and personal taxes. If the assumptions are relaxed and imperfections are introduced, however, the theorem no longer holds, corporate policy can affect firm value, and the firm should pursue a given policy until the marginal benefit of doing so equals the marginal cost.

In a subsequent paper, Modigliani and Miller (1963) relax the assumption of no taxes, and demonstrate that the tax deductibility of interest payments cause the value of the firm to rise by

[19] A competing theory of capital structure is the pecking order of Myers and Majluf (1984) and Myers (1984). The theory proposes that there is a financing hierarchy of retained earnings, debt, and then equity. Equity financing is least desirable because of the associated adverse selection costs. As discussed by Graham and Leary (2011, p 10), the pecking order theory "was not designed as a general theory to explain capital structure for all firms in all settings; rather, the original theory is geared towards mature, low growth-option firms." In addition, Frank and Goyal (2003) note that the pecking order theory predicts capital structure progressively worse in the 1990s than in earlier decades.

the amount of the tax subsidy. Given that the firm's objective function is linear and there is no offsetting cost of debt, this implies that the firm should be financed entirely with debt.[20] However, subsequent work introduces trade-offs to the tax benefits of debt, such as financial distress (Kraus and Litzenberger 1973; Scott 1976) and agency costs (Jensen and Meckling 1976; Myers 1977). Nonetheless, the main theme of Modigliani and Miller (1963) still holds: 1) the incentive to finance with debt increases with the corporate marginal tax rate, and 2) firm value increases with the use of debt up to the point where the marginal cost equals the marginal benefit.

Despite the tax advantage, the deductibility of interest in itself is not an incentive to merge. Absent a merger, a firm can simply borrow to repurchase its shares and thereby obtain access to the same tax advantage. Although not an incentive to merge, the tax-advantage of debt is an incentive to borrow. Corporate acquisitions enhance the tax benefit of borrowing by reducing the agency costs of debt. Agency conflicts may lead to an overly cautious debt policy, and to the extent that the target is underleveraged, an acquisition allows access to the untapped tax gain from additional use of debt capacity which increases firm value. Even absent agency frictions, acquisitions enhance the tax benefit of borrowing by pooling the two firms' idiosyncratic risks and thus reducing the non-tax borrowing costs and the deadweight costs of bankruptcy.

The conjecture that acquisitions enhance the tax benefit of borrowing is generally not supported in the literature. Auerbach and Reishus (1988a) examine debt-equity ratios two years before and two years after the merger. Despite rising debt-equity ratios during the sample period (1968 to 1983), the authors find only a modest increase of 2.1 percentage points, from 30% before to 32.1% after the merger. The authors reach similar conclusions in their two subsequent studies

[20] The tax code generally favors debt over equity by allowing debt-costs (i.e., interest) to be deducted against the corporate tax, but not equity-costs (i.e., dividends). This asymmetric treatment results in two layers of tax on equity-financed investment, at the corporate and investor level, and only one tax on debt-financed investment (i.e., at the investor level).

(Auerbach and Reishus 1988b; Auerbach and Reishus 1988c) and conclude that the potential increase in interest deductions is not a major tax benefit in acquisitions.

Using Value Line performance forecasts, Devos, Kadapakkam, and Krishnamurthy (2009) estimate that in their sample of 264 mergers completed between 1980 and 2004, the average synergy gain is 10.04% of the market value of the combined firm. Decomposing the synergy gains, the authors find that only 1.64% is due to tax savings projected from an increase in debt tax shields. The authors conclude that the "relatively small magnitude of interest tax shields documented here suggests that financial synergies are not a major source of merger gains" (p. 1193). The lack of evidence on the tax benefit of interest tax shields in acquisition financing suggests either that the tax and non-tax costs of debt financing outweigh the potential benefits, or that potential debt trade-offs have not been accounted for.

DeAngelo and Masulis (1980) demonstrate that interest deductions and other investment-related tax shields are substitutable. In the acquisition setting, this predicts that the acquirer trades-off the present value of potential interest deductions from financing the acquisition with debt against the present value of tax losses acquired from the target. Thus, one explanation for why debt is used sparingly is that the tax value of target's tax losses generally exceeds the projected benefit from interest-deductibility. However, this explanation is not supported empirically.

Examining a sample of 340 acquisitions completed between 1985 and 1988, Erickson (1998) models the choice between 100% debt and 100% stock financing as a function of acquirer and target firm characteristics. As predicted by the neoclassical investment model, he finds that the probability of debt-financing increases with the acquirer's marginal tax rate. Inconsistent with the trade-off theory, however, he does not find evidence of the predicted negative association between the target firm's NOLC and the probability of debt financing.

Dhaliwal et al. (2005) re-examine the trade-off between target NOLC and debt financing by modelling the choice between 100% debt and 100% cash financing in a sample of 167 taxable cash acquisitions completed between 1987 and 1997. By focusing only on taxable cash acquisitions, the authors examine the financing choice independently of the tax-status of the acquisition. Despite isolating the financing method from tax-status, however, the authors do not find evidence in support of the predicted negative association between target NOLCs and debt financing.

One explanation for this lack of findings is that, despite the small tax benefit of debt (e.g., Auerbach and Reishus 1988a; Devos et al. 2009), the tax benefit of NOLCs is even smaller. Erickson (1998) estimates that, conditional on reporting a positive NOLC, the median target firm in his sample has an NOLC of $2.6 million while the median value of interest tax-shields from debt-financing is $8.1 million. He concludes that "the acquiring firm's traits significantly influence a transaction's structure, while the target firm's attributes are relatively unimportant in most acquisitions" (p. 281).

4.6 Step-up Structures

A step-up occurs when the price that the acquirer pays for the target's depreciable assets exceeds the undepreciated balance of the assets for tax purposes. The step-up of the target's assets from historic cost to the purchase price (i.e., fair market value) allows for higher depreciation tax shields, and thus creates a tax benefit that would not be available if the target's recorded asset values were carried over to the combined entity unchanged.

The available tax benefit from a step-up can be further increased by the discretion available to the acquirer in the purchase price allocation. In purchasing a pool of assets, the purchase price is allocated to assets based on their fair market value. In practice, a reasonable range of values

exist and managers have discretion over the allocation assigned to specific assets. Generally, the tax benefit of the step-up increases with the proportion of the purchase price that is allocated to shorter-lived assets eligible for accelerated depreciation as opposed to indefinite-lived intangibles or goodwill which are depreciated for tax purposes on a straight-line basis over 15 years.[21]

Step-up structures are also associated with significant costs. Step-ups impose a capital gains tax to the target corporation on the difference between the recorded fair market value (i.e., sale price) and historic cost. Unlike the depreciation tax benefit, which is generated over subsequent years, the capital gains tax is due immediately. The capital gains tax can be offset by the target's tax attributes (e.g., carryforwards and credits), but any unused portion does not transfer to the combined entity. Moreover, because step-ups are taxable acquisitions, target shareholders are subject to capital gains tax on the recognized gain on their shares. Thus, step-up structures impose two levels of taxation. For a step-up to provide a net-positive tax benefit, the present value of depreciation deductions available from the step-up must exceed the two levels of capital gains tax net of the target's NOLC.

The above discussion suggests that the gain from the step-up could be potentially large if the capital gains tax were eliminated (as would be the case if the target's NOLC fully offset the tax). Under prior tax law, the General Utilities doctrine (codified by the IRS in 1954) eliminated the corporate-level capital gains tax on all distributions of property to its shareholders (Kahng

[21] Historically, the amortization of goodwill was not tax-deductible. The *Omnibus Budget Reconciliation Act of 1993* enacted §197 of the *Internal Revenue Code* provided for a 15-year tax-deductible amortization of purchased intangibles, including goodwill, for qualifying acquisitions (i.e., taxable asset purchases) after August 10, 1993. Studies document that although the increased potential tax benefit from amortizing goodwill resulted in higher acquisition premiums, it did not increase the incidence of step-up structures (Ayers, Lefanowicz, and Robinson 2000; Henning and Shaw 2000; Weaver 2000). This suggests that 1) tax deductibility of goodwill was not a significant enough of a benefit to incentivize step-up structures, and that 2) if a step-up structure is elected, at least some of the tax benefit accrues to target shareholders via higher premiums. The sample composition varies across the studies. Weaver examines 279 taxable asset and stock divestitures completed between 1991 and 1994. Ayers et al. (2000) examine taxable acquisitions of subsidiaries, private corporations, and public corporations completed between 1990 and 1996. Henning and Shaw (2000) examine 1741 asset and stock purchases completed between 1990 and 1994.

1998). This exemption created a tax incentive for an acquirer to step-up a target's assets to the purchase price and obtain a depreciation tax-benefit without incurring the offsetting capital gains tax. Because a step-up structure imposed only one level of taxation (i.e., shareholder capital gains tax), it was considered a tax-advantaged acquisition structure.[22]

The TRA 86 repealed the General Utilities doctrine, thereby subjecting step-up structures to two levels of taxation, and thus reducing their incidence (Scholes et al. 2015). However, even prior to TRA 86, anecdotes and empirical evidence suggests that step-up benefits did not matter in the acquisition of free standing C corporations. Auerbach and Resihus (1998a) estimate that in only 2 out of 40 acquisitions did the step-up benefit exceed the target's NOLC. Similarly, Auerbach and Resihus (1998b) estimate the potential tax benefit from a step-up structure averages only about 2% of the target's value. Erickson (1998; 2000) argues that step-ups were uncommon prior to TRA and even more rare afterward because the capital gains tax liability typically exceeds the present value of the future tax benefits from depreciation deductions, thereby making step-ups a negative NPV decision.

4.7 Conclusions

The Scholes-Wolfson framework proposes that shareholder-wealth maximization requires a contractual perspective that involves three key themes, "all taxes, all parties, and all costs". Net operating losses represent only one type of potential tax benefit available in M&A transactions. Effective tax planning, and thus shareholder-wealth maximization, requires that this benefit be valued in light of other tax and non-tax benefits and costs, such as the medium of exchange, the method of acquisition financing, step-up structures, and target shareholders' capital gains tax

[22] Gilson, Scholes and Wolfson (1988) argue that this does not constitute an acquisition-related tax benefit because a firm could obtain a similar tax-favored outcome by distributing its assets to its shareholders absent an acquisition.

liability. In the following chapter, I develop my testable hypotheses while taking into consideration the cost-benefit analyses discussed in this chapter.

Chapter 5. Hypothesis Development

5.1 Introduction

There are at least two fundamental decisions that an acquirer makes in undertaking an acquisition once it identifies a potential target. First, the acquirer decides how much to offer the target's shareholders for their stock. Second, the acquirer decides on the medium of exchange and method of acquisition financing. Hypotheses 1 and 2, discussed in sections 5.2.1 and 5.2.2, predict the effect of the target's NOLC on acquisition premium and financing, respectively. Section 5.3 provides a summary.

5.2 Hypotheses

5.2.1 Hypothesis 1 (H1) – Acquisition Premium

Suppose TargetCo_1 and TargetCo_2 have assets in place that are expected to generate the same stream of future cash flows with a present value of $10 million, and that TargetCo_2 additionally has an NOLC of $5 million. Assuming that the fair market value (MV) of TargetCo_2's stock equals $10 million on the date of ownership change, and that the federal long-term tax-exempt rate (FLTR) equals 2 percent, under §382, AcquisitionCo can offset an annual maximum of $200,000 of income in any post-acquisition year (MV * FLTR = $10 million * 2%). Given that an NOL can be carried forward 20 years, AcquisitionCo can use up to $4 million of TargetCo_2's NOLC to offset its income over the 20-year period ($200,000 x 20 years). In this scenario, $1 million of the NOLC is eliminated and the present value of the $4 million in tax losses that can be used, at a 10% discount rate, is $1.7 million. This example assumes that AcquisitionCo is taxable.

Holding all else constant, an acquirer with a relatively high marginal tax rate (MTR) is better able to use a greater portion of the acquired NOLC in the short-term as compared to an

acquirer with a relatively low MTR. Accordingly, a high MTR acquirer will assign a higher present value to TargetCo_2's NOLC as compared to a low MTR acquirer. An acquirer with a marginal tax rate of 0% is indifferent between the two target corporations and should be willing to pay the same amount for either target (i.e., $10 million). As the acquirer's marginal tax rate increases, its valuation of the two targets diverges. The value of TargetCo_1 remains at $10 million, while the value of TargetCo_2 increases with the acquirer's marginal tax rate. The value of TargetCo_2 to the acquirer is some amount X, where $10 million < X < $11.7 million.

Assuming that the target's NOLC increases the acquirer's reservation price, the question still remains as to why the acquirer would pay for the target's NOLC? In acquisitions, the deal price is determined by negotiations between the acquirer and target. The acquirer will pay consideration up to the value of the target's expected future cash-flows plus expected synergies, while the target will accept no less than its own value (Hansen 1987). Laamanen (2007) argues that to the extent that the target's shareholders recognize the higher potential value of the firm's assets to the acquirer, the target's shareholders may not sell their shares at the prevailing market price. Acquirers' tax status can easily be observed from public information and thus the target's shareholders may demand higher compensation from an acquirer that derives a higher value from the NOLC.[23]

My first hypothesis, stated in the alternative, is as follows:

H1: There is a positive association between the target's NOLC and acquisition premium that is increasing in the acquirer's marginal tax rate.

[23] My argument is similar to that of Schleifer and Vishny (1992) and Clark and Ofek (1994) that shareholders of distressed targets receive higher premiums if the distressed target provides greater synergies to the acquirer.

5.2.2 Hypothesis 2 (H2) – Acquisition Financing

With respect to acquisition financing, the acquirer considers the marginal benefits and marginal costs of both debt and non-debt (i.e., stock and/or internal cash) financing. The trade-off theory suggests that debt and non-debt tax shields are substitutable (i.e., DeAngelo and Masulis 1980). Acquisitions are major investments and the method of financing can significantly alter the acquiring firm's capital structure. Debt-financed acquisitions increase leverage and generate material interest tax-shields, and this has a direct and immediate effect on the acquirer's marginal tax rate. By reducing the acquirer's marginal tax rate, debt financing reduces the NPV of the target's NOLC to the acquirer. Alternatively, if an acquirer has sufficient non-debt tax shields from its own NOLC, investment tax credits, and asset depreciation, and from the NOLC it will acquire from the target, there is no marginal benefit of interest tax shields from debt financing.

In practice, if the target has an NOLC, the acquirer will choose the mix of debt and non-debt financing for which the marginal benefits exceed the marginal costs.

Suppose AcquisitionCo purchases TargetCo_2.

Scenario 1: if AcquisitionCo projects taxable income of $200,000 or less in each of the 20 post-acquisition years, then it should prefer 100% non-debt financing. TargetCo_2's NOLC will fully offset AcquisitionCo's post-acquisition taxable income (for up to 20 years) and there is no marginal benefit of interest tax shields.

Scenario 2: If AcquisitionCo expects to generate more than $200,000 in taxable income, it should prefer a mix of debt and non-debt financing. The target's NOLC will offset the $200,000 each year and interest-deductions from debt-financing offset at least some additional income.

My second hypothesis, stated in the alternative, is as follows:

H2: The probability of at least partial debt financing is relatively lower in acquisitions in which the target has an NOLC.

This hypothesis assumes that the acquirer chooses the optimal capital structure for which the marginal costs of debt equal the marginal benefit. In other words, the tax-benefit from the optimal amount of debt financing (i.e., where there is perfect NOLC-debt substitution) is equal to the offsetting costs of debt (i.e., financial distress and potential loss of corporate control). This hypothesis also assumes that the cost-benefit of all alternative combinations of financing are held constant. Consider the acquisition of TargetCo_2 by a cash-constrained acquirer whose management believes that its equity is under-valued. If debt-financing is the least costly financing alternative, the acquirer may opt for a 100% debt-financed transaction. To the extent that the acquirer has insufficient capacity for additional tax deductions beyond the NPV of the interest tax shield, the acquirer will effectively forgo the NPV of the NOLC. In such a scenario, there is a positive NOLC-debt association. Across the sample of acquisitions, the observed effect will depend on the average association in the cross-section. This could lead to observing a positive, negative, or zero NOLC-debt association.

5.3 Conclusions

In this Chapter, I present my two formal hypotheses. Hypothesis 1 predicts a positive association between the target's NOLC and acquisition premium that is increasing with the acquirer's marginal tax rate. Hypothesis 2 predicts that an acquisition is less likely to be debt-financed if the target firm has an NOLC. In the following chapter, I describe my tests of these hypotheses.

Chapter 6. Research Design and Sample Selection

6.1 Introduction

In this chapter, I present my research design and describe my sample selection procedure. Section 6.2 presents my empirical models. The regression models to test hypotheses 1 and 2 are presented in sections 6.2.1 and 6.2.2, respectively. In section 6.2.3 I discuss the variables I include in my models. Section 6.3 presents my sample selection procedure. Section 6.4 discusses sample statistics. Finally, Section 6.5 concludes.

6.2 Empirical Models

6.2.1 Model of Acquisition Premium

My first hypothesis predicts a positive association between the magnitude of a firm's NOLC and the premium it receives conditional on the acquirer's marginal tax rate. I use the following OLS model to test my first hypothesis:

$$Premium = \alpha + \beta_1 MTR + \beta_2 NOLC\_mv + \beta_3 MTR * NOLC\_mv + \beta_k X + \varepsilon \qquad (1)$$

Premium is the excess of the offer price over target's trading price, scaled by the target's trading price. Following prior literature, I use the trading price four weeks prior to the transaction announcement date. *NOLC_mv* is the gross dollar amount of the target's federal net operating loss carry-forward scaled by trading price four weeks prior to the transaction announcement date. *MTR* is the acquirer's marginal tax rate as simulated by Blouin, Core, and Guay (2010).[24] *X* is a vector

[24] An MTR is the present value of current and expected future taxes paid on an additional dollar of income earned today. Consequently, the computation of MTR requires an estimate of present and future taxable income and tax loss carryovers. Many studies rely on simulated marginal tax rates developed by Graham (1996a; 1996b) based upon the approach of Shevlin (1990). Graham simulates his MTRs under the assumption that a firm's future taxable income follows a random walk. Blouin et al. (2010) argue that while stock returns follow a random walk, income mean-reverts due to transitory components in accounting income. Blouin et al. (2010) use a non-parametric approach to simulating MTRs in which they assume that future taxable income is a function of current performance and firm size. Proxies for the marginal tax rate (MTR) can be computed as either pre or post financing. The latter deducts interest expense from taxable income in computing the MTR. Accordingly, post financing MTRs tend to be lower than pre financing MTRs, on average. Both proxies are subject to limitation. The post-financing MTR is endogenously affected by financing decisions (e.g., Graham, Lemmon, and Schallheim 1998), while the pre-financing MTR may overstate the tax benefit

of the determinants of acquisition premium. This includes acquirer, target, and deal attributes. I defer the discussion of these variables to section 6.2.3. Standard errors are clustered by target industry (2-digit standard industrial classification (SIC)).

In equation (1), β_1 captures the effect of the acquirer's marginal tax rate on premium for deals in which the target does not have an NOLC (i.e., *NOLC_mv* = 0). β_2 captures the effect of the target's NOLC on premium for deals in which the acquirer is not taxable (i.e., *MTR* = 0). β_3 captures the effect of the target's NOLC on premium conditioning on the acquirer's marginal tax rate. Hypothesis 1 predicts a positive coefficient on β_3. Because I use the gross NOLC from the tax footnotes (as opposed to the tax-effected amount reported in the deferred tax asset), the maximum tax-benefit of a dollar of NOLC is \$0.35. Due to §382 restrictions, however, the observed premium per dollar of NOLC must be lower than \$0.35.

6.2.2 Model of Acquisition Financing

The trade-off theory proposes that debt and non-debt tax shields are substitutable (Modigliani and Miller 1958; DeAngelo and Masulis 1980). Accordingly, my second hypothesis predicts that the probability that an acquisition is financed with debt is relatively lower if the target has an NOLC. To test this, I use the following probit regression to model the acquirer's choice to finance the acquisition with bank debt:

$$\Pr(>0\%\ BankFin) = \alpha + \beta_1 NOLC\_d + \beta_2 MTR + \beta_k Z + \varepsilon \qquad (2)$$

>0% BankFin equals one if the acquisition is at least partially financed with a bank loan. *NOLC_d* equals one if the target has a federal net operating loss carryforward. *MTR* is the acquirer's marginal tax rate as previously defined. *Z* is a vector of the determinants of acquisition financing. I discuss these determinants in the following section. I adjust standard errors for acquirers' within-

of debt. In my tests, I use the post-financing corporate marginal tax rate as of the end of the fiscal year immediately prior to the year of the acquisition announcement.

industry (2-digit SIC) correlation because acquisitions tend to cluster by industry (Gort 1969; Palepu 1986).

Hypothesis 2 predicts a positive coefficient on β_1. I do not make any formal predictions on the economic magnitude of β_1. The coefficient on β_2 captures the effect of the acquirer's marginal tax rate on the probability of debt-financing. Consistent with prior work (e.g., Erickson 1998), I expect a positive coefficient on β_2.

6.2.3 Determinants of Acquisition Premium and Financing

Vectors (*X*) and (*Z*) capture the determinants of acquisition premium and financing, respectively. Both vectors include a common set of target, acquirer, and deal characteristics. To control for potential merger waves arising from industry shocks (e.g., Harford 2005), I also include the interactions of announcement year and target industry (1-digit SIC) dummies.

Controlling for target characteristics is crucial because if loss firms differ systematically from profitable firms, then the effect of NOLC-related correlated omitted variables will bias my results. It is well-documented that NOLCs are associated with investment (e.g., Auerbach 1986; Waegenaere, Sansing, and Wielhouwer 2020; Krieg, Krull, and Li 2020). Accordingly, I control for capital expenditures (*Capex*), research and development expenditures (*R&D*), and intangible assets (*Intangible*). I additionally control for investment opportunity (*Q*) and the riskiness of firm investment (*EBITDA_SD*) (Langenmayr and Lester 2018). Following Favilukisy, Giammarino, and Pizarro 2016, I include controls for the target's stock return (*Return*) and stock return volatility (*Volatility*). Finally, I control for earnings management (*Accruals*) (e.g., Maydew 1997; Albring, Dhaliwal, Khurana, and Pereira 2011; Erickson, Heitzman, and Zhang 2013).

Both vectors additionally control for acquirer attributes identified by prior literature to be associated with acquisition financing and premium (e.g., Martin 1996; Erickson 1998; Dhaliwal

et al. 2005; Chow, Klassen, and Liu 2016).[25] I control for the acquirer's overvaluation (*Q*)[26], market performance (*Return*), cash holdings (*Cash*), tangibility (*PPE*), ratio of debt-to-equity (*D/E*), research and development expenditures (*R&D*), and institutional ownership (*InstOwn*).[27]

Deal characteristics include dummies for whether the deal is a tender offer (*Tender*), the presence of multiple bidders (*Competition*), the acquirer and target are in the same 2-digit SIC industry code (*Horizontal Deal*), the takeover is hostile (*Hostile*), and the acquirer's accounting method for the acquisition (*Pooling*). I additionally control for the relative size of the target to the acquirer (*Relative Size*) and the size of the deal (*Deal Size*).

Finally, I use Ayers et al.'s (2003; 2004) approach to control for the target shareholders' capital gains tax liability. The approach involves interactions between three variables, *Taxable, CG, and InstOwn*. *Taxable* equals one if stock consideration makes up less than 80% of the total deal consideration.[28] *CG* is the 10-year change in the top federal individual capital gains tax rate.[29] *InstOwn* is the percent of the target's shares held by institutions. I expect a positive coefficient on *Taxable*CG* and a negative coefficient on *Taxable*CG*InstOwn*. This method of controlling for the capital gains tax liability assumes that institutional investors are, on average, tax-exempt and

[25] The behavioral finance literature identifies numerous behavioral factors that influence corporate decisions. For example, Malmendier and Tate (2008) find that CEO overconfidence is significantly negatively associated with acquisition announcement returns. Most behavioral proxies are market-based and thus also reflect firm characteristics. Recent work challenges the construct validity of commonly used market-based proxies for CEO behavioral characteristics (e.g., Bouwman 2009; Cao 2011; Han, Lai, and Ho 2016). Accordingly, I do not attempt to include behavioral factors in my empirical models.

[26] Overvalued bidders are more likely to pay with stock rather than with cash (Schleifer and Vishny 2003; Dong, Hirshleifer, Richardson, and Teoh 2006). See Section 4.3 for a discussion of the adverse selection associated with stock payment.

[27] I do not control for the acquirer's size and profitability because they are highly correlated with the MTR proxy. As discussed in footnote 24, Blouin et al. (2010) simulate the MTR under the assumption that future taxable income is a function of current performance and firm size.

[28] Generally, for an acquisition to qualify as tax-free the payment must consist mostly of the acquirer's stock with the exception of cash paid in lieu of fractional shares. Additionally, the acquirer must obtain 80% control of the target. To classify transactions as taxable and tax-free, studies typically use a cut-off percentage less 100% to allow for the possibility that some cash was included as payment for fractional shares (e.g., Hanlon et al. 2020).

[29] The holding period is typically not observable. However, Landsman and Shackelford (1995) use proprietary data and find that the average holding period in the RJR Nabisco takeover was just under 10 years.

that a target with a larger fraction of institutional holdings is less sensitive to the tax status of the acquisition.

6.3 Data Sources and Sample

My data come from various sources. I use SDC Platinum Mergers & Acquisitions database to obtain my sample of M&A transactions and data on deal characteristics, including premium and financing. I obtain financial statement data for the acquirer and target from Compustat in the year prior to the acquisition announcement. Stock price data is obtained from The Center for Research in Security Prices (CRSP). I use Blouin, Core, and Guay's (2010) simulated marginal tax rates which I obtain from Wharton Research Data Services (WRDS). Data on institutional ownership is obtained from Thomson Reuters Institutional (13f) Holdings. Finally, I hand-collect target firms' NOLC from their 10-k filings available on EDGAR.

My sample selection procedure is as follows. I require that 1) the transaction is classified as either a merger or an acquisition, 2) the transaction is announced between 1995 and 2016[30], 3) the transaction value is at least $1 million, 4) the acquirer does not hold any equity in the target prior to the acquisition and seeks to own 100% of the target after the acquisition, 5) both acquirer and target are public U.S. incorporated firms, 5) neither the acquirer or the target is a subsidiary of another firm, 6) neither the acquirer or the target belongs to a regulated industry (SIC 6000-6999 and 4900-4999)[31]. This selection criterion yields 1,507 transactions.

For each transaction, I obtain the target firm's 10-K filing from EDGAR for the year prior to the acquisition announcement. I eliminate 4 deals in which the target is an S corporation, 15

[30] I begin my sample period for in 1995 because I hand-collect targets' NOLC from 10-k filings in the year prior to the acquisition announcement and Edgar only provides consistent coverage from 1994 onward. I end my sample period in 2016 because the Tax Cuts and Jobs Act of 2017 significantly altered NOLC provisions and the deductibility of interest.

[31] I remove these firms because they face regulatory capital requirements that affect their use of leverage and their tax planning. Some regulated firms, such as REITs, are flow-through entities and do not pay corporate taxes.

deals in which the target is not listed on EDGAR, and 144 deals in which the 10-K report is not available.[32] I then eliminate 200 transactions in which the target's reported NOLC is aggregated with other tax carryforwards or the NOLC is reported only in the deferred tax asset.[33] Finally, I eliminate 116 transactions for which there is insufficient data to compute all variables in my main empirical tests. The final sample consists of 1,028 transactions.

6.4 Summary Statistics

Figure 1 presents time-series graphs of targets' NOLC aggregated by acquisition announcement year. Panel A shows the % of target firms with a federal NOLC. Panel B (Panel C) presents the aggregate mean (median) dollar amount of the federal NOLC. Panel D presents aggregate mean and median NOLC conditional on NOLC>0. The graphs show that number of targets that have a federal NOLC and the amount of targets' NOLC is increasing over time.

Table 1 reports summary statistics for the variables I use in my tests of hypotheses 1 and 2. The mean (median) acquirer in my sample has a marginal tax rate (*MTR*) of 30% (34%).[34] Approximately 18.5% of deals are at least partially debt financed (*>0% BankFin*) and 8.2% are fully debt financed (*100% BankFin*). For the mean (median) deal, acquisition premium (*Premium*) is 46.9% (39.2%).

61% of targets have a federal net operating loss carryforward (*NOLC_d =1*). This is twice as large as the sample mean of 30% reported by Dhaliwal et al. (2005) for targets acquired between 1987 and 1997. My sample period, 1995-2016, slightly overlaps with Dhaliwal et al.'s (2005) and the percent of targets in my sample with an NOLC in 1995 of 32% is comparable with Dhaliwal

[32] Many of these eliminations are because SDC incorrectly lists private target corporations as public.
[33] I require that target firms disclose the tax amount of their federal NOLC in the footnotes. I exclude transactions for which the target reports only the tax-effected amount of the NOLC in the deferred tax asset because NOLCs may differ for tax and financial reporting (Auerbach and Poterba 1987).
[34] Eight acquirers in my sample have simulated marginal tax rates between 36% and 38%. As discussed by Blouin et al. (2010), a firm may have an MTR greater than the 35% statutory corporate tax rate because of the graduated rate structure and particularly if the firm has an NOLC that it is carrying back.

et al.'s sample mean of 30%. The percent of targets with a federal NOLC in my sample increases over time (Figure 1 Panel A). In 2015, 84% of targets have an NOLC.

Erickson (1998) estimates that conditional on reporting a positive federal NOLC, the median target firm in his sample that was acquired between 1985 and 1988 reported $2.6 million. The corresponding estimate in my sample for acquisitions announced between 1995 and 2016 is $42.6 million. As shown in Figure 1 Panel D, the median conditional NOLC at the start of my sample period in 1995 is $16 million. The mean is $33 million.

6.5 Conclusions

This chapter provides details of the design of my empirical models, my sample selection procedure, and the summary statistics of the variables I use in my tests. In the following chapter, I report the results of estimating equations (1) and (2) which correspond with my first and second hypothesis, respectively.

Chapter 7. Empirical Tests of Hypotheses 1 and 2

7.1 Introduction

In this chapter, I discuss the results of the empirical tests of my hypotheses. Section 7.2 focuses on my first hypothesis which predicts that there is a positive association between the target's federal net operating loss carryforward (NOLC) and acquisition premium and that this association is increasing in the acquirer's marginal tax rate. To test this hypothesis, I estimate equation (1) reported in Chapter 6 and I discuss the baseline results in section 7.2.1 below. In section 7.2.2, I report the results from additional analyses that consider the target's valuation allowance.

In section 7.3, I discuss the results of the empirical test for my second hypothesis which predicts that the probability of debt financing is relatively lower if the target has a federal NOLC. The baseline results, reported in section 7.3.1, correspond with equation (2) from Chapter 6. In section 7.3.2 I examine the NOLC-debt association in response to the credit supply shock during 2007-2009 financial crisis. This provides a unique setting because the credit supply shock provides an exogenous source of cross-sectional variation in the availability of debt that affects some acquirers more than others. I conclude with a chapter summary in section 7.4.

7.2 Test of Hypothesis 1

7.2.1 Baseline Results

Hypothesis 1 predicts a positive association between the target's federal net operating loss carryforward (NOLC) and acquisition premium that is increasing in the acquirer's marginal tax rate (MTR). The baseline test of hypothesis 1 is reported in Column (1) of Table 2. The coefficient on $\beta_1 MTR$ captures the effect of the acquirer's MTR on acquisition premium for deals in which the target does not have an NOLC. I do not have any a priori expectations for the sign or magnitude

of this coefficient. The reported coefficient of -0.061 is not statistically different from zero. The coefficient on $\beta_2 NOLC\_mv$ captures the effect of the target's NOLC on acquisition premium for deals in which the acquirer is not taxable (i.e., the acquirer's MTR is zero). The reported coefficient of -0.015 is not statistically different from zero. The coefficient on $\beta_3 MTR * NOLC\_mv$ captures the effect of the target's NOLC on premium conditioning on the acquirer's marginal tax rate. The coefficient is 0.132 ($p<0.10$ one-tailed).

To provide an economic estimate of the premium per dollar of NOLC, I calculate the partial derivative of the regression equation with respect to $NOLC\_mv$ conditioning on values of MTR. I estimate that a fully taxable acquirer (with an MTR of 35%) pays \$0.031 per dollar of the target's NOLC. I observe an insignificant premium at an MTR of 0% and 17.5%. The evidence supports hypothesis 1 that acquirers with higher marginal tax rates pay larger premiums for NOLCs.

The sign and significance of the coefficients on the control variables are generally consistent with prior literature. The positive coefficient on the acquirer's Q Ratio (*Q*) is consistent with prior evidence that overvalued acquirers pay larger premiums (Fu, Lin, and Officer 2013). The coefficients on the target's intangible assets (*Intangibles*) and research and development expenditures (*R&D*) are significantly positive. This evidence is consistent with the argument that uncertainty regarding the future cash flows of intangible assets creates asymmetric information between the firm and the market, and that acquirers choosing to engage in acquisitions value these assets higher than the stock market (Laamanen 2007). The coefficient on *EBITDA_SD* is negative, suggesting that targets with risky investment are associated with lower premiums.

Finally, I find that target shareholders' capital gains liability affects acquisition premium. As compared to ordinary investors, institutional investors are more likely to be tax exempt. In column (1), the coefficient on *Taxable * CG* is significantly positive, while the coefficient on

*Taxable * CG * InstOwn* is significantly negative. This evidence is consistent with Ayers et al. (2003).

7.2.2 Additional Analyses

Acquisition premium is the excess of the offer price over the target's pre-offer share price that an acquirer relies upon to determine its initial bid. In Section 3.2, I argue that a positive premium indicates that 1) the target's shareholders previously discounted the value of the NOLC, and that 2) the acquisition creates value by transferring the NOLC to a firm that is better able to use it. In this section, I provide direct tests of these assumptions.

Hayn (1989) argues that the extent to which a firm's NOLC is reflected in its price depends on investors' prior probabilities that the firm will realize the tax benefit of the NOLC taking into account the expected timing of NOL use and the firm's marginal tax rate.[35] If the target is fully taxable and faces the maximum corporate marginal tax rate, the amount of its NOLC that is capitalized is equal to the discounted product of the NOLC and the 35% marginal tax rate.

Provisions of Statement of Financial Accounting Standards No. 109 (SFAS No. 109), now part of Accounting Standards Codification Section 740 (ASC 740), require managers to estimate the future realization of an NOLC based on expectations of future income and to offset the tax-effected amount of the NOLC recorded in the deferred tax asset with a valuation allowance (VA) to the extent that it is "more likely than not" that the tax asset will expire unrealized. The VA provides a source of cross-sectional variation in the NOLC value capitalized in targets' pre-acquisition stock prices.

[35] The amount of the NOLC capitalized is also a function of the various alternatives through which the NOLC can be utilized taking into account their probabilities. For instance, the firm can sell depreciable assets that have appreciated in value and use its NOLC to offset the resulting tax. It is unlikely, however, that the firm could fully obtain the tax-benefit of its NOLC through asset sales. Another method that firms use to maximize the value of their NOLC is to shift income around changes in tax rules (e.g., Maydew 1997; Erickson, Heitzman, and Zhang 2013).

Prior studies document that both the NOLC and the VA are value-relevant. Givoly and Hayn (1992) and Wagner, Zeckhauser, and Ziegler (2018) provide evidence that the market reprices firms' NOLCs in response to federal corporate tax rate changes. Using an event study, Kumar and Visvanathan (2003) document that initial VA disclosures are associated with negative abnormal returns.[36] This suggests that the amount of a target's NOLC that is capitalized in its pre-acquisition price is conditional on the markets' expectation of the realization of the tax benefit.

Prior research shows that markets anticipate acquisitions and impound the expected value of potential synergies into stock prices before an acquisition takes place. Song and Walkling (2000) find evidence of positive abnormal returns to rivals of initial acquisition targets. The evidence on whether the market impounds the NOLC tax benefit in anticipation of an acquisition is mixed (e.g., Hayn 1989; Haw et al. 1987; Plummer and Robinson 1990; Crawford and Lechner 1996).

The effect of acquisition anticipation is heterogeneous. Consider a target whose NOLC tax benefit is not fully impounded in its pre-acquisition price due to the prior disclosure of a VA. An acquisition by a taxable acquirer creates value because the transfer of the tax asset increases the probability that the future tax benefit will be realized. Absent any acquisition anticipation related price-adjustment, a positive premium will be observed if the acquirer is taxable. If the market anticipates the acquisition, however, the tax benefit will be at least partially capitalized leading up to the acquisition. A positive (negative) premium will be observed if partial capitalization is less than (greater than) the post-acquisition NPV of the NOLC taking into account the acquirer's marginal tax rate and the §382 loss limit.

[36] There is debate as to whether the VA is value-relevant. Although there is some evidence that managers use discretion within accounting standards to manage earnings (e.g., Frank and Rego 2006), most of the evidence suggests that this is not the case and that VA disclosures are credible (e.g., Dhaliwal et al. 2013). See Edwards (2018) for evidence on the information content of the valuation allowance in debt markets.

The expectation is different for a target whose NOLC is fully impounded in its pre-acquisition price. Due to the applicability of §382, an acquisition reduces the NPV of the tax benefit and this effect is larger if the acquirer is not taxable.[37] In this scenario, the acquisition premium is negative because the pre-acquisition capitalization is greater than the value of the acquisition offer. If, however, the market discounts the NOLC's value in anticipation of an acquisition, a positive premium will be observed.

In either scenario, no premium will be observed if the market correctly anticipates the NOLC's post acquisition value. For this to occur, the market would have to correctly anticipate the marginal tax rate of the acquirer and the applicable §382 loss limit. This is unlikely.

To test whether the NOLC-premium association varies with the target's valuation allowance, I estimate equation (1) on two sub-samples: 1) deals in which the target's disclosed valuation allowance (VA) exceeds its tax-effected federal NOLC (*VA* = 1; n = 474), and deals in which the target either has not disclosed a VA or the target has disclosed a VA but the VA is less than its tax-effected federal NOLC (*VA* = 0; n = 554).[38]

For the subsample VA=1, I report the results in column (2) of Table 2. The estimate suggests that, conditional on the target disclosing a VA, an acquirer with an MTR of 35% pays $0.026 per dollar of the target's NOLC. This is slightly less than the estimate of $0.031 reported

[37] Although the limitation applies to all targets with an NOLC, deals in which the target has disclosed a VA are less sensitive to the §382 rules because the NOLC-benefit has already been discounted.

[38] As discussed in section 2.3, the amount recorded in the DTA (i.e., the tax-effected NOLC) is equal to the gross NOLC multiplied by the statutory corporate tax rate. To illustrate, a firm that incurs a $100 tax loss in the current year that it cannot carryback will record a tax benefit of $35 in the DTA. If management believes that the tax benefit of the NOLC will not be realized, the NOLC of $35 is offset with an equivalent valuation allowance (VA). Accordingly, I classify deals as VA=1 if the VA is greater than the gross NOLC multiplied by the statutory tax rate. This is a reasonable assumption given prior evidence that limitations on NOLCs are the primary determinant of the valuation allowance (Miller and Skinner 1998). Nonetheless, my proxy for the valuation allowance (VA) is subject to measurement error. Consider a firm whose deferred tax asset consists of a $35 million federal tax-effected NOLC and $100 in intangible assets. The firm records a $100 valuation allowance to offset the intangibles. My proxy for the valuation allowance would equal 1 because the $100 in valuation allowance is greater than the $35 million NOLC. But, my proxy would be incorrect because the firm has not offset any of the NOLC. In short, my proxy overstates the number of firms that have not offset their NOLC and understates the number of firms that have.

in column (1) on the full sample. The positive premium suggests that the target's pre-acquisition price did not fully reflect the value of the tax-benefit and that the transfer of the tax asset to a taxable acquirer creates value for both parties. The target shareholders gain because they are partially compensated for the value of an asset that would likely have expired unused otherwise. The acquirer shareholders gain because the NOLC is purchased at a considerable discount.

For the subsample VA=0, I report the results in column (3) of Table 2. Absent a valuation allowance (*VA* = 0), the NOLC-related premium is $0.126 if the acquirer has an MTR of 35% and -$0.089 if the acquirer has an MTR of 0%. While the negative premium at a 0% MTR is consistent with my expectation, the positive premium at a 35% MTR is not. Absent a VA, the tax asset is of value to the target and this is reflected in its pre-acquisition price. One explanation for this is that the market discounted the value of the NOLC in anticipation that the firm will be acquired (and that §382 will be applicable), and that the positive premium reflects the target's superior bargaining position in obtaining compensation for the loss in value of its NOLC.[39]

The above narrative relies on three key assumptions that can be directly tested. First, I assume that the amount of the NOLC previously capitalized in the target's stock price is conditional on its VA. To test this, I estimate a regression on the target's market value of equity as of the end of the fiscal year immediately prior to the year of the acquisition announcement. Unlike with the premium regressions in which I scaled NOLC by the target's pre-acquisition market value, here I log-transform NOLC so that the measure is unaffected by acquisition anticipation. I estimate this regression on the 1,003 unique target firm-years in my sample and I

[39] Examining pre-TRA 86 acquisitions, Hayn (1989) documents that target firms generate negative NOLC-related returns in taxable cash-for-stock acquisitions. As discussed previously, in the pre TRA-86 period, target's NOLCs were eliminated in taxable acquisitions. Based on this, Hayn concludes that the market partially capitalizes the value of the NOLC prior to the acquisition announcement and that this capitalization reverses upon the announcement of a taxable acquisition because the value of the attribute is eliminated.

include all target characteristics from equation (1). I report the estimate in column (1) of Table 3. The coefficients on *NOLC_ln* and on *NOLC_ln*VA* are 0.109 ($p<0.01$) and -0.105 ($p<0.10$), respectively. This confirms my assumption that the capitalization of the NOLC tax-benefit in the target's stock price is relatively higher absent a VA.

A second key assumption I make is that there is an acquisition anticipation related price adjustment prior to the acquisition announcement. For targets that have not previously disclosed a VA, the NOLC value is already impounded into price and the anticipation of an acquisition reduces this capitalization because of the expected loss in the NOLC's value due to §382. To test this, I estimate a regression on the % change in target's market value between the end of the fiscal year immediately prior to the year of the acquisition announcement and the date 4 weeks prior to the acquisition announcement. The regression is estimated as a function of the target's NOLC conditioning on its VA. I report the estimate in column (2) of Table 3. The coefficient on *NOLC_ln* is -0.017 ($p<0.05$). This coefficient captures the acquisition anticipation related price adjustment for targets without a VA. The negative sign confirms my assumption that the market anticipates that the acquisition will reduce the value of the NOLC. The coefficient on *NOLC_ln*VA* is 0.04 ($p<0.05$), suggesting an upward price revision for targets with a VA. This is consistent with a reversal of the prior VA price discount. This also suggests that targets with a VA receive a larger premium than the $0.026 estimate reported in column (2) of Table 2 because the value of the tax benefit is partially impounded prior to the acquisition.

Finally, I assume that the VA dictates the division of the NOLC gain/loss between the acquirer and target firms. If the target has a VA, the acquirer gains by purchasing the NOLC at a discount. Absent a VA, however, the acquirer incurs at least some of the cost of the §382-induced

reduction in the value of the target's NOLC, as evidenced by the relatively larger acquisition premium. To test this explanation, I examine acquirer and target acquisition announcement returns.

For this analysis, I eliminate deals in which either the acquirer or the target is not listed on CRSP or has insufficient data to compute announcement returns. The sample size is reduced to 946 deals, 420 deals for which VA=1 and 526 deals for which VA=0. I compute target (*tCAR3*) and acquirer (*aCAR3*) announcement returns as the log-transformation of one plus the three-day (-1,1) cumulative abnormal return estimated using the market model where the model parameters are estimated in the (−210, −60) window prior to the acquisition announcement. For ease of interpretation, I also log-transform the target's NOLC (*NOLC_ln*). I regress *CAR* on *MTR*, *NOLC_ln*, *VA*, and their interactions.

For the subsample VA=1, I report acquirer (*aCAR3*) and target (*tCAR3*) returns in Table 4 columns (1) and (2), respectively. Conditional on the acquirer having an MTR of 35%, I estimate an NOLC-premium elasticity of 0.002 ($p<0.10$) in column (1). This evidence is consistent with my expectation. The acquirer, conditional on being taxable, generates a positive price response due to having acquired the NOLC at a significant discount. Returns to the target firm, reported in column (2) are not significantly different from zero.

For the subsample VA=0, I report acquirer (*aCAR3*) and target (*tCAR3*) returns in Table 4 columns (3) and (4), respectively. In column (3), I estimate an NOLC-premium elasticity of -0.0043 ($p<0.01$) if the acquirer has an MTR of 35%, suggesting that the acquirer absorbs some of the loss related to §382. The corresponding return to the target, reported in column (4), is -0.0076 ($p<0.01$). The magnitude of the target's return is nearly twice as large as that of the acquirer's, suggesting that the target absorbs most of the loss in the NOLC's value.

Additionally, the results in column (4) indicate that the target firm's return is more negative in deals in which the acquirer has a relatively lower MTR. In a deal in which the acquirer is not taxable, the estimate of the NOLC-premium elasticity of -0.0358 ($p<0.01$) is considerably larger than the elasticity of -0.0076 ($p<0.01$) in a deal in which the acquirer is fully taxable. This corroborates the evidence on acquisition premium reported in Table 2.

7.3 Test of Hypothesis 2

7.3.1 Baseline Results

Hypothesis 2 predicts that the probability of debt financing is relatively lower if the target has a federal NOLC. To test hypothesis 2, I estimate equation (2) and report the probit coefficients in Table 5. The dependent variable, (*>0% BankFin*), takes a value of one if the acquisition is at least partially financed via a bank loan. The key variable of interest is $\beta_1 NOLC\_d$ which takes a value of one if the target has a federal NOLC. H2 predicts a negative coefficient on β_1. Because I include year and industry interactions, the probit estmation drops combinations for which there is no variation in debt financing.

I report my baseline regression results in column (1) of Table 5. The coefficient on $\beta_1 NOLC\_d$ is -0.403 ($p<0.05$). At the bottom of Table 5 I present the marginal effect which I compute as the partial derivative of the regression equation with respect to $NOLC\_d$. The estimate suggests that, holding all other variables at their sample mean, the probability of at least a partial debt-financed acquisition is 6.4 percentage points lower in deals in which the target has an NOLC relative to deals in which the target does not have an NOLC.

The sign and significance of the coefficients on the control variables suggest that while target and deal characteristics affect the likelihood of at least partial debt-financing, the acquirer's characteristics largely do not matter. This is puzzling, especially given the well-documented

positive association between the acquirer's marginal tax rate and acquisition debt financing (e.g., Erickson 1998). One explanation for this is that my dependent variable captures any amount of debt financing whereas prior studies have generally modelled the choice of 100% debt financing.

In column (2) of Table 5, I report coefficients from a probit regression on 100% debt-financing. The coefficient on $\beta_1 NOLC\_d$ is -0.493 ($p<0.01$) and the corresponding marginal effect is 6.8 percentage points. As expected, the acquirer's marginal tax rate (MTR) is significantly positively associated with 100% debt financing. The marginal estimate suggests that the probability of a 100% debt financed acquisition is 11 percentage points higher for a fully taxable acquirer (with an MTR of 35%) relative to a non-taxable acquirer (with an MTR of 0%).

In column (3), I restrict the sample to cash-for-stock taxable deals and compare 100% debt-financed acquisitions to 100% cash-financed acquisitions. This test allows for a direct comparison with models estimated by Dhaliwal et al. (2005). The sample for this test consists of 139 transactions of which 34 (24%) are fully debt-financed. The coefficient on $\beta_1 NOLC\_d$ is -1.953 ($p<0.01$). The marginal effect suggests that the target having an NOLC decreases the relative probability of a 100% debt-financed acquisition by 33 percentage points. In terms of the acquirer's characteristics, the coefficient on *PPE* is positive and significant, suggesting that larger available collateral increases the probability of debt financing. The coefficient on *Cash* is negative and significant, suggesting that acquirers with larger cash holdings are more likely to finance with internal cash as opposed to debt.

Across all models, the sign and significance of the coefficients on the control variables are generally consistent with prior literature. The coefficients on *Relative_Size* and *Deal_Size* are positive and mostly significant, suggesting that the acquirer is more likely to obtain external financing when acquiring a larger target. The estimate in columns (1) suggests that higher target

shareholders' capital gains liability reduces the probability of debt financing. This is because debt-financing is associated with cash payment and this increases the probability of a taxable acquisition structure.

Under the trade-off theory, the substitutability of tax shields generates the largest benefit for acquirers with high marginal tax rates (i.e., tax constrained acquirers).[40] To test this, I estimate equation (2) and interact the target's federal NOLC ($NOLC\_d$) with the acquirer's marginal tax rate (*MTR*). I report the estimation in Column (4) of Table 5. The dependent variable, (*>0% BankFin*), takes a value of one if the acquisition is at least partially financed via a bank loan. As expected, the reported marginal effect shows that the NOLC-debt substitution is strongest in deals in which the acquirer has a high marginal tax rate. For a fully taxable acquirer with an MTR of 35%, the probability of a debt-financed acquisition is 7 percentage points lower for a deal in which the target has an NOLC relative to one in which it does not. The marginal estimate is reduced to 6 (5) percentage points at an MTR of 30% (25%).

7.3.2 Additional Analyses

To sharpen my inference, I examine the NOLC-debt substitution hypothesis in the presence of financing frictions. The 2007-2009 credit crisis provides a powerful setting. With the collapse of numerous banks during this period, there was an inward shift in the bank credit supply curve and firms responded to the credit supply shock by seeking alternative sources of financing. Studies document that the demand curve for bond financing shifted out in response to the contraction of the bank credit supply curve (e.g., Becker and Ivashina 2014; Adrian, Colla, and Shin 2012). As

[40] Dhaliwal et al. (2005) also recognize this, but are unable to test it. In footnote 25, the authors state "recent studies on tax substitution effects generally specify that the effect occurs for tax constrained firms only. Because there is little variation in the tax rates of acquirers in our sample, tests of interaction effects are not feasible" (p 28).

the composition of corporate debt shifted from private to public, by early 2008 the cost of public debt exceeded the cost of new bank loans (De Fiore and Uhlig 2015).

I begin my plotting the time-series averages of debt financing and NOLCs over my sample period. Figure 2 plots the percentage of targets with NOLCs and the percentage of acquirers that at least partially issue debt to finance the acquisition. The aggregate trend for debt financing and NOLCs appears to be consistent with the NOLC-debt trade-off theory. There is a dip in debt financing and a corresponding increase in target's with NOLCs around the end of 2007 and beginning of 2008. This period corresponds with the tightening of the bank credit supply. I also plot the time-series average NOLC of all firms listed in Compustat.[41] Unlike with the NOLC of target firms, this aggregate NOLC of all firms does not follow an inverse trend with the debt time-series. This suggests that the NOLC-debt trade-off observed in acquisitions is likely not due to chance.

Next, I examine the NOLC-debt association in the years surrounding the crisis while controlling for other determinants of debt issuance. Restricting the sample period to years 2006 through 2009, I estimate equation (2) and interact *NOLC_d* with dummies for each quarter. The coefficients, reported in Table 6, show that the NOLC-debt substitution is strongest in the last quarter of 2007 and the first quarter of 2008. This is the period during which the cost of public debt reached a record high. One explanation for the empirical results is that acquirers of NOLC target firms had previously relied on bond financing as opposed to bank financing. Firms that borrow in public debt markets differ from those that borrow in private debt markets (Denis and Mihov 2003) and it is costly and sometimes not possible to shift between the two markets (Adrian et al. 2012).

[41] This is based on the aggregate NOLC (Compustat mnemonic = tlcf). I remove observations with missing values.

Accordingly, this suggests that as the cost of bond financing rises, acquirers that previously relied on bond markets are more likely to substitute to NOLC tax shields. To test this empirically, I estimate a regression of the acquirer's choice of tax shield as a function of its access to bond financing. Following Adrian et al. (2012), I use bond ratings as a proxy for access to bond markets. I compute a dummy (*Rated*) equal to one if the acquirer has a bond rating. I estimate the model for a subsample of 66 acquisitions that are announced in either 2007 or 2008.

I report the probit regression coefficients in Table 7. In column (1), the coefficient on *Rated* is 0.961 ($p<0.01$). The marginal estimate indicates that the probability of acquiring a target with an NOLC is 17.5 percentage points higher for an acquirer with a credit rating relative to an acquirer without a credit rating. In column (2), I include acquirer industry (1-digit SIC) fixed effects. The coefficient on *Rated* is 3.406 ($p<0.01$) and the corresponding marginal effect of 44 percentage points is economically large.

In column (3), I include acquirer industry (1-digit SIC) fixed effects and I interact *Rated* with the acquirer's marginal tax rate (*MTR*). Because the NOLC-debt substitution is strongest when acquirer has a high marginal tax rate, I expect high MTR acquirers with a credit rating to have the highest relative probability of acquiring a target with an NOLC. The marginal effect reported in column (3) suggests that among fully taxable acquirers (with an MTR of 35%) the probability of acquiring a target with an NOLC is 50 percentage points higher if the acquirer has a credit rating.

The findings are in line with my prediction. As the cost of bond financing rises, acquirers that previously relied on bond markets are more likely to substitute to NOLC tax shields. This effect is economically larger if the acquirer is fully taxable.

7.4 Empirical Limitations

My tests of H1 and H2 are subject to limitations. To the extent that my proxy for the target's NOLC is correlated with the error term, the reported regression coefficients are biased. A standard method to overcome this limitation is to find an instrument that is correlated with tax status, but uncorrelated with the error in the structural equation. Finding good instruments for tax status is difficult because variables that affect NOLC generally also affect acquisition premium. Larcker and Rusticus (2010) demonstrate that instrumental variable (IV) estimates often perform worse than OLS, suggesting that implementing a credible IV method is very difficult.

I partially address this limitation by controlling for target firm characteristics that prior research finds to be associated with NOLCs and by including industry and year interactions. Additionally, the cross-sectional tests of interactions with the acquirer's marginal tax rate largely rule out the possibility of the alternative explanation that my NOLC proxy is capturing a different firm characteristic, such as growth prospects. Nonetheless, I acknowledge that I cannot completely rule out the possibility of correlated omitted variables.

A second limitation of my tests is that my empirical models do not account for the fact that acquisitions are not random events (e.g., Song and Walkling 2000). Firms may self-select into M&A deals and this could lead to biased coefficients if firms' propensity to enter into M&A deals is correlated with tax status. The interrelation between takeover likelihood and premium may lead to a nonrandom sample, and the inability to observe premium for firms that are not acquired creates a censoring problem.[42] This bias can be addressed by using Heckman's (1979) two-step selection

[42] There is also a selection problem relating to the bidders in my sample. Firms choose an optimal capital structure that balances the benefits and costs of debt. If some potential bidders do not bid due to the high offsetting costs of debt (i.e., financial distress and the related loss of corporate control), my results may understate the effect of the determinants of debt financing. Consider two types of firms. Those that benefit from additional debt issuance and those that don't. If the occurrence of each type of firm in my sample of bidders were proportionate to what is observed in the population, then no sample selection bias would be present and OLS would produce unbiased coefficients. This would be the case if selection into the sample of bidders (i.e., the propensity to undertake an acquisition) was

model. The estimation requires data on all variables in my models for all firms, including those that are not acquired. Because NOLC data is hand-collected from 10-k filings, this solution is not practical for my setting. Accordingly, I acknowledge that firms that enter into M&A deals differ from firms that do that and that my findings may have limited out-of-sample generalization.

7.5 Conclusions

In summary, the evidence in this chapter provides empirical support for my two hypotheses. In support of H1, I document a positive association between the target firm's NOLC and acquisition premium that is increasing in acquirer's marginal tax rate. Additionally, I document that the division of the NOLC-related tax benefit between the acquiring and target firms is conditional on the VA. Taken together, the results provide new insight into whether and to what extent NOLCs are valued in corporate acquisitions, and how the potential tax-benefit is divided between the parties.

In support of H2, I document that acquirers trade-off the present value of potential interest tax-shields with the present value of the target's NOLC. In addition, I document that the magnitude of the NOLC-debt trade-off increases with the acquirer's marginal tax rate. This evidence is consistent with tax-constrained firms benefiting the most from substituting between tax shields. Finally, I document that non-debt tax shields are most valuable when the supply of credit is limited. Collectively, my results provide strong evidence that debt and non-debt tax shields are substitutable.

independent of capital structure (e.g., the propensity to issue debt). If firms that benefit less from additional debt issuance are less likely to be in my sample because they are less likely to undertake an acquisition, then my sample disproportionately over-represents bidders that do not benefit from additional debt issuance, either because they are tax-exhausted or the offsetting costs of debt are high.

Chapter 8. The effect of §382 Loss Limitation Rules on Acquisition Completion

8.1 Introduction

In this chapter I provide empirical tests for the effects of the §382 loss limitation rules in acquisitions. In section 8.2, I discuss the relevant institutional details and provide a prediction for the effect of §382 loss limitation rules on the probability of acquisition completion. I report the results of my tests in sections 8.3 and 8.4. Section 8.5 concludes with a summary.

8.2 Institutional Setting and Research Design

Loss limitation rules under §382 of the Internal Revenue Code restrict the use of a corporation's tax losses if the corporation undergoes an ownership change. The annual loss limit is computed as the fair market value (MV) of the target at the time of ownership change multiplied by the adjusted federal long-term tax-exempt rate (FLTR).

The key institutional detail here is that the loss limit is computed as of the *date of ownership change* which coincides with the date that the acquisition is completed. Accordingly, the applicable loss-limit is not known with certainty on the *date of the offer* which precedes the ownership change date.[43] The implication is that the loss-limit may change between the date of the offer and the date that the transaction closes (or is withdrawn). A higher (lower) loss limit corresponds with a higher (lower) post-acquisition NPV of the target's NOLC. Accordingly, I predict that a drop in the loss limit between the date of the offer (i.e., the initial acquisition announcement date) and the date of closing will reduce the probability that a deal closes.

I compute the change in the loss limit as:

[43] Some firms explicitly state that there is uncertainty on the applicable §382 loss limit. In its schedule 13D, filed on December 27, 1994, 21st Century Insurance Group (formerly 20th Century Holdings) states:

Because the value of the Company's stock, as well as the federal long-term tax-exempt rate, fluctuate, it is impossible to predict with any accuracy the annual limitation upon the amount of taxable income of the Company that could be offset by such NOLs or other items were an ownership change to occur.

$Target\_\Delta 382Limit$ = [($FLTR_{ClosingDate}$ * $MV_{ClosingDate}$) - ($FLTR_{AnnDate}$ * $MV_{AnnDate}$)] (3)

where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the target's market value, both computed as of the date on which the transaction closes. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date.[44]

I estimate the following probit model to test whether a drop in the loss limit reduces the probability that the deal is completed:

$$\Pr(Completed) = \alpha + \beta_1 NOLC\_ln + \beta_2 Target\_\Delta 382Limit\_d + \beta_3 NOLC\_ln * Target\_\Delta 382Limit\_d + \beta_k C + \varepsilon \quad (4)$$

where $Completed$ is equal to one if the transaction is completed and zero if it is withdrawn. For ease of interpretation, I convert $Target\_\Delta 382Limit$ to a dummy variable equal to one if it has a negative value (i.e., a loss-limit drop). I log transform the gross dollar amount of the NOLC because doing so allows for estimating conditional probabilities that are unaffected by the target firm's size. The assumption in equation (4) is that the sensitivity of deal completion to a drop in the loss limit is increasing in the size of the potential tax benefit.

I control for variables that likely affect the outcome. Deal characteristics include whether the deal is a tender offer (*Tender*), the presence of competing bidders (*Competition*), within industry merger (*Horizontal Deal*), accounting treatment (*Pooling*), the relative size of the target (*Relative Size*), and deal size (*Deal Size*). I control for financing (*AllStock*) and (*>0% Debt*). I include the target firms' initial market reaction to the acquisition announcement (*tCAR3*) to control

[44] As discussed previously, the base §382 calculation is adjusted for other factors. The inability to observe all potential adjustments may lead to some measurement error in computing the loss limit. The change in the loss limit, however, is less subject to this potential measurement error because it is unlikely that the adjustment factors materially change between the two dates. The mean (median) deal in the sample closes within 3.5 (3) months of the initial announcement date. It is unlikely that, built-in losses for instance, will change materially in such a short period.

for any announcement induced shift in the target's market value that may affect the change in the loss limit. I also include the acquirers' initial market reaction to the acquisition announcement (*aCAR3*) to capture potential synergies.

Studies find that targets' financial reporting quality is an important determinant of acquisition completion (e.g., Skaife and Wangerin 2012; Amel-Zadeh and Zhang 2015). I include an indicator if the target received an Accounting and Auditing Enforcement Release (AAER) at any time in the previous 5 years.[45] I further control for the target's information environment with the number of analysts following the firm (*Analyst*) and analyst forecast error (*Forecast_Error*). Finally, I include the target's Q Ratio (*Q*) which measures the quality of the target's management (e.g., Lang, Stulz, and Walking 1989; Servaes 1991). For acquirer characteristics, I include Tobin's Q (*Q*) and institutional ownership (*InstOwn*) to control for deal quality, and the marginal tax rate (*MTR*) to capture the importance of the NOLC to the acquirer.

For this test, I restrict the sample to deals in which the target has an NOLC and the NOLC is greater than the announcement date loss limit ($FLTR_{ClosingDate} * MV_{ClosingDate}$).[46] This leaves a sample of 585 transactions. The sample is further reduced because announcement years 2013 and 2015 have no variation in deal completion. The useable sample for this test consists of 489 transactions. Panel A of Table 8 provides summary statistics of key variables used in the tests in this section. The change in the target's loss limit ($Target\_\Delta 382Limit\_d$) is negative in 16% of deals.

[45] AAERs are commonly used in the literature as a proxy for accounting misconduct. Erickson, Hanlon and Maydew (2004) provide descriptive evidence that 29 firms subject to AAERs paid taxes on their fraudulently overstated earnings. This directly impacts the NOLC through the future reversal of the tax liability.

[46] Loss limitation rules are not applicable in deals in which the target's NOLC is less than the loss limit. See Appendix B.

In Panel B of Table 8, I classify each of the 489 transactions into one of the following four groups: 1) *Completed* = 1 & $Target\_\Delta 382Limit\_d$ = 1 (n = 58), 2) *Completed* = 0 & $Target\_\Delta 382Limit\_d$ = 1 (n = 21), 3) Completed = 1 & $Target\_\Delta 382Limit\_d$ = 0 (n = 374), and 4) Completed = 0 & $Target\_\Delta 382Limit\_d$ = 0 (n = 36). In Panel C, I provide a cross-tabulation of bank financing (*>0% BankFin*) and bond financing (*BondFin*).

8.3 Results – Acquisition Completion

I report the estimation of equation (4) in column (1) of Table 9. The model includes acquisition announcement year and target industry (1-digit SIC) fixed effects. Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *Target_Δ382Limit_d* conditioning on values of *NOLC_ln*. The marginal estimate suggests that at an NOLC of $50 million (which approximates the median deal in the sample), a drop in the loss limit reduces the relative probability of completion by 7.7 percentage points. The effect of a drop in the loss limit on deal completion increases with the size of the NOLC. At an NOLC of $500 million, a drop in the loss limit reduces the relative probability of completion by 14.4 percentage points.[47]

In column (2) of Table 9, I include announcement year by target industry (1-digit SIC) interactions. This reduces the sample from 489 to 277 transactions. Relative to deals with an increase in the loss limit, a decrease in the loss limit reduces the conditional probability of completion by 14.8 (30.3) percentage points in a deal in which the target has an NOLC of $50 ($500) million.

[47] The change in the loss limit (*Target_Δ382Limit*) is affected by the change in the target's market value of equity and the change in federal long-term tax exempt rate (FLTR). In untabulated tests, I decompose *Target_Δ382Limit* into the change in market value and the change in the FLTR. Regression estimates suggest that the effect of a drop in market value on deal completion is 3-6 times larger than the effect of a drop in the FLTR on deal completion, depending on the specification and magnitude of the NOLC. This is not surprising given that, conditional on a drop in market value, the average target's value drops by nearly 18%, while conditional on a drop in the FLTR, the average drop in FLTR is only 5%, on average.

In columns (3) and (4), I replace *Target_Δ382Limit_d* with *Target_Δ382Limit_%* * -1, which is equal to *Target_Δ382Limit* scaled by ($FLTR_{AnnDate}$ * $MV_{AnnDate}$) and multiplied by negative one. Column (3) includes acquisition announcement year and target industry (1-digit SIC) fixed effects. Column (4) includes announcement year by target industry (1-digit SIC) interactions. I plot conditional probabilities from column (4) in Figure 3. Panels A and B depict the conditional probability of completion at 25% and 50% changes in the loss limit. The figures show that the probability of completion conditional on a drop in the loss limit decreases with the size of the NOLC, suggesting that §382 loss limitation rules are of greater significance in deals with relatively larger tax-incentives. The figures also depict that an increase in the loss limit does not significantly affect the likelihood of completion, suggesting that changes in the loss limit are asymmetric with respect to increases and decreases.

The results from these analyses suggest that, by requiring that the loss limit be computed as of the deal closing date, §382 imposes a significant cost on acquisitions in which the target firm has an NOLC. The effect of a drop in the loss limit on deal completion is economically significant.[48]

8.4 Additional Analyses

8.4.1 Tax Shield Substitution and Acquisition Completion

In this section, I provide evidence for a specific tax-planning activity that an acquirer can undertake to re-balance its optimal tax plan in response to a drop in the loss limit. In Chapter 7, I

[48] A potential alternative to cancelling the deal is for the acquirer to renegotiate the terms of the offer. Skaife and Wangerin (2013) argue that the acquirer can use private information that it obtains during the due diligence process of the M&A transaction to renegotiate the initial offer. Empirically, the authors document that deals in which the target firm has low financial reporting quality, the acquirer is more likely to be renegotiate the terms of the deal to pay a lower price. Of the 489 deals in my sample, 19 deals are renegotiated to a lower price and 18 of these deals are subsequently completed. In an untabulated test, I estimate equation (4) replacing the dependent variable equal to one for deals that are renegotiated to a lower price. The results suggest that the probability of renegotiation is relatively higher in deals in which the loss limit drops and that this effect is stronger in deals in which the NOLC is larger.

document that acquirers are less likely to obtain bank financing for acquisitions of targets with NOLCs. This prediction, and the related empirical evidence, can be extended by examining acquirers' public debt issuance in between the announcement and closing dates. A drop in the loss limit corresponds with a lower post-acquisition NPV of the target's NOLC. If, as predicted by my second hypothesis, tax shields are substitutable then the acquirer can at least partially reduce the negative tax effect of a drop in the loss limit by issuing bonds. This, in turn, should at least partially offset the effect of a drop in the loss limit on deal completion.

Testing this requires the estimation of two equations. Because the decision to issue debt and to complete the acquisition are likely not independent (i.e., autocorrelation between error terms), I estimate the following two probit models jointly using a seemingly unrelated regression (SUR) model that applies the generalized least squares estimator (Zellner 1962):

$$\Pr(BondFin) = \alpha + \beta_3 NOLC\_ln * Target\_\Delta 382Limit\_d + \beta_k Z + \varepsilon \quad (5)$$

$$\Pr(Completed) = \alpha + \gamma_7 NOLC\_ln * Target\_\Delta 382Limit\_d * BondFin + \beta_k C + \varepsilon \quad (6)$$

Where *BondFin* equals one for deals in which the acquirer issues bonds between the announcement and closing dates.[49] $Target\_\Delta 382Limit\_d$ equals one if the change in the target's §382 loss limit is negative. All other variables are as previously defined. Both equations include main effects and lower order interactions. I include announcement year and acquirer industry (1-digit SIC) dummies. Standard errors are clustered by acquirer's industry (1-digit SIC).

The regressions results are reported in Table 10. For ease of interpretation, I plot conditional probabilities in Figure 4. In Panel A, marginal effects are computed as the partial derivative of equation (5) with respect to *Target_Δ382Limit_d* conditioning on values of *NOLC_ln*. The graph suggests that the probability of issuing bonds, conditional on a drop in the

[49] I obtain data on acquirers' public bond issues from Mergent Fixed Income Securities Database (FISD).

loss limit, is relatively higher at larger values of NOLC. In Panel B, marginal effects are computed as the partial derivative of equation (6) with respect to *BondFin* conditioning on values of *Target_Δ382Limit_d* and of *NOLC_ln*. Conditional on a drop in the loss limit ($Target\_\Delta 382Limit\_d$ = 1), the probability of deal completion is significantly higher for acquirers that issue bonds relative to those that do not. The effect size is economically large. For loss limit increases ($Target\_\Delta 382Limit\_d$ = 0), bond issuance has no significant impact on deal completion.

Consistent with my predictions, the results suggest that 1) acquirers offset the effect of a drop in the loss limit by issuing bonds (and that this effect is stronger the larger the NOLC), and 2) the issuance of bonds offsets the negative effect of a drop in the loss limit on acquisition completion.

The findings suggest that the NOLC-debt trade-off also applies in public debt markets. The findings also provide some support for the argument that acquisitions are not tax-motivated. Given the growing trend in loss firms, arguably it would be more cost-efficient for a tax-motivated acquirer to abandon a transaction and seek another target than to incur additional costs associated with debt issuance. The willingness of acquirers to issue additional debt and thus complete the acquisition suggests that there are likely other sources of synergies associated with the acquisition.

8.4.2 Time to Deal Completion

Holding all else constant, the most cost-efficient way to protect against the negative consequences of §382 is to time the completion of the acquisition to coincide with a more favorable loss-limit. To test this, I estimate the following probit model:

$$\Pr(Competed|month \leq 1) = \alpha + \beta_1 NOLC\_ln + \beta_2 Target\_382Limit\_AnnDate + \beta_3 NOLC\_ln * Target\_382Limit\_AnnDate + \beta_k C + \varepsilon \quad (7)$$

Where (*Completed | month ≤ 1*) equals 1 if the deal is completed either in the same month or in the month subsequent to the initial acquisition offer. *Target_382limit_AnnDate* is the natural logarithm of 1 plus the target's acquisition announcement date §382 loss limit ($FLTR_{AnnDate}$ * $MV_{AnnDate}$). I include announcement year and acquirer industry (1-digit SIC) dummies. Standard errors are clustered by acquirer industry (1-digit SIC).

If acquisitions are timed to correspond with a favorable loss limit, then I expect a positive coefficient on β_3. I report the results in Table 11. The coefficients on β_1 and β_3 are -0.117 ($p<0.01$) and 0.189 ($p<0.01$), respectively. Marginal effects, reported at the bottom of the table, are computed as the partial derivative of equation (7) with respect to *Target_382limit_AnnDate* conditioning on values of *NOLC_ln*. The estimates suggest that when the loss-limit is favorable, the acquirer is more likely to complete the acquisition within one month of the initial acquisition offer if the target's NOLC is large.

8.5 Conclusions

The tests and related discussion in this chapter provide some insight into the consequences of loss limitation rules. As previously discussed, the §382 rules are intended to discourage tax motivated acquisitions. The evidence on the asymmetric effect of loss limit changes, however, is not consistent with this purpose. If acquisitions were tax-motivated, then an increase in the loss-limit would increase the conditional probability of completion. Examining this evidence in light of the evidence on the NOLC-debt substitution, the findings collectively suggest that acquirers structure acquisitions to obtain the maximum tax-benefit taking into consideration the potential costs. A drop in the loss-limit alters this equilibrium by reducing the expected tax-benefit. Taken together, the evidence suggests that §382 imposes significant (and perhaps unintended) costs on acquisitions.

Chapter 9. The Effect of the Acquirer's NOLC on the Medium of Exchange and on Acquisition Completion

9.1 Introduction

In this chapter I examine the effect of the acquirer's net operating loss carryforward (NOLC) on deal structure and on the probability of completion. For these tests, I obtain the acquirers' NOLC from Compustat and retain observations with non-missing values only. A limitation of this analysis is that Compustat reports only the aggregate net operating loss.[50] I examine the effect of the acquirer's NOLC on the medium of exchange in section 9.2 and on the probability of deal completion conditional on the change in the §382 loss limit in section 9.3. In section 9.4, I discuss aggregate time-series trends in NOLCs and the medium of exchange. Section 9.5 concludes.

9.2 The Effect of the Acquirer's NOLC on the Medium of Exchange – Firm Level Evidence

In Chapter 4 section 4.3, I discuss the determinants of the medium of exchange in corporate acquisitions. The literature has recognized four key determinants: asymmetric information, agency costs, capital structure, and target shareholders' capital gains tax liability. With few exceptions, prior studies have largely overlooked the corporate tax incentive for the medium of exchange.[51]

Stock issuance increases the acquirer's risk of triggering a §382 ownership change of its own stock. This is especially costly for an acquirer with a substantial loss carryforward. Erickson (1998) notes that several of the acquiring firms with NOLCs in his sample explicitly disclose that they are opting for taxable cash acquisitions to avoid the potential of triggering an ownership change under §382. Erickson's (1998) sample includes acquisitions completed between 1985 and

[50] The aggregate NOLC consists of federal, state, and foreign tax loss carryforwards.
[51] Exceptions include studies that examine the tax incentive for step-up structures (e.g., Erickson 1998).

1988. Because NOLCs have grown exponentially since then, it is reasonable to assume that so has the disincentive for stock payment.[52]

I estimate the following probit model to test whether acquirers with NOLCs are less likely to issue stock in acquisitions that may trigger an §382 ownership change:

$$Pr(Acquirer\_382\_Trigger) = \alpha + \beta_1 TLCF\_d + \beta_k X + \varepsilon \quad (8)$$

where *Acquirer_382_Trigger* is equal to one if the estimated value of the stock consideration in the deal is equal to at least 50% of the acquirer's market value 4 weeks prior to the acquisition announcement.[53] *TLCF_d* equals one if the acquirer has an NOLC and 0 if it does not. The coefficient on β_1 captures the conditional probability of an §382-triggering stock payment for acquirers with NOLCs relative to acquirers without.

I report results in Table 12. Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *TLCF_d*. The estimate in column (1) includes announcement year and acquirer industry (1-digit SIC) fixed effects. The coefficient on β_1 is -0.517 ($p<0.05$). The marginal effect suggests that having an NOLC reduces the relative probability of triggering an §382 ownership change by 4 percentage points. In column (2), I include announcement year by acquirer industry (1-digit SIC) interactions. The marginal

[52] Searching through SEC filings, I note a number of firms that explicitly discuss the costs associated with §382. In its form S-4, filed on November 20, 2014, Engility Holdings states:

Under Section 382 of the Code, if a corporation undergoes an "ownership change" as defined in that section, the corporation's ability to use its pre-change NOLs and other pre-change tax attributes to offset its post-change income may become subject to significant limitations. As a result, it may be more difficult for New Engility to be acquired or to engage in strategic acquisitions because such transactions could result in the loss of New Engility's NOLs and other tax attributes. For example, New Engility's ability to use equity as consideration in a strategic transaction may be limited because such an equity issuance could result in an ownership change. If an ownership change were to occur, New Engility's ability to use any NOLs and certain other tax attributes existing at that time could be significantly limited.

[53] This measure is adopted from Erickson et al. (2019).

effect suggests that having an NOLC reduces the relative probability of triggering an §382 ownership change by 15.2 percentage points.

The results provide empirical support for anecdotes that acquirers with loss carryforwards are less likely to pay with stock if the value of the stock is large enough to trigger an ownership change.

9.3 The Effect of the Acquirer's NOLC on Acquisition Completion

In this section, I document that the potential for §382 loss restrictions on the acquirer's NOLC affects the probability of deal completion. I estimate the following probit model:

$$\Pr(Completed) = \alpha + \beta_k TLCF\_ln * Acquirer\_\Delta 382Limit\_d * Acquirer\_382\_Trigger + \beta_k X + \varepsilon \quad (9)$$

where $Completed$ equals one if the transaction is completed and zero if it is withdrawn. *TLCF_ln* is the natural logarithm of 1 plus the acquirer's aggregate net operating loss carryforward. *Acquirer_382_Trigger* is equal to one if the estimated value of the stock consideration in the deal is equal to at least 50% of the acquirer's market value 4 weeks prior to the acquisition announcement. *Acquirer_Δ382Limit_d* is equal to one if the change in the acquirer's §382 loss limit is negative.[54] All variables are defined in Appendix C. Equation (9) includes main effects and lower-order interactions, and announcement year and acquirer industry (1-digit SIC) dummies. Standard errors are clustered by acquirer industry (1-digit SIC).

I report the results of the estimation in Table 13 column (1). Marginal effects, reported at the bottom of the table, are computed as the partial derivative of equation (9) with respect to *Acquirer_382_Trigger* conditioning on values of *Acquirer_Δ382Limit_d* and *TLCF_ln*. For the mean acquirer (with an NOLC of $500 million), a decrease in the §382 loss limit

[54] I use equation (3) to compute the acquirer's loss limit. I replace MV with the acquirer's market value.

(*Acquirer_Δ382Limit_d* = 1) reduces the probability of completion by 13 percentage points in deals that potentially trigger a §382 ownership change relative to deals that do not.

In column (2) of Table 13, I replace *Acquirer_Δ382Limit_d* with *Acquirer_Δ382Limit_%* * -1, which is equal to % change in the acquirer's §382 loss limit multiplied by negative one. I plot the conditional probability of completion in Figure 5. The graph shows that, conditional on a 50% drop in the loss limit, the probability of completion is significantly lower in deals that potentially trigger a §382 ownership change relative to deals that do not. This effect is increasing in the size of the acquirer's NOLC. The graph also depicts that the effect of an increase in the loss limit is relatively small, suggesting that changes in the loss limit are asymmetric with respect to increases and decreases.

9.4 The Effect of the Acquirer's NOLC on the Medium of Exchange – Aggregate Evidence

Boone, Lie, and Liu (2014) examine the distribution of stock and cash payments over time and note that beginning in the late 1990s and early 2000s there is a decline in all-stock deals in favor of all-cash deals. They note that the traditionally studied determinants of the medium of exchange are unable to explain this shift.

In light of the evidence in this chapter, I propose that that §382 loss limitation rules can at least partially explain this phenomenon. In all-stock deals, the acquirer risks triggering an ownership change of its stock and this is especially costly if it has a large NOLC. Given the complexity of §382, it is not uncommon for firms to trigger a §382 ownership change unexpectedly. This disincentive for all-stock deals is even stronger considering the additional costs associated with stock payment. Studies consistently document that stock payment is associated with significantly negative announcement returns for the acquirer (e.g., Travlos 1987; Fuller, Netter, and Stegemoller 2002).

In Panel A of Figure 6, I plot the time-series distribution of all-stock and all-cash deals and the percentage of acquirers with NOLCs in my sample. The figure shows that the decreased propensity of all-stock deals coincides with the increase in the percent of acquirers with NOLCs beginning in the early 2000s. Aggregating the data at announcement year, the correlation between the percent of acquirers with an NOLC and the percent of all-stock deals is -0.93 ($p<0.001$). The correlation of NOLC with all-cash deals is 0.80 ($p<0.001$).

In Panel B of Figure 6, I plot the time-series distribution of all-stock and all-cash deals and the percent of acquirers with NOLCs for acquisitions of Canadian target firms by Canadian acquirers. There is no observed shift between all-stock and all-cash deals. There are key institutional differences between the U.S. and Canadian tax codes' treatment of NOLCs in acquisitions.[55] In the U.S., the anti-avoidance rules are triggered if there is a 50 percent change in a corporation's stock. In Canada, the triggering event is the acquisition of 50% voting control.[56] More importantly, however, Canada does not have an equivalent §382 loss limit. Following an acquisition of control, a loss can be carried over and applied unrestricted to income from the same or a similar business.[57]

9.5 Conclusions

In this chapter, I provide evidence on the importance of the acquirer's NOLC in corporate acquisitions. I begin by documenting that acquirers with NOLCs are less likely to pay with stock

[55] See Donnelly and Young (2002) for a comprehensive discussion on the difference in tax loss treatment between Canada and the U.S.

[56] There are some exceptions. For instance, the triggering event is deemed to have not occurred if control is acquired by a related taxpayer. See subsection 256(7) of the Income Tax Act, RSC 1985, c. 1 (5th Supp.) as amended.

[57] In Canada, if the acquirer obtains less than 50% of the voting shares of the target, no triggering event is deemed to have occurred and the acquirer can use the target's tax loss without restriction even if the "similar business" requirement is not met. Among others, Donnelly and Young (2002) argue that the 50% voting control threshold is unjust because all equity owners, and not just voting shareholders, are beneficiaries of a corporation's tax loss. As discussed by Donnelly and Young (2002), some tax practitioners advocate that tax neutrality would be better achieved if Canada were to adopt the U.S. version of anti-avoidance rules, including loss limitation rules. The evidence in this chapter does not support this policy option to achieve tax neutrality. This may be of interest to future research.

consideration if doing so has the potential to trigger an ownership change under §382. Next, I document that acquirers that pay with stock are exposed to additional costs. Deals are more likely to be withdrawn if the change in the acquirer's loss limit becomes unfavorable. Collectively, my tests provide a plausible explanation for the shift in the early 2000s from all-stock to all-cash deals. Using aggregate data, I show not only that the shift coincided with the increase in firms reporting NOLCS, but also that the propensity for all-stock (all-cash) closely follows the time-series pattern of acquiring firms that report NOLCs. Collectively, my evidence indicates that tax-incentives are a significant determinant of the medium of exchange in corporate acquisitions.

Chapter 10. Conclusion

In this dissertation, I examine tax incentives in corporate acquisitions. In accordance with the Scholes-Wolfson framework, of "all taxes, all parties, and all costs", a key insight in this dissertation is that the tax and non-tax attributes of the target and acquirer firm interact to determine the available tax incentive and thus the optimal level of tax-planning.

Using a sample of 1,028 domestic acquisitions by public U.S. firms, I examine tax incentives associated with the target firm's net operating loss carryforward (NOLC). Empirically, I document a positive association between the target's NOLC and acquisition premium that is increasing in the acquirer's marginal tax rate. By doing so, I provide the first evidence that NOLC-benefits are priced in corporate acquisitions under the tax rules in place following the Tax Reform Act of 1986.

Next, I document that the acquirer trades-off the net present value (NPV) of potential interest deductions against the NPV of the target's NOLC. Empirically, I document that the conditional probability of financing the acquisition with debt is relatively lower in deals in which the target has an NOLC. This effect is stronger in deals in which the acquirer has a higher marginal tax rate. By documenting the substitutability of debt and non-debt tax shields in the structuring of corporate acquisitions, my findings provide new insight into how taxes affect optimal financing decisions.

Finally, I document that §382 of the *Internal Revenue Code* distorts investment incentives. §382 requires that the annual loss limit applicable on NOLCs post-acquisition be computed as of the date that the transaction closes. This creates uncertainty on the potential value of the NOLC because the applicable loss limit cannot be predicted accurately as of the date that the acquisition is announced. My empirical evidence suggests that a drop in the loss limit between the

announcement and closing dates increases the probability that the deal is canceled. To avoid the negative consequences of §382, the acquirer is forced to either time the closing of the deal to coincide with a favorable loss limit, or to incur additional costs associated with debt-issuance to offset the effect of the decrease in the value of the NOLC tax shield.

A second, and potentially costlier, unintended consequences of §382 is that it reduces the acquirer's incentive to pay with stock. Stock consideration can potentially trigger an ownership change in the acquirer's stock and thereby impose loss limitation rules on the acquirer's NOLC. Empirically, I demonstrate that acquirers with NOLCs are less likely to pay with stock if there is potential for triggering an ownership change. Conditional on paying with stock, I find that deals are more likely to be cancelled if the loss limit drops between the announcement and closing dates. Finally, I show that the aggregate trend in the decline of all-stock deals and the corresponding rise in all-cash deals coincides with the increase in the percent of acquirers with NOLCs. This suggests that the §382 distortion on investment is potentially large.

In light of recent tax changes under the *Tax Cuts and Jobs Act* (TCJA) of 2017, my findings may be of interest to future studies examining tax incentives in corporate acquisitions. By reducing the statutory corporate tax rate from 35% to 21%, the TCJA reduced the value of all tax shields, both debt and non-debt. The TCJA further reduced the tax advantage of debt financing by limiting interest deductions to 30% of taxable income. In addition, the TCJA overhauled the NOL rules by eliminating carrybacks and allowing an indefinite carry-forward but limiting the deduction to 80% of taxable income. The recent passage of the *Coronavirus Aid, Relief, and Economic Security Act* (CARES Act) has temporarily lifted the NOL restrictions and allows for NOLs to be carried back for 5 years. These recent events provide unique opportunities for future research.

References

Adrian, T., Colla, P., & Song Shin, H. (2013). Which Financial Frictions? Parsing the Evidence from the Financial Crisis of 2007 to 2009. *NBER Macroeconomics Annual*, *27*, 159–214.

Albring, S. M., Dhaliwal, D. S., Khurana, I. K., & Pereira, R. (2011). Short-Term Incentive Effects of a Reduction in the NOL Carryback Period. *Journal of the American Taxation Association*, *33*(2), 67–88.

Amel-Zadeh, A., & Zhang, Y. (2014). The Economic Consequences of Financial Restatements: Evidence from the Market for Corporate Control. *The Accounting Review*, *90*(1), 1–29.

Amihud, Y., Lev, B., & Travlos, N. G. (1990). Corporate Control and the Choice of Investment Financing: The Case of Corporate Acquisitions. *The Journal of Finance*, *45*(2), 603–616.

Auerbach, A. J. (1986). The Dynamic Effects of Tax Law Asymmetries. *The Review of Economic Studies*, *53*(2), 205–225.

Auerbach, A. J., & Poterba, J. M. (1987). Tax-Loss Carryforwards and Corporate Tax Incentives. In Taxes and Capital Formation (pp. 89-92), edited by M. Feldstein. Chicago: University of Chicago Press.

Auerbach, A. J., & Reishus, D. (1988a). Taxes and the merger decision: An empirical Analysis. In Knights raiders, and targets: The impact of the hostile takeover (pp. 300-313), edited by J. 0. Coffee, L. Lowensteio, & S. Rose-Ackerman. New York: Oxford University Press.

Auerbach, A. J., & Reishus, D. (1988b). The Effects of Taxation on the Merger Decision. In Corporate Takeovers: Causes and Consequences (pp. 157-190), edited by A. J. Auerbach. Chicago: University of Chicago Press.

Auerbach, A. J., & Reishus, D. (1988c). The Impact of Taxation on Mergers and Acquisitions. In

Mergers and Acquisitions (pp. 69-85), edited by A. J. Auerbach. Chicago: University of Chicago Press.

Ayers, B. C., Lefanowicz, C. E., & Robinson, J. R. (2000). The Effects of Goodwill Tax Deductions on the Market for Corporate Acquisitions. *Journal of the American Taxation Association*, *22*(s-1), 34–50.

Ayers, B. C., Lefanowicz, C. E., & Robinson, J. R. (2003). Shareholder Taxes in Acquisition Premiums: The Effect of Capital Gains Taxation. *The Journal of Finance*, *58*(6), 2783–2801.

Ayers, B. C., Lefanowicz, C. E., & Robinson, J. R. (2004). The Effect of Shareholder-Level Capital Gains Taxes on Acquisition Structure. *The Accounting Review*, *79*(4), 859–887.

Ayers, B. C., Lefanowicz, C. E., & Robinson, J. R. (2007). Capital Gains Taxes and Acquisition Activity: Evidence of the Lock-in Effect*. *Contemporary Accounting Research*, *24*(2), 315–344.

Becker, B., & Ivashina, V. (2014). Cyclicality of credit supply: Firm level evidence. *Journal of Monetary Economics*, *62*, 76–93.

Blouin, J., Core, J. E., & Guay, W. (2010). Have the tax benefits of debt been overestimated? *Journal of Financial Economics*, *98*(2), 195–213.

Bouwman, C. H. S. (2014). Managerial optimism and earnings smoothing. *Journal of Banking & Finance*, *41*, 283–303.

Boone, A. L., Lie, E., & Liu, Y. (2014). Time trends and determinants of the method of payment in M&As. *Journal of Corporate Finance*, *27*, 296–304.

Bradley, M., Desai, A., & Kim, E. H. (1988). Synergistic gains from corporate acquisitions and their division between the stockholders of target and acquiring firms. *Journal of*

Financial Economics, *21*(1), 3–40.

Brown, D. T., & Ryngaert, M. D. (1991). The Mode of Acquisition in Takeovers: Taxes and Asymmetric Information. *The Journal of Finance*, *46*(2), 653–669.

Cao, J. (2009). CEO Overconfidence or Stock Mispricing and Growth? Reexamining the Effect of CEO Option Exercise Behavior on Corporate Investment. Working paper.

Chiang, W.-C., Stammerjohan, W., & Englebrecht, T. D. (2014). Pricing target NOLs in mergers and acquisitions from the participating firms' perspective. *Advances in Accounting*, *30*(1), 32–42.

Chow, T., Klassen, K. J., & Liu, Y. (2016). Targets' Tax Shelter Participation and Takeover Premiums. *Contemporary Accounting Research*, *33*(4), 1440–1472.

Clark, K., & Ofek, E. (1994). Mergers as a Means of Restructuring Distressed Firms: An Empirical Investigation. *Journal of Financial and Quantitative Analysis*, *29*(4), 541–565.

Cooper, M., & Knittel, M. (2006). Partial Loss Refundability: How Are Corporate Tax Losses Used?. *National Tax Journal*, *59*(3), 651–663.

Cooper, M., & Knittel, M. (2010). The Implications of Tax Asymmetry for U.S. Corporations. *National Tax Journal*, *63*(1), 33–61.

Crawford, D., & Lechner, T. A. (1996). Takeover Premiums and Anticipated Merger Gains in the Us Market for Corporate Control. *Journal of Business Finance & Accounting*, *23*(5–6), 807–829.

Dai, Z., Maydew, E., Shackelford, D. A., & Zhang, H. (2008). Capital Gains Taxes and Asset Prices: Capitalization or Lock-in? *Journal of Finance*, *63*(2), 709–742.

De Fiore, F., & Uhlig, H. (2015). Corporate Debt Structure and the Financial Crisis. *Journal of Money, Credit and Banking*, *47*(8), 1571–1598.

DeAngelo, H., & Masulis, R. W. (1980). Optimal capital structure under corporate and personal taxation. *Journal of Financial Economics*, *8*(1), 3–29.

Denis, D. J., & Mihov, V. (2003). The choice among bank debt, non-bank private debt, and public debt: Evidence from new corporate borrowings. *Journal of Financial Economics*, *70*(1), 3–28.

Devos, E., Kadapakkam, P.-R., & Krishnamurthy, S. (2009). How Do Mergers Create Value? A Comparison of Taxes, Market Power, and Efficiency Improvements as Explanations for Synergies. *The Review of Financial Studies*, *22*(3), 1179–1211.

Dhaliwal, D. S., Kaplan, S. E., Laux, R. C., & Weisbrod, E. (2013). The Information Content of Tax Expense for Firms Reporting Losses. *Journal of Accounting Research*, *51*(1), 135–164.

Dhaliwal, D. S., Newberry, K. J., & Weaver, C. D. (2005). Corporate Taxes and Financing Methods for Taxable Acquisitions*. *Contemporary Accounting Research*, *22*(1), 1–30.

Dechow, P. M., Ge, W., Larson, C. R., & Sloan, R. G. (2011). Predicting Material Accounting Misstatements. *Contemporary Accounting Research*, 28(1), 17-82

Dobridge, C. L. (2016). Fiscal Stimulus and Firms: A Tale of Two Recessions. *Finance and Economics Discussion Series 2016-013. Washington: Board of Governors of the Federal Reserve System, Http://Dx.Doi.Org/10.17016/FEDS.2016.013.*, *2016*(13), 1–65.

Doidge, C., & Dyck, A. (2015). Taxes and Corporate Policies: Evidence from a Quasi Natural Experiment. *The Journal of Finance*, *70*(1), 45–89.

Dong, M., Hirshleifer, D., Richardson, S., & Teoh, S. H. (2006). Does Investor Misvaluation Drive the Takeover Market? *The Journal of Finance*, *61*(2), 725–762.

Donnelly, M., & Young, A. (2002). Policy Options for Tax Loss Treatment: How Does Canada

Compare? *Canadian Tax Journal*, *50*(2), 60.

Dyreng, S., & Maydew, E. (2018). Virtual Issue on Tax Research. *Journal of Accounting Research*, *56*(2), 311–311.

Eckbo, B. E., & Thorburn, K. S. (2000). Gains to Bidder Firms Revisited: Domestic and Foreign Acquisitions in Canada. *The Journal of Financial and Quantitative Analysis*, *35*(1), 1–25.

Edwards, A. (2018). The Deferred Tax Asset Valuation Allowance and Firm Creditworthiness. *Journal of the American Taxation Association*, *40*(1), 57–80.

Erickson, M. (1998). The effect of taxes on the structure of corporate acquisitions. *Journal of Accounting Research*, *36*(2), 279–298.

Erickson, M. (2000). Discussion of The Effect of Taxes on Acquisition Price and Transaction Structure. *The Journal of the American Taxation Association*, *22*(s-1), 18–33.

Erickson, M., Hanlon, M., & Maydew, E. L. (2004). How Much Will Firms Pay for Earnings That Do Not Exist? Evidence of Taxes Paid on Allegedly Fraudulent Earnings. *The Accounting Review*, *79*(2), 387–408.

Erickson, M. M., Heitzman, S. M., & Zhang, X. F. (2013). Tax-Motivated Loss Shifting. *The Accounting Review*, *88*(5), 1657–1682.

Erickson, M. M., Ton, K., & Wang, S. (2019). The Effect of Acquirer Net Operating Losses on Acquisition Premiums and Acquirer Abnormal Returns. *Journal of the American Taxation Association*, *41*(2), 103–124.

Fama, E. F. (2011). My Life in Finance. *Annual Review of Financial Economics*, *3*(1), 1–15.

Favilukis, J., Giammarino, R., & Pizzaro, J. (2016). Tax-Loss Carry Forwards and Returns. Working paper.

Feenberg, D., & Coutts, E. (1993). An Introduction to the TAXSIM Model. *Journal of Policy*

Analysis and Management, 12(1), 189-194

Frank, M. M., & Rego, S. O. (2006). Do Managers Use the Valuation Allowance Account to Manage Earnings around Certain Earnings Targets? *Journal of the American Taxation Association*, *28*(1), 43–65.

Frank, M. Z., & Goyal, V. K. (2003). Testing the pecking order theory of capital structure. *Journal of Financial Economics*, *67*(2), 217–248.

Fu, F., Lin, L., & Officer, M. S. (2013). Acquisitions driven by stock overvaluation: Are they good deals? *Journal of Financial Economics*, *109*(1), 24–39.

Fuller, K., Netter, J., & Stegemoller, M. (2002). What Do Returns to Acquiring Firms Tell Us? Evidence from Firms That Make Many Acquisitions. *The Journal of Finance*, *57*(4), 1763–1793.

Ghosh, A., & Ruland, W. (1998). Managerial Ownership, the Method of Payment for Acquisitions, and Executive Job Retention. *The Journal of Finance*, *53*(2), 785–798.

Gilson, R. J., Scholes, M. S., & Wolfson, M. A. (1988). Taxation and the dynamics of corporate control: The uncertain case for tax motivated acquisition. In Knights raiders, and targets: The impact of the hostile takeover (pp. 300-313), edited by J. 0. Coffee, L. Lowensteio, & S. Rose-Ackerman. New York: Oxford University Press.

Givoly, D., & Hayn, C. (1992). The Valuation of the Deferred Tax Liability: Evidence from the Stock Market. *The Accounting Review*, *67*(2), 394–410.

Gort, M. (1969). An Economic Disturbance Theory of Mergers. *The Quarterly Journal of Economics*, *83*(4), 624–642.

Graham, J. R. (1996a). Debt and the marginal tax rate. *Journal of Financial Economics*, *41*(1), 41–73.

Graham, J. R. (1996b). Proxies for the corporate marginal tax rate. *Journal of Financial Economics*, *42*(2), 187–221.

Graham, J. R., & Leary, M. T. (2011). A Review of Empirical Capital Structure Research and Directions for the Future. *Annual Review of Financial Economics*, *3*(1), 309–345.

Graham, J. R., Lemmon, M. L., & Schallheim, J. S. (1998). Debt, Leases, Taxes, and the Endogeneity of Corporate Tax Status. *The Journal of Finance*, *53*(1), 131–162.

Graham, J. R., Raedy, J. S., & Shackelford, D. A. (2012). Research in accounting for income taxes. *Journal of Accounting and Economics*, *53*(1), 412–434.

Han, S., Lai, G., & Ho, C.-L. (2016). CEO Overconfidence or Private Information? Evidence from U.S. Property-Liability Insurance Companies. Working paper.

Hanlon, M., & Heitzman, S. (2010). A review of tax research. *Journal of Accounting and Economics*, *50*(2), 127–178.

Hanlon, M., Verdi, R., & Yost, B. P. (2020). CEO Tax Effects on Acquisition Structure and Value. *The Accounting Review*.

Hansen, R. G. (1987). A Theory for the Choice of Exchange Medium in Mergers and Acquisitions. *The Journal of Business*, *60*(1), 75–95.

Harford, J. (2005). What drives merger waves? *Journal of Financial Economics*, *77*(3), 529–560.

Harris, M., & Raviv, A. (1988). Corporate control contests and capital structure. *Journal of Financial Economics*, *20*, 55–86.

Haw, I.-M., Pastena, V., & Lilien, S. (1987). The Association between Market-Based Merger Premiums and Firms' Financial Position Prior to Merger. *Journal of Accounting, Auditing & Finance*, *2*(1), 24–42.

Hayn, C. (1989). Tax attributes as determinants of shareholder gains in corporate acquisitions.

Journal of Financial Economics, *23*(1), 121–153.

Heckman, J. J. (1979). Sample Selection Bias as a Specification Error. *Econometrica*, *47*(1), 153–161.

Heider, F., & Ljungqvist, A. (2015). As certain as debt and taxes: Estimating the tax sensitivity of leverage from state tax changes. *Journal of Financial Economics*, *118*(3), 684–712.

Heitzman, S., & Lester, R. (Forthcoming). Tax Loss Measurement. *National Tax Journal*.

Henning, S. L., & Shaw, W. H. (2000). The Effect of the Tax Deductibility of Goodwill on Purchase Price Allocations. *Journal of the American Taxation Association*, *22*(1), 18–37.

Henning, S. L., Shaw, W. H., & Stock, T. (2000). The Effect of Taxes on Acquisition Price and Transaction Structure. *The Journal of the American Taxation Association*, *22*(s-1), 1–17.

Hoenig, M. (2014). Trafficking in Net Operating Losses: What's So Bad? *Tax Notes, Special Report*, 919–939.

Huang, Y.-S., & Walkling, R. A. (1987). Target abnormal returns associated with acquisition announcements: Payment, acquisition form, and managerial resistance. *Journal of Financial Economics*, *19*(2), 329–349.

Jensen, M. C., & Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, *3*(4), 305–360.

Klein, P. (1999). The capital gain lock-in effect and equilibrium returns. *Journal of Public Economics*, *71*(3), 355–378.

Klein, P. (2001). The capital gain lock-in effect and long-horizon return reversal. *Journal of Financial Economics*, *59*(1), 33–62.

Kraus, A., & Litzenberger, R. H. (1973). A State-Preference Model of Optimal Financial Leverage. *The Journal of Finance*, *28*(4), 911–922.

Krieg, K., Krull, L., & Li, J. (2020). How do Net Operating Loss Carryforwards Affect Firm Investment Decisions? Working paper.

Kumar, K. R., & Visvanathan, G. (2003). The Information Content of the Deferred Tax Valuation Allowance. *The Accounting Review*, *78*(2), 471–490.

Laamanen, T. (2007). On the role of acquisition premium in acquisition research. *Strategic Management Journal*, *28*(13), 1359–1369.

Landsman, W. R., & Shackelford, D. A. (1995). The Lock-in Effect of Capital Gains Taxes: Evidence From the RJR Nabisco Leveraged Buyout. *National Tax Journal*, *48*(2), 245–259.

Lang, M. H., & Shackelford, D. A. (2000). Capitalization of capital gains taxes: Evidence from stock price reactions to the 1997 rate reduction. *Journal of Public Economics*, *76*(1), 69–85.

Lang, L., Stulz, R., & Walkling, R. A. (1989). Managerial performance, Tobin's Q, and the gains from successful tender offers. *Journal of Financial Economics*, *24*(1), 137–154.

Langenmayr, D., & Lester, R. (2018). Taxation and Corporate Risk-Taking. *The Accounting Review*, *93*(3), 237–266.

Larcker, D. F., & Rusticus, T. O. (2010). On the use of instrumental variables in accounting research. *Journal of Accounting and Economics*, *49*(3), 186–205.

Malmendier, U., & Tate, G. (2008). Who makes acquisitions? CEO overconfidence and the market's reaction. *Journal of Financial Economics*, *89*(1), 20–43.

Mandelker, G. (1974). Risk and return: The case of merging firms. *Journal of Financial Economics*, *1*(4), 303–335.

Martin, K. J. (1996). The Method of Payment in Corporate Acquisitions, Investment

Opportunities, and Management Ownership. *The Journal of Finance*, *51*(4), 1227–1246.

Maydew, E. L. (1997). Tax-Induced Earnings Management by Firms with Net Operating Losses. *Journal of Accounting Research*, *35*(1), 83–96.

Modigliani, F., & Miller, M. H. (1958). The Cost of Capital, Corporation Finance and the Theory of Investment. *The American Economic Review*, *48*(3), 261–297.

Modigliani, F., & Miller, M. H. (1963). Corporate Income Taxes and the Cost of Capital: A Correction. *The American Economic Review*, *53*(3), 433–443.

Myers, S. C. (1984). The Capital Structure Puzzle. *The Journal of Finance*, *39*(3), 574–592.

Myers, S. C. (1993). Still Searching for Optimal Capital Structure. *Journal of Applied Corporate Finance*, *6*(1), 4–14.

Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, *13*(2), 187–221.

Myers, S. C., McConnell, J. J., Peterson, A., Soter, D., & Stern, J. (1998). Vanderbilt University Roundtable on the Capital Structure Puzzle. *Journal of Applied Corporate Finance*, *11*(1), 8–24.

Palepu, K. G. (1986). Predicting takeover targets: A methodological and empirical analysis. *Journal of Accounting and Economics*, *8*(1), 3–35.

Plummer, E., & Robinson, J. R. (1990). Capital Market Evidence of Windfalls from The Acquisition Of Tax Carryovers. *National Tax Journal*, *43*(4), 481–489.

Scholes, M. S., Wolfson, M. A., Erickson, M. M., Hanlon, M. L., Maydew, E. L., & Shevlin, T. J. (2014). *Taxes & Business Strategy*. Pearson.

Scott, J. H. (1976). A Theory of Optimal Capital Structure. *The Bell Journal of Economics*, *7*(1),

33–54.

Servaes, H. (1991). Tobin's Q and the Gains from Takeovers. *Journal of Finance*, *46*(1), 409–419.

Shackelford, D. A., & Shevlin, T. (2001). Empirical tax research in accounting. *Journal of Accounting and Economics*, *31*(1), 321–387.

Shevlin, T. (1990). Estimating corporate marginal tax rates with asymmetric tax treatment of gains and losses. *Journal of the American Taxation Association*, *11*(2), 51–67.

Shleifer, A., & Vishny, R. W. (1992). Liquidation Values and Debt Capacity: A Market Equilibrium Approach. *The Journal of Finance*, *47*(4), 1343–1366.

Shleifer, A., & Vishny, R. W. (2003). Stock market driven acquisitions. *Journal of Financial Economics*, *70*(3), 295–311.

Skaife, H. A., & Wangerin, D. D. (2013). Target Financial Reporting Quality and M&A Deals that Go Bust. *Contemporary Accounting Research*, *30*(2), 719–749.

Song, M. H., & Walkling, R. A. (2000). Abnormal returns to rivals of acquisition targets: A test of the `acquisition probability hypothesis'. *Journal of Financial Economics*, *55*(2), 143–171.

Stulz, R. (1988). Managerial control of voting rights: Financing policies and the market for corporate control. *Journal of Financial Economics*, *20*(1–2), 25–54.

Travlos, N. G. (1987). Corporate Takeover Bids, Methods of Payment, and Bidding Firms' Stock Returns. *The Journal of Finance*, *42*(4), 943–963.

Waegenaere, A. D., Sansing, R., & Wielhouwer, J. L. (2021). Tax Loss Carryovers in a Competitive Environment. *Contemporary Accounting Research*, *38*(1), 180–207.

Wagner, A. F., Zeckhauser, R. J., & Ziegler, A. (2018). Company stock price reactions to the

2016 election shock: Trump, taxes, and trade. *Journal of Financial Economics*, *130*(2), 428–451.

Wansley, J. W., Lane, W. R., & Yang, H. C. (1983). Abnormal Returns to Acquired Firms by Type of Acquisition and Method of Payment. *Financial Management*, *12*(3), 16–22.

Weaver, C. D. (2000). Divestiture Structure and Tax Attributes: Evidence from the Omnibus Budget Reconciliation Act of 1993. *Journal of the American Taxation Association*, *22*(s-1), 54–71.

Zellner, A. (1962). An Efficient Method of Estimating Seemingly Unrelated Regressions and Tests for Aggregation Bias. *Journal of the American Statistical Association*, *57*(298), 348–368.

Appendix A: The Tax Implications of the Structures Employed in the Acquisition of Freestanding C Corporations

	Taxable Acquisitions			Tax-Free Acquisitions	
	(1)	(2)	(3)	(4)	(5)
	Asset Acquisition	Stock Acquisition with a §338 Election	Stock Acquisition without a §338 Election	Asset Acquisition	Stock Acquisition
Consideration	Cash	Cash	Cash	Stock	Stock
Taxable to target-shareholders[1]	Yes	Yes	Yes	No	No
Target corporation-level taxable gain	Yes	Yes	No	No	No
Step-up in the tax basis of the target's assets	Yes	Yes	No	No	No
Target's tax attributes survive[2]	No	No	Yes[3]	Yes[3]	Yes[3]
Immediate Levels of Tax	Two	Two	One	Deferred	Deferred
Frequency	Rare	Rare	Common	Common	Common

[1]Tax-free acquisitions provide gain deferral and are not really tax-free, but rather tax deferred.
[2]Target tax attributes include net operating loss carry-forwards (NOLs), capital loss carry-forwards, and various types of tax credits.
[3]The target's tax attributes are limited post-acquisition by §382.

This table is adapted from Erickson (2000) and Scholes et al. (2014).

Appendix B: §382 Loss Limitation Rules

If a corporate undergoes a significant ownership change, §382 of the *Internal Revenue Code* limits the amount of future income that can be offset by a pre ownership change net operating loss (NOL). Although the rules are complex, an ownership change is generally defined as any increase greater than 50 percentage points in the corporation's stock over a three-year period by shareholders who own 5 percent for more of the corporation's stock. If an ownership change is triggered, then the amount of taxable income that can be offset in each subsequent tax year is limited to the lesser of:

1) the NOL, and
2) the fair market value (MV) of the old loss corporation at the time of ownership change multiplied by the federal long-term tax-exempt rate (FLTR).

If $(MV_{Target} * FLTR) < NOL_{Target}$, then the maximum amount of taxable income that can be offset in *each* of the 20 subsequent tax years is *limited* to $(MV_{Target} * FLTR)$ and the present value of the NOL to the acquirer is:

$$PV(NOL_{Target}) = (MV_{Target} * FLTR) * \left[\frac{1-(1+r)^{-20}}{r}\right]$$

If $(MV_{Target} * FLTR) >= NOL_{Target}$, then there is no annual offset limit and the value of the NOL does not change. The present value of the NOL to the acquirer is:[58]

$$PV(NOL_{Target}) = \frac{NOL_{Target}}{(1+r)}$$

MV_{Target} = fair market value of the target on the date of ownership change

FLTR = federal long-term tax-exempt rate[59]

NOL = net operating loss

r = discount rate (10% assumed)

[58] Because the NOL is usually relatively immaterial in this case, I assume that the acquirer will fully use the NOL in the subsequent tax year.

[59] §382 requires the use of an adjusted rate which equals the highest FLTR for the three-calendar month period ending with the month of the ownership change.

Appendix C: Variable Definitions and Data Sources

Variable	Definition	Data Source
Acquirer Characteristics		
Cash	Cash holdings (che) scaled by acquirer's market value (MV) 4 weeks prior to the initial acquisition announcement date	che: Compustat MV: Thomson Reuters SDC
D/E	Ratio of total debt (dlc+dltt) to total debt plus equity (ceq)	Compustat
InstOwn	Percent of stock held by institutions	Thomson Reuters Institutional (13f) Holdings
MTR	Acquirer's post-financing marginal tax rate (bcg_mtrint) computed as of the end of the fiscal year immediately prior to the year of the acquisition announcement	Wharton Research Data Services (WRDS) For further details, see Blouin, Core, and Guay (2010).
PPE	Net property plant and equipment (ppent) scaled by lagged total assets (at)	Compustat
Q	Total assets (at) plus market value of equity (prcc_f*csho) all scaled by total assets (at)	Compustat
R&D	Research and Development Expense (xrd) scaled by acquirer's market value (MV) 4 weeks prior to the initial announcement date Missing values of xrd are set to zero	xrd: Compustat MV: Thomson Reuters SDC
Rated	Indicator equal to 1 if the acquirer has a Standard & Poor's Domestic Long Term Issuer Credit Rating (splticrm)	Compustat
Return	Stock return over the prior fiscal year	The Center for Research in Security Prices (CRSP)
TLCF_d	Indicator equal to 1 if the acquirer's aggregate net operating loss carryforward is > 0; missing values are excluded	Compustat
TLCF_ln	Natural logarithm of 1 plus the acquirer's aggregate net operating loss carryforward; missing values are excluded.	Compustat
Target Characteristics		

AAER	Indicator equal to 1 if the target was subject to an Accounting and Auditing Enforcement Release at any time during the prior 5 fiscal years.	https://sites.google.com/usc.edu/aaerdataset/home For further details, see Dechow, Ge, Larson and Sloan (2011).
Accruals	Discretionary accruals computed as the residual from the modified Jones Model.	Compustat
Analyst	Natural logarithm of the number of analysts following the firm	Institutional Brokers' Estimate System (IBES)
Capex	Capital Expenditures (capx) scaled by target's market value (MV) 4 weeks prior to the initial announcement date	capx: Compustat MV: Thomson Reuters SDC
EBITDA_SD	Standard deviation of industry-adjusted (2-digit SIC) earnings before interest taxes depreciation and amortization (EBITDA) over the prior 5 fiscal years	Compustat
Forecast_Error	The natural logarithm of one plus the absolute value of the median consensus forecast scaled by the absolute value of actual earnings	Institutional Brokers' Estimate System (IBES)
InstOwn	Percent of stock held by institutions	Thomson Reuters Institutional (13f) Holdings
Intangibles	Intangible assets (intan) scaled by target's market value (MV) 4 weeks prior to the initial acquisition announcement date Missing values of intan are set to zero	Intan: Compustat MV: Thomson Reuters SDC
Ln(MV)	Natural logarithm of the target's market value of equity as of the end of the fiscal year immediately prior to the year of the acquisition announcement	Compustat
ΔMV	% change in target's market value between the end of the fiscal year immediately prior to the year of the acquisition announcement and the date 4 weeks prior to the initial acquisition announcement	The Center for Research in Security Prices (CRSP)
NOLC	Target's federal net operating loss carryforward in $ millions	10-K report available on EDGAR
NOLC_d	Indicator equal to 1 if target's federal *NOLC* >0	10-K report available on EDGAR
NOLC_mv	Target's federal net operating loss carryforward (*NOLC*) scaled by target's market value (MV) 4 weeks prior to the initial announcement date.	*NOLC*: 10-K report available on EDGAR MV: Thomson Reuters SDC

NOLC_ln	natural logarithm of 1 plus the target's federal net operating loss carryforward (*NOLC*)	10-K report available on EDGAR
Q	Total assets (at) plus market value of equity (prcc_f*csho) all scaled by total assets (at)	Compustat
R&D	Research and Development Expense (xrd) scaled by target's market value (MV) 4 weeks prior to the initial announcement date Missing values of xrd are set to zero	xrd: Compustat MV: Thomson Reuters SDC
Return	Stock return over the prior fiscal year	The Center for Research in Security Prices (CRSP)
VA	Indicator equal to 1 if the target's valuation allowance is greater than or equal to its federal net operating loss carryforward (*NOLC*) multiplied by the statutory federal corporate tax rate (35%)	10-K report available on EDGAR
Volatility	Standard deviation of monthly returns over the prior fiscal year	The Center for Research in Security Prices (CRSP)
Deal Characteristics		
>0% BankFin	Indicator equal to 1 if (rel_loan_deal_amount + valbridge) > 0 rel_loan_deal_amount = bank-issued debt ($ millions) valbridge = bridge loan ($ millions)	Thomson Reuters SDC
100% BankFin	Indicator equal to 1 if [(rel_loan_deal_amount + valbridge)/eqval] >= 100% rel_loan_deal_amount = bank-issued debt ($ millions) valbridge = bridge loan ($ millions) eqval = deal equity value ($ millions) Source: Thomson Reuters SDC	Thomson Reuters SDC
Acquirer_382 _Trigger	Indicator equal to 1 if the estimated value of the stock consideration in the transaction is equal to at least 50% of the acquirer's market value 4 weeks prior to the acquisition announcement	Thomson Reuters SDC

	The estimated value of stock consideration is computed as the percent of stock consideration (pct_stk) multiplied by the deal equity value (eqval).	
Acquirer_Δ382Limit	The change in the acquirer's §382 loss limit between the acquisition announcement and closing dates. Computed as: $[(FLTR_{ClosingDate} * MV_{ClosingDate}) - (FLTR_{AnnDate} * MV_{AnnDate})]$ Where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the acquirers market value as of the date on which the transaction closes. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date. The adjusted federal long-term tax exempt rate (FLTR), is equal to the highest FLTR over the current and prior two months.	Market value: Thomson Reuters SDC FLTR: Internal Revenue Service (IRS) https://apps.irs.gov/app/picklist/list/federalRates.html
Acquirer_Δ382Limit_d	Indicator equal to 1 if *Acquirer_Δ382Limit* is negative.	
Acquirer_Δ382Limit_%	Equal to *Acquirer_Δ382Limit* scaled by the acquirer's announcement date §382 loss limit $(FLTR_{AnnDate} * MV_{AnnDate})$.	
AllStock	Indicator equal to 1 is deal consideration consists entirely of the acquirer's stock.	Thomson Reuters SDC
BondFin	Indicator equal to 1 if the acquirer issued bonds between the deal announcement and closing dates. The closing date is the date on which the transaction is either completed or withdrawn.	Mergent Fixed Income Securities Database (FISD)
CAR3	Three-day (-1, 1) cumulative abnormal acquisition announcement return estimated using the market model where the model parameters are estimated in the (−210, −60) window prior to the acquisition announcement	The Center for Research in Security Prices (CRSP)

	CAR3 is computed for the acquiring (*aCAR3*) and the target (*tCAR3*) firm.	
CG	10-year change in the individual federal capital gains tax rate	National Bureau of Economic Research http://www.nber.org/taxsim For further details, see Feenberg and Coutts (1993).
Competition	Indicator equal to 1 if there are multiple bidders	Thomson Reuters SDC
Completed	Indicator equal to 1 if the deal is completed and 0 if the deal is withdrawn	Thomson Reuters SDC
Completed | month<=1	Indicator equal to 1 if the deal closes in the same month as the month of the initial announcement date or in the subsequent month	Thomson Reuters SDC
Deal Size	Natural logarithm of the deal equity value (eqval) ($ millions)	Thomson Reuters SDC
Horizontal Deal	Indicator equal to 1 if acquirer and target are not in the same industry (based on 2-digit SIC code)	Compustat
Hostile	Indicator equal to 1 if deal attitude is hostile	Thomson Reuters SDC
Tender	Indicator equal to 1 if deal if a tender offer	Thomson Reuters SDC
Pooling	Indicator equal to 1 if the acquirer's accounting treatment for the acquisition is the pooling method	Compustat
Premium	(Offer Price – Closing Price)/Closing Price Closing Price is the target closing stock price 4 weeks prior to the initial acquisition announcement date	Thomson Reuters SDC
Relative Size	Ratio of target market value to the sum of the target and acquirer market value Market values are computed as of 4-weeks prior to the initial announcement date.	Thomson Reuters SDC
Taxable	Indicator equal to 1 if at least 80% of the deal consideration is cash	Thomson Reuters SDC
Target_382Limit _AnnDate	Natural logarithm of 1 plus the target's §382 loss limit as of 4-weeks prior to the acquisition announcement date The §382 loss limit is computed as:	Market value: Thomson Reuters SDC FLTR: Internal Revenue Service (IRS)

	$(FLTR_{AnnDate} * MV_{AnnDate})$ Where $FLTR_{AnnDate}$ is the adjusted federal long-term tax-exempt rate and $MV_{AnnDate}$ is the target's market value. Both variables are computed as of 4-weeks prior to the initial acquisition announcement date.	https://apps.irs.gov/app/picklist/list/federalRates.html
Target_Δ382Limit	The change in the §382 loss limit between the acquisition announcement and closing dates. Computed as: $[(FLTR_{ClosingDate} * MV_{ClosingDate}) - (FLTR_{AnnDate} * MV_{AnnDate})]$ Where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the target's market value as of the date on which the transaction closes, respectively. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date.	Market value: Thomson Reuters SDC FLTR: Internal Revenue Service (IRS) https://apps.irs.gov/app/picklist/list/federalRates.html
Target_Δ382Limit_d	Indicator equal to 1 if *Target_Δ382Limit* is negative	
Target_Δ382Limit_%	Equal to *Target_Δ382Limit* scaled by *Target_382Limit_AnnDate*	

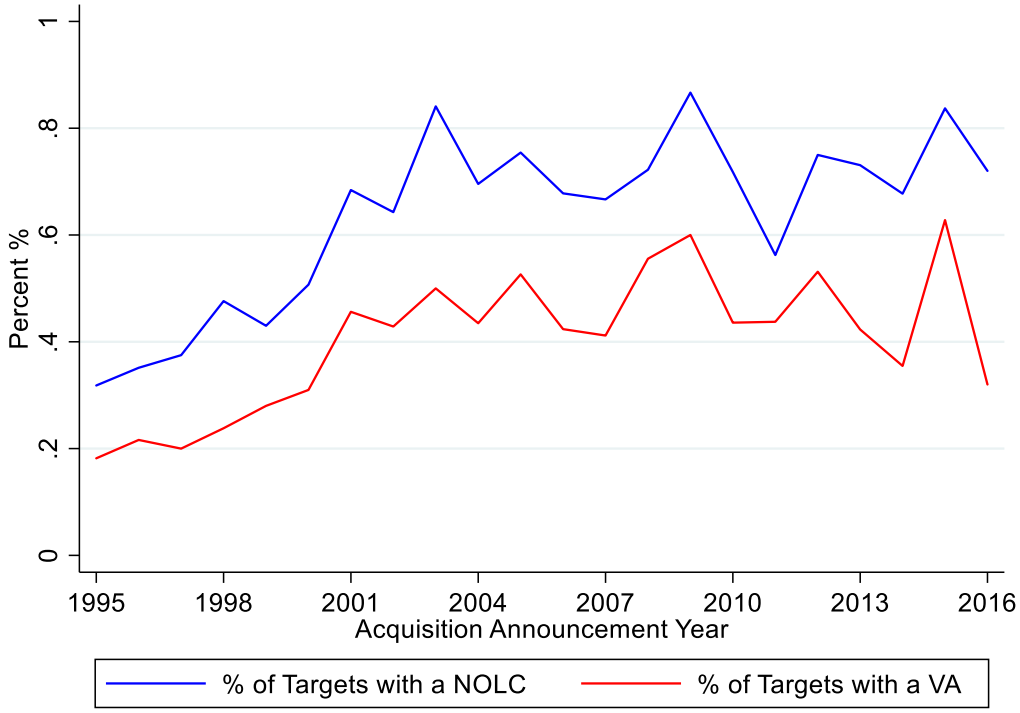
Figure 1

Targets' Net Operating Loss Carryforward and Valuation Allowance Aggregated by Acquisition Announcement Year

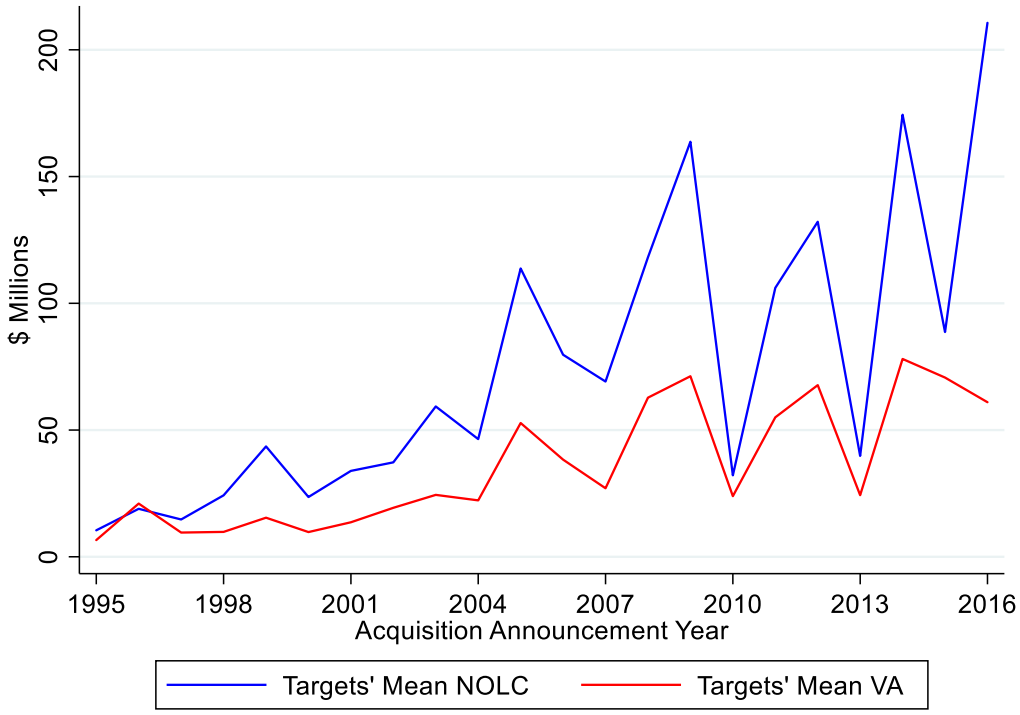
This figure presents the time-series plots of target firms' net operating loss carryforward (NOLC) and valuation allowance (VA).

The sample includes 1,022 acquisitions announced between 1995 and 2016 involving U.S. public acquirer and target firms. Two acquisitions, for which the target's NOLC is greater than $2 billion, are excluded. These transactions are announced in years 2013 and 2016 and the target's NOLC is $2.6 billion and $9.8 billion, respectively.

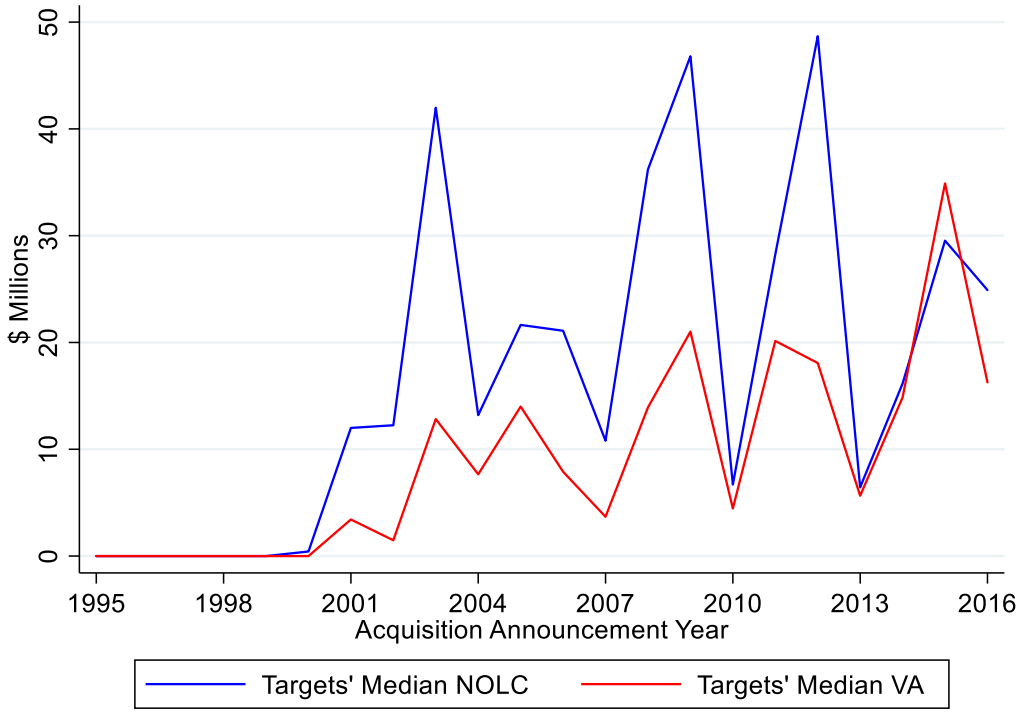
Panel A: Percent (%) of target firms with a NOLC and VA



Panel B: Mean NOLC and VA of target firms



Panel C: Median NOLC and VA of target firms



Panel D: Mean and Median NOLC of target firms conditional on NOLC>0

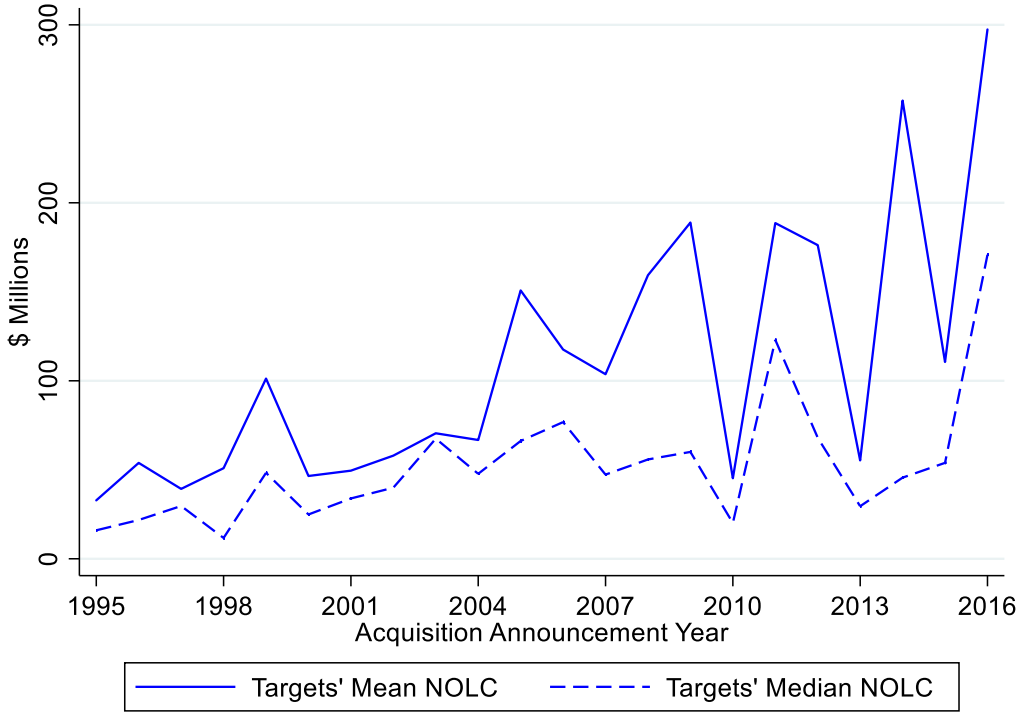


Figure 2

Targets' Net Operating Loss Carryforward and Acquisition Debt Financing Aggregated by Acquisition Announcement Year

This figure presents the time-series plots of target firms' net operating loss carryforward (NOLC) and acquisition debt financing.

The sample includes 1,022 acquisitions announced between 1995 and 2016 involving U.S. public acquirer and target firms. Two acquisitions, for which the target's NOLC is greater than $2 billion, are excluded. These transactions are announced in years 2013 and 2016 and the target's NOLC is $2.6 billion and $9.8 billion, respectively.

The dashed blue line depicts the % of Compustat listed firms with an aggregate NOLC conditional on a non-missing NOLC value (Compustat variable: tlcf).

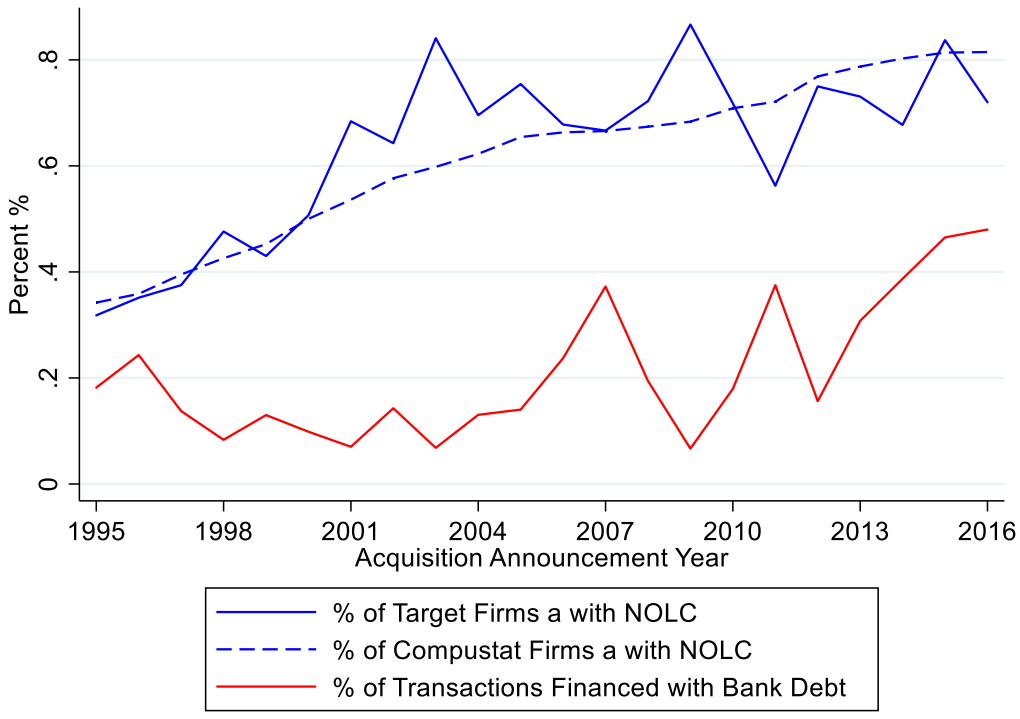


Figure 3: Predictive Margins

Probability of Deal Completion
Conditional on the Change in the Target's §382 Loss Limit

This figure corresponds with the regression coefficients reported in columns 3 and 4 of Table 9, estimated with the following probit model:

$$\Pr(Completed) = \alpha + \beta_1 NOLC\_ln + \beta_2 Target\_\Delta 382Limit\_\% +$$

$$\beta_3 NOLC\_ln * Target\_\Delta 382Limit\_\% + \beta_k C + \varepsilon$$

Completed = 1 if the transaction is completed and 0 if it is withdrawn.

NOLC_ln = natural logarithm of 1 plus the target's federal net operating loss carryforward.

Target_Δ382Limit_% = % change in the target firm's §382 loss limit between the acquisition announcement and closing dates. It is computed as:

$$\frac{[(FLTR_{ClosingDate} * MV_{ClosingDate}) - (FLTR_{AnnDate} * MV_{AnnDate})]}{(FLTR_{AnnDate} * MV_{AnnDate})}$$

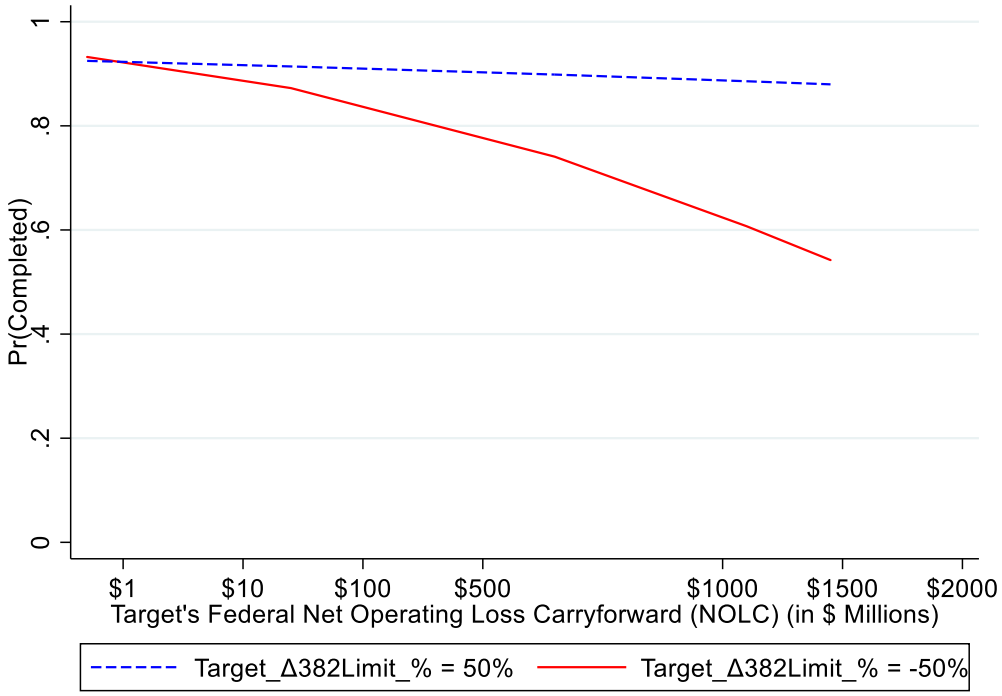
Where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the target's market value as of the date on which the transaction closes. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date.

Marginal effects are computed as the partial derivative of the regression equation with respect to *Target_Δ382Limit_% = (± 50%)* conditioning on values of *NOLC_ln*.

Panel A depicts the marginal effect for the regression reported in Table 9 column (3). The regression includes announcement year and target industry (1-digit SIC) fixed effects.

Panel B depicts the marginal effect for the regression reported in Table 9 column (4). The regression includes announcement year by target industry (1-digit SIC) interactions.

Panel A: Probability of Deal Completion Conditional on *Target_Δ382Limit_d*



Panel B: Probability of Deal Completion Conditional on *Target_Δ382Limit_d*

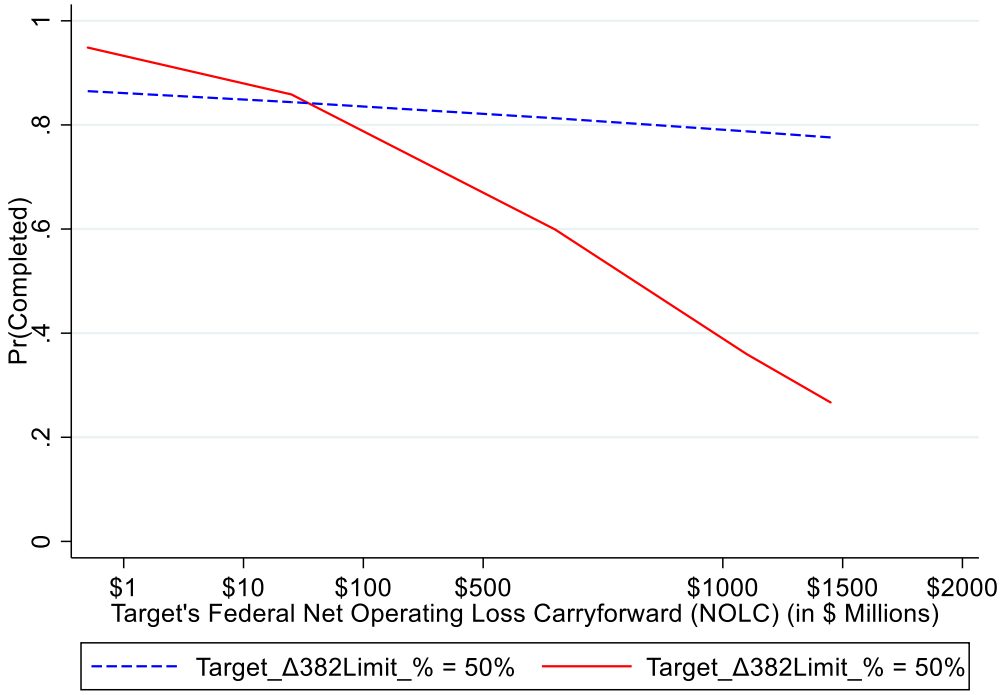


Figure 4: Predictive Margins

Probability of Bond Issuance and Deal Completion Conditional on the Change in the Target's §382 Loss Limit

This figure corresponds with the regression coefficients reported in columns (1) and (2) of Table 10. Coefficients from the two probit regressions are jointly estimated using a seemingly unrelated regression (SUR) model that applies the generalized least squares estimator.

Regression 1 models the probability that the acquirer issues bonds conditional on the size of the target's federal net operating loss carryforward (NOLC) and the change in the Target's §382 Loss Limit:

$$\Pr(BondFin) = \alpha + \beta_3 NOLC\_ln * Target\_\Delta 382Limit\_d + \beta_k Z + \varepsilon$$

Regression 2 models the probability that the acquirer completes the acquisition conditional on the size of the target's federal net operating loss carryforward (NOLC) and the change in the Target's §382 Loss Limit:

$$\Pr(Completed) = \alpha + \gamma_7 NOLC\_ln * Target\_\Delta 382Limit\_d * BondFin + \beta_k C + \varepsilon$$

Both equations include main effects and lower order interactions.

BondFin = 1 if the acquirer issues bonds between the acquisition announcement and closing date. The closing date is the date on which the transaction is either completed or withdrawn.

Completed = 1 if the transaction is completed and 0 if it is withdrawn.

NOLC_ln = natural logarithm of 1 plus the target's federal net operating loss carryforward.

Target_Δ382Limit_d = 1 if the change in the target's §382 loss limit is negative. The change in the §382 loss limit is computed as:

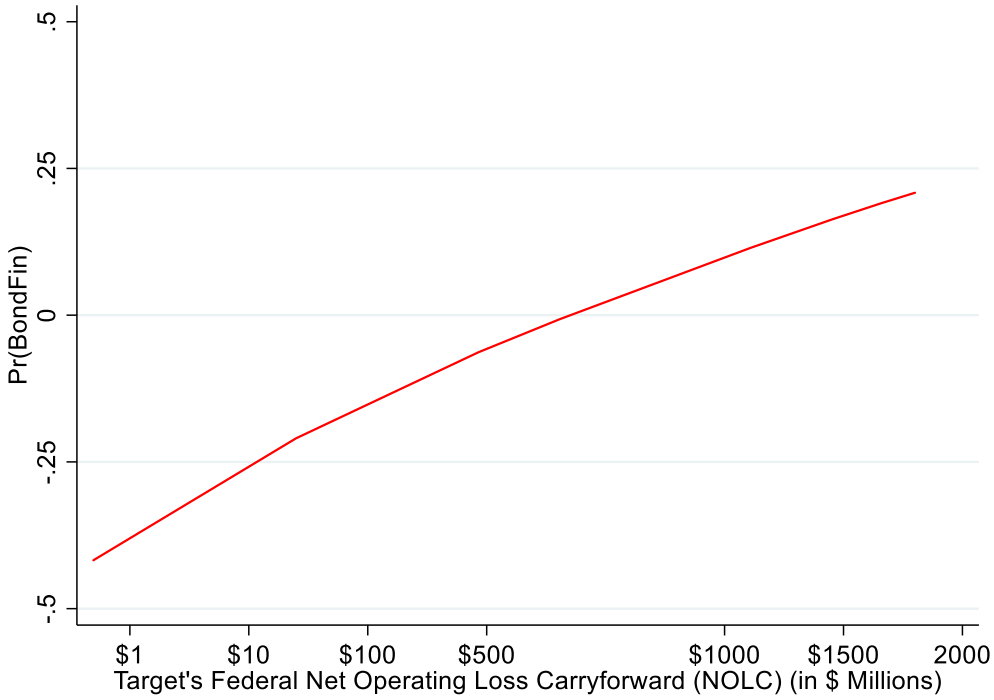
Target_Δ382Limit = [($FLTR_{ClosingDate}$ * $MV_{ClosingDate}$) - ($FLTR_{AnnDate}$ * $MV_{AnnDate}$)]

Where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the target's market value as of the date on which the transaction closes. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date.

In Panel A, the marginal effect is computed as the partial derivative of the regression (1) with respect to *Target_Δ382Limit_d* conditioning on values of *NOLC_ln*.

In Panel B, the marginal effect is computed as the partial derivative of the regression (2) with respect to *BondFin* conditioning on values of *Target_Δ382Limit_d* and of *NOLC_ln*.

Panel A: Probability of Bond Issuance Conditional on *Target_Δ382Limit_d*



Panel B: Probability of Deal Completion Conditional on *Target_Δ382Limit_d*

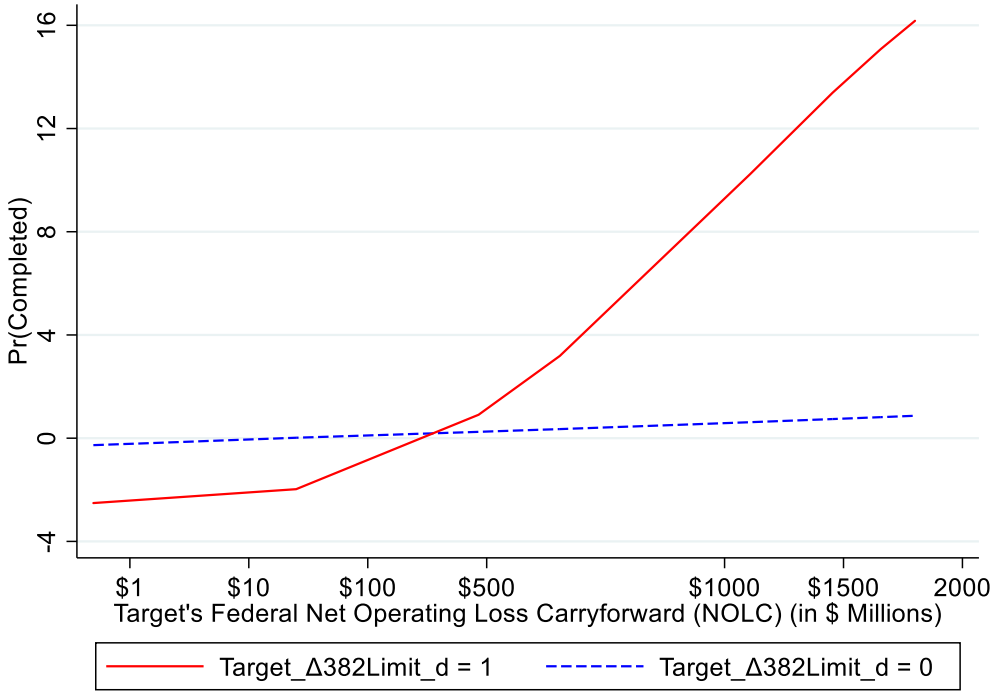


Figure 5: Predictive Margins

Probability of Deal Completion
Conditional on the Change in the Acquirer's §382 Loss Limit

This figure corresponds with the regression coefficients reported in column 2 of Table 13, estimated with the following probit model:

$$\Pr(Completed) = \alpha + TLCF\_ln * Acquirer\_\Delta 382Limit\_\% * Acquirer\_382\_Trigger + \beta_k C + \varepsilon$$

The model includes main effects and lower order interactions.

Completed = 1 if the transaction is completed and 0 if it is withdrawn.

TLCF_ln = natural logarithm of 1 plus the acquirer's aggregate net operating loss carryforward (Compustat variable: tlcf)).

Acquirer_382_Trigger = 1 if the estimated value of the stock consideration in the deal is equal to at least 50% of the acquirer's market value 4 weeks prior to the acquisition announcement.

Acquirer_Δ382Limit_% = % change in the acquirer's §382 loss limit between the acquisition announcement and closing dates. It is computed as:

$$\frac{[(FLTR_{ClosingDate} * MV_{ClosingDate}) - (FLTR_{AnnDate} * MV_{AnnDate})]}{(FLTR_{AnnDate} * MV_{AnnDate})}$$

Where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the acquirer's market value as of the date on which the transaction closes. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date.

The marginal effect is computed as the partial derivative of the regression equation with respect to *Acquirer_382_Trigger* conditioning on *Acquirer_Δ382Limit_% = (± 50%)* and on values of *TLCF_ln.*

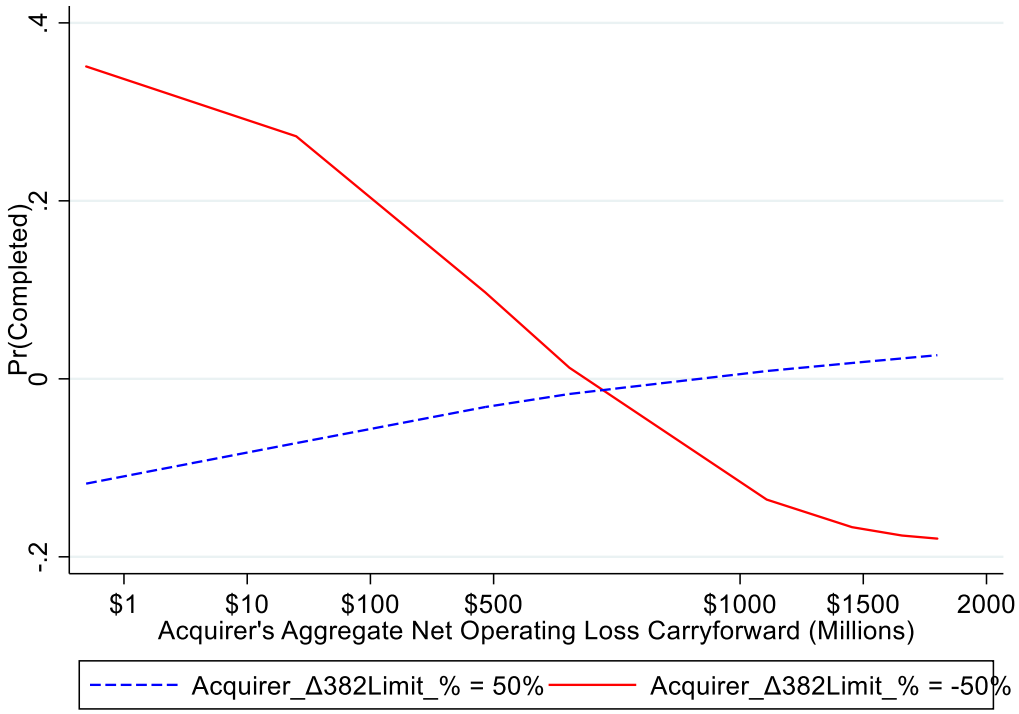

.4
.2
0
-.2
Pr(Completed)
$1
$10
$100
$500
$1000
$1500
2000
Acquirer's Aggregate Net Operating Loss Carryforward (Millions)
Acquirer_Δ382Limit_% = 50%
Acquirer_Δ382Limit_% = -50%

Figure 6

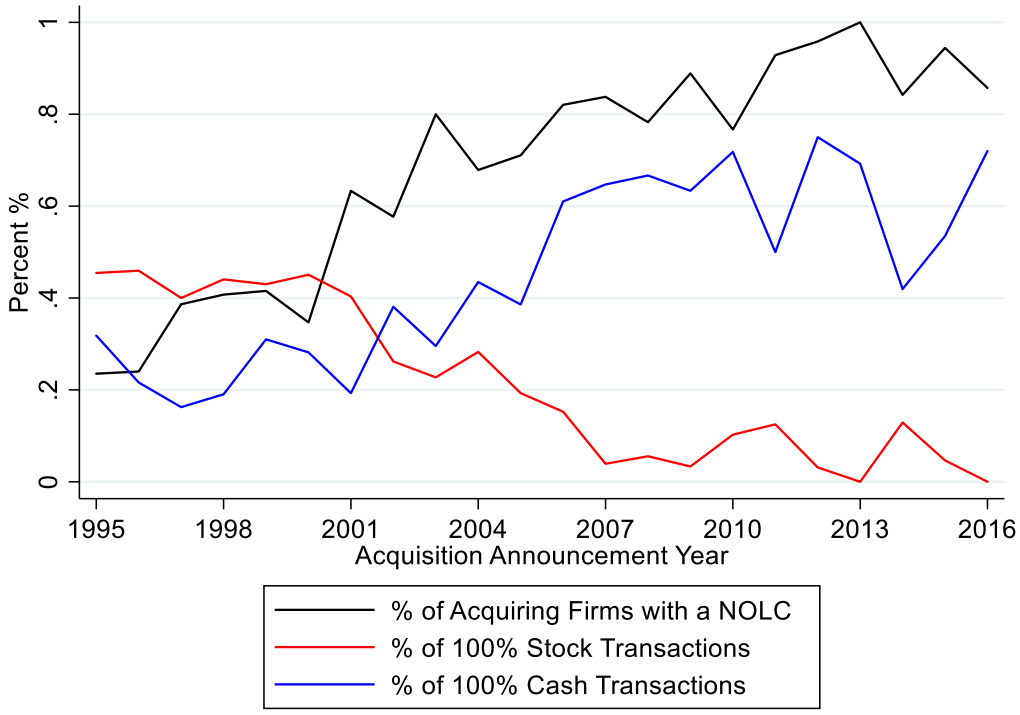
Acquirers' NOLC and Method of Payment
Aggregated by Acquisition Announcement Year

This figure presents the time-series plots of the % of acquiring firms with an aggregate net operating loss carryforward (NOLC) conditional on a non-missing NOLC value (Compustat variable: tlcf), and the % of acquisitions that are structured as either 100% stock-for-stock or 100% cash-for-stock. Deals with mixed payment are excluded.

Panel A presents a time-series plot for 690 acquisitions in my sample that are announced between 1995 and 2016 involving U.S. public acquirer and target firms.

Panel B presents a time-series plot for 1,172 acquisitions announced between 1995 and 2016 involving Canadian public acquirer and target firms.

Panel A: U.S. Acquisitions



Panel B: Canadian Acquisitions

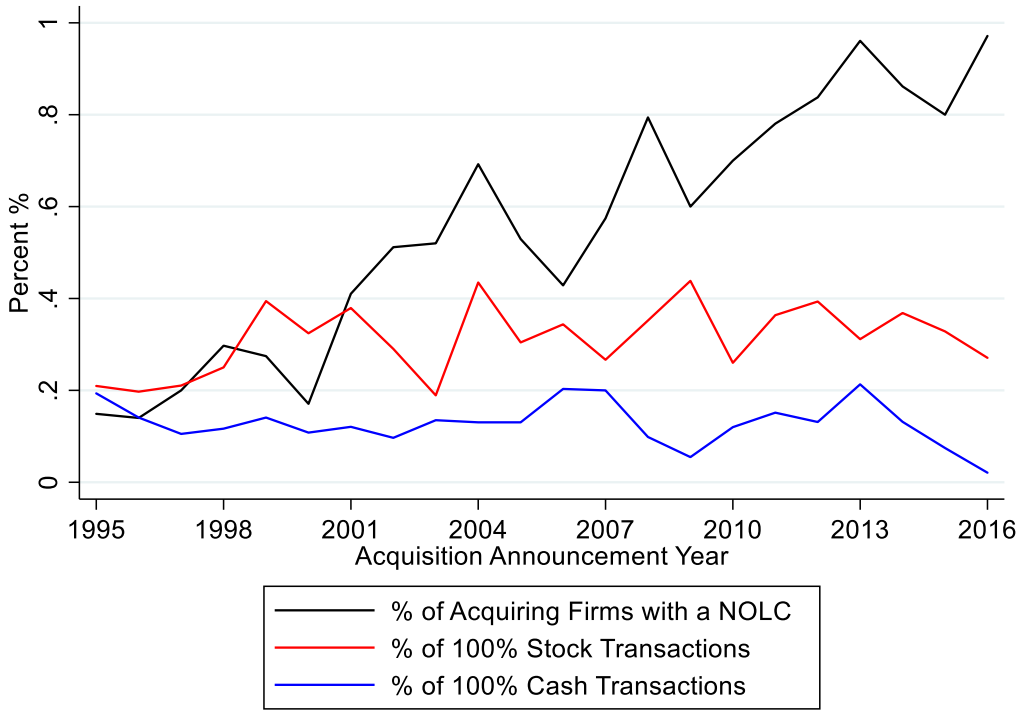


Table 1

Summary Statistics for Variables Used in Tests of Hypotheses 1 and 2

The sample includes 1,028 acquisitions involving U.S. public acquirers and targets announced between 1995 and 2016. Variable definitions and data sources are reported in Appendix C.

	Mean	S.D.	p1	p5	p10	p25	p50	p75	p90	p95	p99
Acquirer Characteristics											
MTR	0.300	0.085	0.024	0.094	0.144	0.305	0.340	0.349	0.350	0.350	0.351
Q	2.910	1.574	1.215	1.411	1.532	1.864	2.431	3.334	5.045	6.636	8.268
Return	0.027	0.483	-0.943	-0.743	-0.625	-0.298	0.035	0.275	0.593	0.927	1.300
Cash	0.131	0.188	0.001	0.005	0.009	0.025	0.067	0.167	0.309	0.428	1.147
PPE	0.260	0.239	0.016	0.035	0.054	0.095	0.179	0.340	0.604	0.758	1.249
D/E	0.291	0.262	0.000	0.000	0.000	0.052	0.258	0.432	0.647	0.782	1.204
R&D	0.033	0.051	0.000	0.000	0.000	0.000	0.016	0.042	0.085	0.132	0.303
InstOwn	0.643	0.253	0.023	0.141	0.269	0.485	0.690	0.832	0.924	0.984	1.091
Target Characteristics											
NOLC ($ millions)	77	360	0	0	0	0	8	57	151	278	1003
NOLC_mv	0.721	2.701	0.000	0.000	0.000	0.000	0.021	0.290	1.331	3.514	13.818
NOLC_d	0.611	0.488	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000
VA ($ millions)	42	228	0	0	0	0	3	29	79	145	691
VA	0.461	0.499	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000
Q	2.686	1.526	1.117	1.280	1.384	1.682	2.190	3.098	4.806	6.695	7.608
Return	-0.025	0.583	-0.982	-0.867	-0.726	-0.411	-0.066	0.263	0.635	1.050	2.149
Volatility	0.170	0.108	0.042	0.062	0.072	0.097	0.140	0.211	0.302	0.390	0.584
EBITDA_SD	0.112	0.151	0.008	0.015	0.021	0.032	0.061	0.118	0.254	0.402	0.894
Intangibles	0.166	0.316	0.000	0.000	0.000	0.000	0.040	0.194	0.469	0.715	2.061
Capex	0.067	0.115	0.001	0.003	0.006	0.013	0.030	0.070	0.144	0.252	0.752
R&D	0.086	0.171	0.000	0.000	0.000	0.000	0.025	0.087	0.221	0.365	1.062

Accruals	0.007	0.123	-0.458	-0.214	-0.118	-0.034	0.005	0.058	0.137	0.202	0.396
InstOwn	0.518	0.305	0.002	0.035	0.098	0.263	0.512	0.784	0.922	0.989	1.154
Ln(MV)	5.470	1.834	1.312	2.482	3.124	4.221	5.475	6.729	7.773	8.509	9.825
ΔMV	0.061	0.454	-0.775	-0.570	-0.428	-0.212	0.022	0.258	0.568	0.799	2.041
Deal Characteristics											
Premium	0.469	0.423	-0.370	-0.053	0.065	0.214	0.392	0.622	0.966	1.312	2.087
>0% BankFin	0.185	0.388	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000
100% BankFin	0.082	0.274	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000
Tender	0.227	0.419	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000	1.000
Competition	0.061	0.240	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000
Horizontal Deal	0.664	0.472	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000
Hostile	0.020	0.142	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000
Pooling	0.098	0.298	0.000	0.000	0.000	0.000	0.000	0.000	0.000	1.000	1.000
Relative Size	0.172	0.177	0.000	0.002	0.006	0.027	0.110	0.269	0.438	0.527	0.677
Deal Size	5.874	1.782	1.936	3.028	3.509	4.662	5.855	7.180	8.185	8.761	10.133
Taxable	0.741	0.438	0.000	0.000	0.000	0.000	1.000	1.000	1.000	1.000	1.000
CG	-4.838	6.275	-13.140	-13.140	-13.140	-7.740	-6.810	-5.490	8.940	9.290	9.290
aCAR3 (n = 946)	-0.006	0.060	-0.123	-0.123	-0.095	-0.040	-0.003	0.026	0.069	0.110	0.122
tCAR3 (n = 946)	0.255	0.246	-0.241	-0.050	0.007	0.096	0.216	0.367	0.543	0.687	1.231

Table 2

Baseline Test of Hypothesis 1
Regressions on Acquisition Premium

This table reports the coefficients from the following OLS regression:

$$Premium = \alpha + \beta_1 MTR + \beta_2 NOLC\_mv + \beta_3 MTR * NOLC\_mv + \beta_k X + \varepsilon$$

Premium = (Offer Price – Target's Stock Price $_{t\text{-}4weeks}$) / Target's Stock Price $_{t\text{-}4weeks}$.

MTR = acquirer's marginal tax rate simulated by Blouin et al. (2010).

NOLC_mv = target's federal net operating loss carryforward scaled by target's market value 4 weeks prior to the acquisition announcement.

X is a vector of the determinants of acquisition premium. The vector includes announcement year by target industry (1-digit SIC) interactions. These coefficients are not reported.

Variable definitions and data sources are reported in Appendix C.

Hypothesis 1 predicts a positive coefficient on $\beta_3 MTR * NOLC\_mv$.

In columns (2) and (3), regressions are reported on subsamples of deals conditional on the target firm's valuation allowance (*VA*). *VA* = 1 if the target's valuation allowance is greater than or equal to its federal net operating loss carryforward (NOLC) multiplied by the statutory federal corporate tax rate (35%).

The sample includes 1,024 acquisitions announced between 1995 and 2016 involving U.S. public acquirer and target firms.

t-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by target industry (2-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

± indicates one-tailed statistical significance at the 10% level if the sign of the coefficient is consistent with the prediction.

Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *NOLC_mv* conditioning on values of *MTR*.

---

	(1) ***Premium***	*VA* = 1 (2) ***Premium***	*VA* = 0 (2) ***Premium***
$\beta_1 MTR$	-0.061	0.121	-0.534*
	(-0.29)	(0.29)	(-1.88)
$\beta_2 NOLC\_mv$	-0.015	-0.006	-0.089**
	(-0.49)	(-0.17)	(-2.61)
$\beta_3 MTR * NOLC\_mv$	0.132±	0.092	0.615***
	(1.40)	(0.79)	(3.52)
Acquirer Characteristics			
Q	0.023**	0.015	0.022**
	(2.22)	(0.76)	(2.21)
Return	0.066**	0.097	0.050*
	(2.37)	(1.20)	(1.78)
Cash	-0.111	-0.139	-0.079
	(-1.20)	(-0.72)	(-0.47)
PPE	-0.173**	-0.061	-0.284***
	(-2.38)	(-0.33)	(-3.87)
D/E	0.100	0.169	0.078
	(1.41)	(1.08)	(1.00)
R&D	-0.244	-0.536	0.501
	(-0.67)	(-0.74)	(1.00)
InstOwn	-0.115*	-0.357**	-0.035
	(-1.78)	(-2.43)	(-0.54)
Target Characteristics			
Q	-0.002	0.052***	-0.026*
	(-0.12)	(3.64)	(-1.92)
Return	0.005	-0.018	-0.007
	(0.15)	(-0.51)	(-0.15)
Volatility	0.391**	0.489**	0.588*
	(2.53)	(2.34)	(1.88)
EBITDA_SD	-0.283***	-0.444***	-0.167
	(-2.89)	(-2.93)	(-0.59)
Intangibles	0.245***	0.350***	0.227**
	(3.50)	(3.64)	(2.42)
Capex	0.202	0.488	0.244
	(1.16)	(1.16)	(1.07)
R&D	0.468***	0.623**	-0.007
	(3.32)	(2.68)	(-0.05)
Accruals	-0.121	-0.071	-0.038
	(-0.82)	(-0.34)	(-0.31)
InstOwn	-0.139	-0.271	-0.119

	(-0.81)	(-0.81)	(-0.65)
Deal Characteristics			
Tender	0.088**	0.124	0.086**
	(2.29)	(1.07)	(2.53)
Competition	0.038	0.132	-0.034
	(0.83)	(1.28)	(-0.56)
Horizontal Deal	0.006	0.043	0.001
	(0.22)	(0.77)	(0.03)
Hostile	0.091*	0.230***	0.133
	(1.82)	(2.76)	(1.56)
Pooling	0.021	0.122	-0.012
	(0.49)	(0.97)	(-0.21)
Relative Size	-0.407***	-0.569***	-0.317***
	(-5.00)	(-3.56)	(-3.12)
Deal Size	0.029*	0.056***	0.021
	(1.83)	(3.14)	(1.07)
Taxable	0.109	0.091	0.016
	(1.63)	(1.05)	(0.13)
*Taxable * InstOwn*	-0.109	-0.155	-0.089
	(-0.88)	(-0.78)	(-0.49)
*CG * InstOwn*	0.023	0.012	0.008
	(1.59)	(0.53)	(0.24)
*Taxable * CG*	0.021*	0.008	0.007
	(1.72)	(0.50)	(0.33)
*Taxable * CG * InstOwn*	-0.030*	-0.012	-0.019
	(-1.87)	(-0.62)	(-0.55)
Constant	0.381***	0.884***	0.681*
	(3.07)	(4.61)	(1.99)
N	1,028	474	554
Adjusted R2	0.234	0.339	0.138
Marginal Effects		*VA* = 1	*VA* = 0
dydx(*NOLC_mv*)	(1)	(2)	(3)
at *MTR*	***Premium***	***Premium***	***Premium***
0%	-0.015	-0.006	-0.089**
	(-0.49)	(-0.17)	(-2.61)
17.5%	0.008	0.010	0.018
	(0.50)	(0.63)	(0.58)
35%	0.031***	0.026**	0.126***
	(2.37)	(2.12)	(2.44)

Table 3

Hypothesis 1 Sensitivity Test 1
Regressions on Targets' Market Value of Equity

This table reports the coefficients from cross-sectional OLS regression on the target's market value.

Column (1) estimates:

$$\ln(MV) = \alpha + \beta_1 NOLC\_ln + \beta_2 VA + \beta_3 NOLC\_ln * VA + \beta_k M + \varepsilon$$

Column (2) estimates:

$$\Delta MV = \alpha + \beta_1 NOLC\_ln + \beta_2 VA + \beta_3 NOLC\_ln * VA + \beta_k M + \varepsilon$$

Ln(MV) = natural logarithm of the target's market value of equity as of the end of the fiscal year immediately prior to the year of the acquisition announcement.

ΔMV = % change in target's market value between the end of the fiscal year immediately prior to the year of the acquisition announcement and the date 4 weeks prior to the acquisition announcement.

NOLC_ln = natural logarithm of 1 plus the target's federal net operating loss carryforward.

VA = 1 if the target's valuation allowance is greater than or equal to its federal net operating loss carryforward (*NOLC*) multiplied by the statutory federal corporate tax rate (35%).

M is a vector of the determinants of market value. The vector includes announcement year and target industry (2-digit SIC) fixed effects. These coefficients are not reported.

Variable definitions and data sources are reported in Appendix C.

The sample includes 1,003 firms that are targets in acquisitions announced between 1995 and 2016 involving U.S. public acquirer and target firms.

t-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by target industry (2-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *VA* conditioning on values of *NOLC_ln*

	(1) ***ln(MV)***	(2) ***ΔMV***
$\beta_1 NOLC\_ln$	0.109***	-0.017**
	(2.82)	(-2.18)
$\beta_2 VA$	-0.008	-0.018
	(-0.05)	(-0.37)
$\beta_3 NOLC\_ln * VA$	-0.105*	0.040**
	(-1.89)	(2.30)
Return	0.028	0.099**
	(0.38)	(2.03)
Volatility	-1.174**	0.389
	(-2.30)	(1.50)
EBITDA_SD	0.231	-0.190**
	(1.47)	(-2.38)
Intangibles	-0.018*	0.011***
	(-1.71)	(6.31)
Capex	-1.197***	-0.420***
	(-2.97)	(-4.01)
R&D	-0.678**	-0.359***
	(-2.17)	(-5.81)
Accruals	0.053	-0.216**
	(0.28)	(-2.10)
InstOwn	3.839***	-0.098
	(18.39)	(-1.62)
Constant	3.469***	0.466**
	(10.85)	(2.51)
N	1,003	1,003
Adjusted R2	0.592	0.131

Marginal Effects

dydx(*VA*) at *NOLC* ($Millions)	(1) ***ln(MV)***	(2) ***ΔMV***
$1	-0.081	0.010
	(-0.53)	(0.25)
$10	-0.261**	0.077***
	(2.38)	(3.42)
$50	-0.422***	0.138***

	(-3.21)	(4.12)
$100	-0.494***	0.165***
	(-3.17)	(3.84)
$500	-0.663***	0.229***
	(-2.90)	(3.36)
$1000	-0.736***	0.256***
	(-2.80)	(3.22)
$1500	-0.779***	0.272***
	(-2.75)	(3.16)
$2000	-0.809***	0.283***
	(-2.71)	(3.12)

Table 4

Hypothesis 1 Sensitivity Test 2
Regressions on Acquisition Announcement Returns

This table reports the coefficients from regressions on acquisition announcement returns. The following OLS model is estimated:

$$ln(1 + CAR3) = \alpha + \beta_1 MTR + \beta_2 NOLC\_ln + \beta_3 MTR * NOLC\_ln + \beta_k X + \varepsilon$$

CAR3 = three-day (-1, 1) cumulative abnormal return estimated using the market model where the model parameters are estimated in the (−210, −60) window prior to the acquisition announcement. *CAR3* is computed for the acquiring (*aCAR3*) and the target (*tCAR3*) firm.

MTR = acquirer's marginal tax rate simulated by Blouin et al. (2010).

NOLC_ln = natural logarithm of 1 plus the target's federal net operating loss carryforward.

X is a vector of the determinants of acquisition announcement returns. The vector includes announcement year by target industry (1-digit SIC) interactions. These coefficients are not reported.

The model is estimated conditional on the target firm's valuation allowance (VA).
VA = 1 if the target's valuation allowance is greater than or equal to its federal net operating loss carryforward (NOLC) multiplied by the statutory federal corporate tax rate (35%).

Variable definitions and data sources are reported in Appendix C.

The sample includes 946 acquisitions announced between 1995 and 2016 involving U.S. public acquirer and target firms. The sample is restricted to transactions for which CAR can be estimated for both the acquirer and the target firm.

t-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by industry (2-digit SIC). Standard errors are cluster by target industry in columns (1) and (2) and by acquirer industry in columns (3) and (4).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *NOLC_ln* conditioning on values of *MTR*.

	VA = 1 (1) ***ln(1+aCAR3)***	*VA* = 1 (2) ***ln(1+tCAR3)***	*VA* = 0 (3) ***ln(1+aCAR3)***	*VA* = 0 (4) ***ln(1+tCAR3)***
$\beta_1 MTR$	0.060	0.087	0.085***	-0.404**
	(0.69)	(0.27)	(4.56)	(-3.69)
$\beta_2 NOLC\_ln$	-0.001	-0.010	0.008	-0.036***
	(-0.15)	(-0.44)	(0.70)	(-5.92)
$\beta_3 MTR * NOLC\_ln$	0.007	0.004	-0.034	0.081**
	(0.63)	(0.05)	(-1.13)	(3.66)
Acquirer Characteristics				
Q	-0.002	-0.006	-0.001	0.011
	(-1.00)	(-0.63)	(-0.27)	(1.76)
Return	0.014***	0.043***	0.007	-0.012
	(9.20)	(4.16)	(0.54)	(-0.54)
Cash	-0.008	0.062	0.014	-0.117
	(-0.13)	(0.70)	(0.89)	(-1.59)
PPE	-0.011	0.008	0.020**	-0.057
	(-0.44)	(0.10)	(2.68)	(-1.66)
D/E	0.000	0.054	0.012	0.039
	(0.02)	(0.97)	(1.13)	(1.38)
R&D	-0.114	-0.346*	-0.065	0.159
	(-0.98)	(-2.11)	(-1.45)	(0.52)
InstOwn	0.007	-0.028	-0.030***	-0.047
	(0.39)	(-0.76)	(-4.36)	(-1.22)
Target Characteristics				
Q	-0.005	0.019**	-0.004	-0.015*
	(-1.83)	(3.28)	(-1.04)	(-2.03)
Return	0.005	-0.020	0.002	0.021
	(1.33)	(-1.72)	(0.53)	(1.80)
Volatility	-0.035	-0.008	0.009	0.220**
	(-0.72)	(-0.11)	(0.14)	(3.15)
EBITDA_SD	0.047	-0.046	0.008	-0.097
	(1.52)	(-1.07)	(0.41)	(-0.64)
Intangibles	-0.015	0.095***	0.008	0.116**
	(-1.65)	(3.74)	(0.62)	(3.49)
Capex	-0.015	0.088	-0.014	0.073
	(-0.26)	(0.79)	(-0.47)	(0.97)
R&D	-0.006	0.193**	0.076	0.005
	(-0.26)	(2.82)	(1.54)	(0.05)
Accruals	-0.028	0.065	-0.021	0.111**
	(-1.80)	(1.21)	(-0.79)	(2.48)

InstOwn	-0.004	0.095	0.011	-0.046
	(-0.18)	(0.80)	(0.39)	(-0.83)
Deal Characteristics				
Tender	-0.007	0.064	0.020**	0.049*
	(-0.56)	(1.91)	(2.52)	(2.21)
Competition	0.021	-0.143***	0.019	-0.059
	(1.19)	(-4.16)	(1.17)	(-1.26)
Horizontal Deal	0.001	0.001	0.003	0.002
	(0.13)	(0.06)	(0.43)	(0.26)
Hostile	-0.050*	0.079	0.016	0.068*
	(-2.07)	(1.76)	(0.64)	(2.30)
Pooling	-0.024**	0.008	-0.006	0.033
	(-3.35)	(0.19)	(-0.64)	(1.41)
Relative Size	-0.001	-0.344**	-0.048***	-0.201***
	(-0.02)	(-3.39)	(-4.56)	(-5.44)
Deal Size	-0.004	0.003	-0.001	0.001
	(-0.78)	(0.37)	(-0.52)	(0.18)
Taxable	0.010	0.050	0.001	0.031
	(0.30)	(0.50)	(0.11)	(0.71)
*Taxable * InstOwn*	0.033	-0.132	-0.001	0.036
	(1.06)	(-1.37)	(-0.03)	(0.51)
*CG * InstOwn*	0.004	0.006	0.004	-0.010
	(1.36)	(0.68)	(1.12)	(-1.27)
*Taxable * CG*	0.002	-0.003	-0.001	-0.006
	(0.66)	(-0.61)	(-0.48)	(-0.92)
*Taxable * CG * InstOwn*	-0.003	0.003	-0.002	0.007
	(-0.64)	(0.51)	(-0.42)	(0.78)
Constant	0.019	0.167*	-0.013	0.311***
	(0.81)	(2.02)	(-0.46)	(4.24)
N	420	420	526	526
Adjusted R2	0.034	0.209	0.112	0.215
Marginal Effects	*VA* = 1	*VA* = 1	*VA* = 0	*VA* = 0
dydx(*NOLC_ln*)	(1)	(2)	(3)	(4)
at *MTR*	***aCAR3***	***tCAR3***	***aCAR3***	***tCAR3***
0%	-0.0005	-0.010	0.0077	-0.0358***
	(-0.15)	(-0.44)	(0.70)	(-5.92)
17.5%	0.0007	-0.0094	0.0017	-0.0217***
	(0.41)	(-1.05)	(0.30)	(-7.05)
35%	0.0020*	-0.0087	-0.0043***	-0.0076***
	(1.86)	(-0.76)	(-3.35)	(-2.18)

Table 5

Baseline Test of Hypothesis 2
Regressions on Acquisition Financing

This table reports the coefficients from regressions on acquisition financing. The baseline test, reported in column (1) is estimated with the following probit regression:

$$\Pr(> 0\%\ BankFin) = \alpha + \beta_1 NOLC\_d + \beta_2 MTR + \beta_k Z + \varepsilon$$

>0% BankFin = 1 if the deal is financed with any amount of bank debt.

NOLC_d = 1 if the target has a federal net operating loss carryforward (*NOLC*).

MTR = acquirer's marginal tax rate simulated by Blouin et al. (2010).

Z is a vector of the determinants of acquisition financing. The vector includes announcement year by target industry (1-digit SIC) interactions. These coefficients are not reported.

Variable definitions and data sources are reported in Appendix C.

Hypothesis 2 predicts a negative coefficient on $\beta_1 NOLC\_d$.

The sample includes 1,024 acquisitions announced between 1995 and 2016 involving U.S. public acquirer and target firms.

In column (2), the dependent variable *100% BankFin* is equal to 1 if the transaction is 100% debt financed and 0 otherwise.
In column (3), the dependent variable *100% BankFin* is equal to 1 if the transaction is 100% debt financed and 0 if the transaction is financed 100% with internal cash.
In column (4), the baseline regression is estimated with the interaction of *NOLC_d* and *MTR*.

z-statistics (*t-statistics*) are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by acquirer industry (2-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

Marginal effects are reported at the bottom of the table. In columns (1) - (3), the marginal effect is computed as the partial derivative of the regression equation with respect to *NOLC_d*. In column (4), the marginal effect is computed as the partial derivative of the regression equation with respect to *NOLC_d* conditional on values of *MTR*.

	(1) *>0% BankFin*	(2) *100% Bankfin*	(3) *100% BankFin*	(4) *>0% BankFin*
MTR	1.237	3.051**	0.259	1.954
	(0.88)	(2.21)	(0.06)	(1.18)
NOLC_d	-0.403**	-0.493***	-1.953***	-0.060
	(-2.52)	(-2.66)	(-4.50)	(-0.10)
*MTR*NOLC_d*				-1.078
				(-0.57)
Acquirer Characteristics				
Q	-0.026	-0.045	-0.042	-0.029
	(-0.49)	(-0.67)	(-0.30)	(-0.55)
Return	0.001	-0.140	-0.336	0.012
	(0.01)	(-0.69)	(-0.43)	(0.07)
Cash	-0.379	-0.151	-4.439**	-0.394
	(-0.61)	(-0.25)	(-2.40)	(-0.63)
PPE	0.294	0.745**	3.426**	0.296
	(0.93)	(2.41)	(2.22)	(0.93)
D/E	0.068	0.445	-0.273	0.063
	(0.21)	(1.08)	(-0.31)	(0.19)
R&D	2.941	1.596	16.933**	2.957
	(1.05)	(1.00)	(2.48)	(1.04)
InstOwn	0.231	-0.284	0.679	0.209
	(0.69)	(-0.58)	(0.65)	(0.59)
Target Characteristics				
Q	-0.089	-0.260***	0.612**	-0.088
	(-1.26)	(-2.88)	(2.32)	(-1.27)
Return	-0.008	-0.096	-0.779***	-0.014
	(-0.06)	(-0.51)	(-3.02)	(-0.10)
Volatility	-0.499	-1.787**	-0.574	-0.507
	(-0.42)	(-2.29)	(-0.10)	(-0.43)
EBITDA_sd	-3.154*	-0.962	1.588	-3.131*
	(-1.68)	(-0.72)	(0.48)	(-1.68)
Intangibles	0.341	0.866***	4.397***	0.339
	(1.05)	(2.66)	(2.98)	(1.05)
Capex	1.401*	-0.022	6.153*	1.376*
	(1.76)	(-0.03)	(1.81)	(1.70)
R&D	-1.374	-0.052	6.077	-1.406
	(-1.53)	(-0.11)	(1.21)	(-1.53)
Accruals	1.536**	1.295	0.483	1.541**
	(2.34)	(1.54)	(0.44)	(2.41)

InstOwn	-4.363**	-2.774**	1.367	-4.408**
	(-2.42)	(-2.55)	(1.61)	(-2.38)
Deal Characteristics				
Tender	0.299*	0.171	-0.815***	0.301*
	(1.93)	(0.65)	(-2.61)	(1.93)
Competition	-0.749***	-0.080	-1.584**	-0.746***
	(-2.83)	(-0.28)	(-2.36)	(-2.79)
Horizontal Deal	0.692***	0.766***	0.626	0.692***
	(4.66)	(3.64)	(1.58)	(4.65)
Hostile	-0.280	-0.758**	-1.214	-0.274
	(-0.54)	(-2.25)	(-1.19)	(-0.53)
Pooling	-0.186	-0.453*	-0.004	-0.193
	(-0.54)	(-1.76)	(-0.00)	(-0.56)
Relative Size	3.072***	1.222**	3.483*	3.082***
	(4.94)	(2.19)	(1.93)	(4.96)
Deal Size	0.238***	0.026	-0.084	0.238***
	(3.40)	(0.37)	(-0.57)	(3.40)
Taxable	2.896***	-0.106		2.855***
	(3.77)	(-0.16)		(3.64)
*Taxable * InstOwn*	4.481**	2.996**		4.518**
	(2.43)	(2.37)		(2.41)
*CG * InstOwn*	-0.568*	-0.039	0.097	-0.559*
	(-1.74)	(-0.27)	(0.94)	(-1.70)
*Taxable * CG*	-0.629***	-0.013		-0.621***
	(-2.79)	(-0.13)		(-2.70)
*Taxable*CG*InstOwn*	0.649**	0.089		0.639*
	(2.00)	(0.58)		(1.95)
Constant	-0.927	-2.373	-6.590***	-1.145
	(-0.49)	(-1.36)	(-3.61)	(-0.62)
N	866	613	139	866
Pseudo R2	0.451	0.366	0.450	0.451

Marginal Effects

	(1)	(2)	(3)	(5)
	>0% BankFin	***100% Bankfin***	***100% BankFin***	***>0% BankFin***
dydx(*NOLC_d*)	-0.064**	-0.068**	-0.332***	
	(-2.49)	(-2.83)	(-5.80)	
dydx(*MTR*)				
(a) at MTR = 0%	0.154	0.041	0.229	
(b) at MTR = 35%	0.219	0.150	0.244	

(b) – (a)	0.065	0.109***	0.015	
	(0.96)	(3.19)	(0.06)	
dydx(*NOLC_d*) at *MTR*				
0%				-0.008
				(-0.10)
5%				-0.016
				(-0.23)
10%				-0.024
				(-0.41)
15%				-0.033
				(-0.70)
20%				-0.042
				(-1.15)
25%				-0.051*
				(-1.86)
30%				-0.061**
				(-2.47)
35%				-0.071**
				(-2.34)

Table 6

Hypothesis 2 Sensitivity Test 1
Regression on Acquisition Financing During the 2007-2009 Debt Crisis

---

This table reports the coefficients from the following OLS regression:

$$> 0\%\ BankFin = \alpha + NOLC\_d + \sum_i YQ_i + NOLC\_d * \sum_i YQ_i + \beta_k Z + \varepsilon$$

>0% BankFin = 1 if the transaction is financed with any amount of bank debt.

NOLC_d = 1 if the target has a federal net operating loss carryforward.

YQ = indexes quarterly periods for acquisitions announced between 2006 and 2009.
The coefficients are estimated with respect to 2006 Q1 as the base.

Z is a vector of the determinants of acquisition financing. These coefficients are not reported.

Variable definitions and data sources are reported in Appendix C.

The sample includes 176 acquisitions announced between 2006 and 2009 involving U.S. public acquirer and target firms.

t-statistics are estimated using heteroskedasticity-robust standard errors clustered by acquirer industry (1-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

	>0% BankFin	
	Coefficient	*t-statistic*
NOLC_d	0.270	(1.80)
2006 Q2	0.073	(0.42)
2006 Q2 * *NOLC_d*	0.050	(0.16)
2006 Q3	0.506**	(2.67)
2006 Q3 * *NOLC_d*	-0.369	(-1.89)
2006 Q4	0.207	(1.05)
2006 Q4 * *NOLC_d*	-0.193	(-0.74)
2007 Q1	0.567**	(2.94)
2007 Q1 * *NOLC_d*	-0.589**	(-2.62)
2007 Q2	-0.016	(-0.08)
2007 Q2 * *NOLC_d*	-0.029	(-0.13)
2007 Q3	0.581*	(2.26)
2007 Q3 * *NOLC_d*	-0.881**	(-2.76)
2007 Q4	0.549**	(2.78)
2007 Q4 * *NOLC_d*	-0.698***	(-5.47)
2008 Q1	0.520	(0.85)
2008 Q1 * *NOLC_d*	-1.103***	(-4.31)
2008 Q2	-0.146	(-0.29)
2008 Q2 * *NOLC_d*	-0.463	(-1.40)
2008 Q3	0.364	(0.86)
2008 Q3 * *NOLC_d*	-0.638*	(-2.25)
2008 Q4	-0.602	(-0.85)
2008 Q4 * *NOLC_d*	-0.125	(-0.72)
2009 Q1	-0.519	(-0.86)
2009 Q1 * *NOLC_d*	-	-
2009 Q2	-0.618	(-0.82)
2009 Q2 * *NOLC_d*	0.080	(0.16)

2009 Q3	-0.449	(-1.00)
2009 Q3 * *NOLC_d*	-0.015	(-0.13)
2009 Q4	-0.547	(-1.12)
2009 Q4 * *NOLC_d*	0.173	(0.51)
Constant	-0.933*	(-2.04)
N	176	
Adjusted R2	0.261	

Table 7

Hypothesis 2 Sensitivity Test 2
Acquirers' Choice of Tax Shield Conditional on Acquirers' Credit Rating

---

This table reports the coefficients from a regression on the acquirer's choice between acquiring an NOLC target and obtaining debt financing via bank loan. The following probit model is estimated:

$$\Pr(NOLCvsBankFin) = \alpha + \beta_1 Rated + \beta_2 MTR + \beta_3 MTR * Rated + \beta_k Z + \varepsilon$$

NOLC_vs_BankFin = 1 if the target has a federal net operating loss carryforward (*NOLC*) and the acquirer does not obtain bank financing; and 0 if the target does not have an *NOLC* and the acquirer obtains bank financing.

Rated = 1 if the acquirer has a Standard & Poor's Domestic Long Term Issuer Credit Rating (Compustat variable: splticrm).

MTR = acquirer's marginal tax rate simulated by Blouin et al. (2010).

Z is a vector of the determinants of acquisition financing. Acquirer industry fixed effects (1-digit SIC) are included in columns (2) and (3).

Variable definitions and data sources are reported in Appendix C.

The sample includes 66 acquisitions announced in 2007 and 2008 involving U.S. public acquirer and target firms. Deals are removed from the sample if 1) the target has a federal NOLC and the acquirer obtains bank financing, or 2) the target does have a federal NOLC and the acquirer does not obtain bank financing. In 36 of the 66 deals, *Rated* = 1.

t-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by acquirer industry (1-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *Rated* conditioning on values of MTR.

---

	(1)	(2)	(3)
	NOLC_vs_BankFin	***NOLC_vs_BankFin***	***NOLC_vs_BankFin***
Rated	0.961***	3.406***	-1.548
	(5.63)	(3.88)	(-0.04)
MTR	-28.327***	-60.552	-70.075
	(-3.05)	(-0.89)	(-0.53)
*MTR * Rated*			14.496
			(0.12)
Q	0.075	0.042	0.063
	(0.22)	(0.09)	(0.16)
Return	-1.828	-4.944**	-4.938**
	(-1.59)	(-2.21)	(-2.26)
Cash	2.727***	10.899***	11.052***
	(3.78)	(4.63)	(4.27)
PPE	-1.864	-3.410	-3.496
	(-1.32)	(-1.02)	(-1.10)
D/E	-1.924	-1.348	-1.303
	(-1.26)	(-1.01)	(-1.16)
R&D	0.389	1.676**	1.716**
	(0.64)	(2.00)	(2.00)
InstOwn	-1.767	-2.089**	-2.114**
	(-1.31)	(-2.27)	(-2.06)
Deal Size	-0.365***	-0.885***	-0.878***
	(-2.95)	(-4.36)	(-4.15)
Constant	13.597***	24.482	27.682
	(2.80)	(1.06)	(0.62)
N	66	66	66
Pseudo R2	0.412	0.586	0.586

Marginal Effects

	(1)	(2)	(3)
	NOLC_vs_BankFin	***NOLC_vs_BankFin***	***NOLC_vs_BankFin***
dydx(*Rated*)	0.175***	0.440***	
	(5.05)	(7.02)	
dydx(*Rated*) at *MTR*			

30%	0.083
	(0.36)
33%	0.347
	(1.45)
34%	0.436***
	(5.80)
35%	0.500***
	(2.68)

Table 8

Summary Statistics for Variables Used in Additional Tests

This table reports summary statistics for variables used in empirical tests discussed in Chapter 7 and reported in Tables 9 through 11. The sample includes 489 acquisitions involving U.S. public acquirers and targets announced between 1995 and 2016. Variable definitions and data sources are reported in Appendix C.

Panel A: Summary Statistics

	Mean	S.D.	p1	p25	p50	p75	p99
Acquirer Characteristics							
MTR	0.287	0.096	0.020	0.269	0.338	0.348	0.351
Q	3.054	1.682	1.236	1.917	2.510	3.563	8.268
PPE	0.247	0.239	0.014	0.081	0.159	0.318	1.353
D/E	0.259	0.253	0.000	0.013	0.218	0.407	1.090
Rated	0.483	0.500	0.000	0.000	0.000	0.000	1.000
InstOwn	0.628	0.251	0.024	0.457	0.669	0.828	1.067
Target Characteristics							
NOLC ($ millions)	110.28	219.01	0.963	16.86	49.00	112.30	1482.00
NOLC_ln	3.787	1.386	0.674	2.882	3.912	4.730	7.302
Q	2.726	1.612	1.117	1.635	2.188	3.106	7.608
Forecast_Error	0.913	1.032	0.000	0.000	0.547	1.514	4.047
Analyst	2.243	1.521	0.000	0.693	2.565	3.401	4.977
AAER	0.053	0.225	0.000	0.000	0.000	0.000	1.000

Deal Characteristics							
Completed	0.883	0.321	0.000	1.000	1.000	1.000	1.000
Target_382Limit_AnnDate	3.308	9.271	0.032	0.235	0.811	2.750	38.145
Target_Δ382Limit_%	0.375	0.446	-0.414	0.120	0.313	0.536	2.316
Target_Δ382Limit_d	0.162	0.368	0.000	0.000	0.000	0.000	1.000
BondFin	0.092	0.289	0.000	0.000	0.000	0.000	1.000
>0% BankFin	0.121	0.326	0.000	0.000	0.000	0.000	1.000
Month<=1	0.157	0.365	0.000	0.000	0.000	0.000	1.000
AllStock	0.311	0.463	0.000	0.000	0.000	1.000	1.000
aCAR3	-0.012	0.086	-0.267	-0.046	-0.007	0.026	0.223
tCAR3	0.267	0.303	-0.276	0.092	0.221	0.376	1.396
Tender	0.241	0.428	0.000	0.000	0.000	0.000	1.000
Competition	0.057	0.233	0.000	0.000	0.000	0.000	1.000
Horizontal Deal	0.665	0.473	0.000	0.000	1.000	1.000	1.000
Hostile	0.016	0.127	0.000	0.000	0.000	0.000	1.000
Pooling	0.096	0.295	0.000	0.000	0.000	0.000	1.000
Relative Size	0.160	0.177	0.000	0.019	0.088	0.248	0.687
Deal Size	5.618	1.717	2.109	4.342	5.592	6.827	9.605

Panel B: Statistics Tabulated by Deal Completion and Δ382Limit

Completed	=	1		0		1		0	
Δ382Limit_Target_d	=	1		1		0		0	
		Mean	Median	Mean	Median	Mean	Median	Mean	Median
Δ382Limit_Target_% * (-1)		-17	-13	-16	-10	48	37	43	30
MTR (%)		22	27	21	20	30	34	29	33
NOLC ($ millions)		89	58	75	64	105	48	221	46
BankFin ($ millions)		202	0	238	0	273	0	368	0
BondFin ($ millions)		179	0	76	0	172	0	6	0
N		58		21		374		36	

Panel C: Cross-tabulation of BankFin and BondFin

		BondFin (N)		
		0	1	
>0% BankFin (N)	0	396	34	430
	1	48	11	459
		444	45	489

Table 9

Probability of Deal Completion
Conditional on the Change in the Target's §382 Loss Limit

This table reports the coefficients from the following probit regression:

$$\Pr(Completed) = \alpha + \beta_1 NOLC\_ln + \beta_2 Target\_\Delta 382Limit\_d + \beta_3 NOLC\_ln * Target\_\Delta 382Limit\_d + \beta_k C + \varepsilon$$

Completed = 1 if the transaction is completed and 0 if it is withdrawn.

NOLC_ln = natural logarithm of 1 plus the target's federal net operating loss carryforward.

Target_Δ382Limit_d = 1 if the change in the target's §382 loss limit is negative.

The change in the §382 loss limit is computed as:

$$Target\_\Delta 382Limit = [(FLTR_{ClosingDate} * MV_{ClosingDate}) - (FLTR_{AnnDate} * MV_{AnnDate})]$$

Where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the target's market value as of the date on which the transaction closes. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date.

C is a vector of the determinants of acquisition completion. Columns (1) and (3) include announcement year and target industry (1-digit SIC) fixed effects. Columns (2) and (4) include announcement year by target industry (1-digit SIC) interactions. These coefficients are not reported.

Variable definitions and data sources are reported in Appendix C.

The sample includes 489 acquisitions involving U.S. public acquirers and targets announced between 1995 and 2016. The sample is restricted to transactions in which the target's *NOLC* is greater than the target's offer date §382 loss limit ($FLTR_{AnnDate} * MV_{AnnDate}$).

In columns (3) and (4), *Target_Δ382Limit_d* is replaced with (*Target_Δ382Limit_%* *-1) which is equal to *Target_Δ382Limit* scaled by ($FLTR_{AnnDate} * MV_{AnnDate}$) and multiplied by negative one.

z-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by target industry (1-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *Target_Δ382Limit_d* conditioning on values of *NOLC_ln*. Marginal effects for the regressions reported in columns (3) and (4) are presented in Figure 3.

	(1) ***Completed***	(2) ***Completed***	(3) ***Completed***	(4) ***Completed***
NOLC_ln	-0.046	-0.153**	-0.222***	-0.432**
	(-0.56)	(-2.53)	(-3.19)	(-2.41)
Target_Δ382Limit_d	0.068	0.664		
	(0.12)	(0.65)		
*NOLC_ln * Target_Δ382Limit_d*	-0.190	-0.462		
	(-1.47)	(-1.60)		
(*Target_Δ382Limit_%* * -1)			0.306	1.659
			(0.57)	(1.27)
NOLC_ln(*Target_Δ382Limit_%* * -1)			-0.293**	-0.636**
			(-1.98)	(-2.15)
Acquirer Characteristics				
MTR	0.496	1.024	0.750	0.712
	(0.44)	(0.94)	(0.62)	(0.49)
Q	-0.051	-0.055	-0.047	-0.098***
	(-0.90)	(-0.81)	(-0.71)	(-2.78)
InstOwn	-0.774	-1.409**	-0.773	-1.033*
	(-1.51)	(-2.40)	(-1.53)	(-1.91)
Target Characteristics				
Q	0.154*	0.268***	0.213**	0.244***
	(1.88)	(3.43)	(2.40)	(5.60)
Forecast_Error	-0.218***	-0.057	-0.208***	-0.077
	(-3.17)	(-0.38)	(-2.80)	(-0.46)
Analyst	0.146*	0.063	0.112	0.109
	(1.71)	(0.31)	(0.90)	(0.59)
AAER	-0.782***	-1.237***	-0.749**	-1.273***
	(-3.62)	(-3.18)	(-2.23)	(-3.01)
Deal Characteristics				
AllStock	-0.385**	-0.661*	-0.438***	-0.773**
	(-2.50)	(-1.72)	(-3.23)	(-2.32)
aCAR3	0.559	3.636***	1.291	3.195***
	(0.83)	(4.78)	(1.39)	(3.83)
tCAR3	-0.033	-0.113	-0.179	-0.150
	(-0.08)	(-0.33)	(-0.38)	(-0.61)
>0% BankFin	0.639***	1.711***	1.060***	1.923***
	(2.75)	(4.03)	(5.62)	(3.52)
Tender	-0.051	-0.197	-0.032	-0.314
	(-0.27)	(-0.43)	(-0.13)	(-0.79)

Competition	-1.602***	-3.265***	-1.925***	-3.282***
	(-4.15)	(-4.51)	(-5.24)	(-4.54)
Horizontal Deal	0.086	0.399**	0.268	0.390*
	(0.58)	(2.23)	(1.47)	(1.68)
Hostile	-1.296	-2.862**	-1.891*	-2.763***
	(-1.15)	(-2.52)	(-1.78)	(-2.63)
Pooling	1.107**	1.646**	0.903*	1.575*
	(1.99)	(2.29)	(1.82)	(1.94)
Relative_Size	-2.374***	-3.438**	-2.558***	-3.699**
	(-3.02)	(-2.36)	(-2.63)	(-2.24)
Deal Size	-0.221**	-0.315**	-0.253**	-0.317**
	(-2.49)	(-2.56)	(-2.38)	(-2.31)
Constant	3.299***	2.780***	7.056***	3.302***
	(3.48)	(9.24)	(4.94)	(3.32)
N	489	277	489	277
Pseudo R2	0.415	0.541	0.520	0.433

Marginal Effects

dydx(*Target_Δ382Limit_d*) at *NOLC* ($ millions)	(1) ***Completed***	(2) ***Completed***
$10	-0.040	-0.048
	(-1.42)	(-1.15)
$50	-0.077***	-0.148***
	(-7.04)	(-9.11)
$100	-0.096***	-0.196***
	(-7.33)	(-5.14)
$500	-0.144***	-0.303***
	(-3.25)	(3.69)
$1000	-0.165***	-0.348***
	(-2.75)	(-3.50)
$1500	-0.178**	-0.374***
	(-2.56)	(-3.38)
$2000	-0.187**	-0.393***
	(-2.45)	(-3.27)

Table 10

Probability of Bond Issuance and Deal Completion Conditional on the Change in the Target's §382 Loss Limit

This table reports the coefficients from the following probit regressions, which are estimated jointly using a seemingly unrelated regression (SUR) model that applies the generalized least squares estimator:

$$\Pr(BondFin) = \alpha + \beta_3 NOLC\_ln * Target\_\Delta 382Limit\_d + \beta_k Z + \varepsilon$$

$$\Pr(Completed) = \alpha + \gamma_7 NOLC\_ln * Target\_\Delta 382Limit\_d * BondFin + \beta_k C + \varepsilon$$

Both equations include main effects and lower order interactions.

BondFin = 1 if the acquirer issues bonds between the acquisition announcement and closing date. The closing date is the date on which the transaction is either completed or withdrawn.

Completed = 1 if the transaction is completed and 0 if it is withdrawn.

NOLC_ln = natural logarithm of 1 plus the target's federal net operating loss carryforward.

Target_Δ382Limit_d = 1 if the change in the target's §382 loss limit is negative.

The change in the §382 loss limit is computed as:

Target_Δ382Limit = [($FLTR_{ClosingDate}$ * $MV_{ClosingDate}$) - ($FLTR_{AnnDate}$ * $MV_{AnnDate}$)]

Where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the target's market value as of the date on which the transaction closes. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date.

Z and *C* are vectors of the determinants of acquisition financing and acquisition completion, respectively. Both vectors include announcement year and acquirer industry (1-digit SIC) fixed effects.

Variable definitions and data sources are reported in Appendix C.

The sample includes 489 acquisitions involving U.S. public acquirers and targets announced between 1995 and 2016. The sample is restricted to transactions in which the target's *NOLC* is greater than the target's announcement date §382 loss limit ($FLTR_{AnnDate}$ * $MV_{AnnDate}$).

z-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by target industry (1-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

Marginal effects are reported in Figure 4.

	(1) ***BondFin***	(2) ***Completed***
NOLC_ln	-0.135** (-2.33)	-0.033 (-0.35)
Target_Δ382Limit_d	-3.017*** (-5.73)	0.956 (0.93)
*NOLC_ln * Target_Δ382Limit_d*	0.642*** (4.22)	-0.401 (-1.58)
BondFin		-3.749*** (-3.78)
*NOLC_ln * BondFin*		1.645*** (4.94)
*Target_Δ382Limit_d * BondFin*		-64.425*** (-8.61)
*NOLC_ln * Target_Δ382Limit_d * BondFin*		17.347*** (8.18)
Acquirer Characteristics		
MTR	0.826 (0.47)	-0.129 (-0.10)
Rated	-1.097** (-2.22)	0.456 (1.20)
*MTR * Rated*	3.963*** (4.38)	-0.310 (-0.15)
PPE	1.125** (2.48)	1.689 (3.77) ***
D/E	0.736** (2.16)	-0.959 (-2.82) ***
Q	-0.133 (-1.55)	-0.078 (-0.97)
InstOwn	0.849** (2.15)	-0.473 (-0.76)
Target Characteristics		
Q	0.064*** (3.19)	0.223*** (2.66)
Forecast_Error	0.179***	-0.259***

	(3.10)	(-3.45)
Analyst	-0.079	0.146
	(-0.66)	(1.48)
AAER	-0.328	-0.876**
	(-0.50)	(-2.34)
Deal Characteristics		
>0% BankFin	0.152	0.755**
	(0.37)	(2.40)
AllStock	0.078	-0.148
	(0.37)	(-0.80)
aCAR3	-1.606***	1.252
	(-2.81)	(1.44)
tCAR3	-0.330	0.156
	(-0.79)	(0.43)
Tender	-0.277	0.120
	(-0.98)	(0.76)
Competition	0.145	-1.826***
	(0.35)	(-3.46)
Horizontal Deal	0.114	0.073
	(0.40)	(0.49)
Hostile		-1.149
		(-1.19)
Pooling	-0.629*	1.600***
	(-1.65)	(4.81)
Relative_Size	-0.030	-2.815***
	(-0.04)	(-2.61)
Deal Size	0.258**	-0.306**
	(2.20)	(-2.01)
Constant	-3.452***	2.189*
	(-2.81)	(1.75)
N	489	489
Pseudo R2	0.299	0.477

Table 11

Timing of Deal Closing
Conditional on the Target's Acquisition Announcement Date §382 Loss Limit

---

This table reports the coefficients from the following probit regression:

$$\Pr(Completed|month \leq 1) = \alpha + \beta_1 NOLC\_ln + \beta_2 Target\_382Limit\_AnnDate + \beta_3 NOLC\_ln * Target\_382Limit\_AnnDate + \beta_k C + \varepsilon$$

Completed | month ≤ 1 = 1 if the deal closes in the same month as the month of the initial announcement date or in the subsequent month.

NOLC_ln = natural logarithm of 1 plus the target's federal net operating loss carryforward.

Target_382limit_AnnDate = natural logarithm of 1 plus the target's acquisition announcement date §382 loss limit. The loss limit is computed as:

$$(FLTR_{AnnDate} * MV_{AnnDate})$$

Where $FLTR_{AnnDate}$ is the adjusted federal long-term tax-exempt rate and $MV_{AnnDate}$ is the target's market value. Both are computed as of 4-weeks prior to the initial acquisition announcement date.

C is a vector of the determinants of acquisition completion. The vector includes announcement year and acquirer industry (1-digit SIC) fixed effects.

Variable definitions and data sources are reported in Appendix C.

The sample includes 419 acquisitions involving U.S. public acquirers and targets announced between 1995 and 2016. The sample is restricted to transactions in which the target's *NOLC* is greater than the target's announcement date §382 loss limit ($FLTR_{AnnDate} * MV_{AnnDate}$), and for which there is sufficient within industry (1-digit SIC) and year variation in *Completed | month<=1*.

z-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by target industry (1-digit SIC). *, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *Target_382limit_AnnDate* conditioning on values of *NOLC_ln*.

---

	(1) ***Completed | month<=1***
NOLC_ln	-0.177*** (-4.27)
Target_382Limit_AnnDate	-0.884** (-2.16)
*NOLC_ln * Target_382Limit_AnnDate*	0.189*** (2.66)
Acquirer Characteristics	
MTR	0.774 (0.71)
Q	0.032 (0.36)
InstOwn	0.461 (1.01)
Target Characteristics	
Q	0.146*** (5.90)
Forecast_Error	0.096*** (3.41)
Analyst	0.108** (2.39)
AAER	0.383 (0.84)
Deal Characteristics	
AllStock	-0.632** (-1.96)
aCAR3	-0.125 (-0.18)
tCAR3	0.035 (0.21)
>0% BankFin	-0.391 (-1.01)
Tender	1.309*** (2.72)
Competition	-0.113 (-0.83)
Horizontal Deal	-0.110 (-1.36)
Hostile	0.579** (2.57)

Pooling	-
Relative_Size	0.850
	(1.61)
Deal Size	-0.116
	(-1.25)
Constant	-0.506
	(-0.83)
N	419
Pseudo R2	0.325

Marginal Effects

	(1)
dydx(*Target_382limit_AnnDate*)	***Completed | month<=1***
at *NOLC* ($ millions) =	
$10	-0.073*
	(-1.88)
$50	-0.023
	(-0.92)
$100	-0.002
	(-0.09)
$500	0.048***
	(2.61)
$1000	0.069***
	(2.86)
$1500	0.081***
	(2.85)
$2000	0.089***
	(2.82)

Table 12

Probability of Triggering an §382 Ownership Change Conditional on the Acquirer's Tax Attributes

This table reports the coefficients from the following probit regression:

$$\Pr(Acquirer\_382\_Trigger) = \alpha + \beta_1 TLCF\_d + \beta_k X + \varepsilon$$

Acquirer_382_Trigger = 1 if the estimated value of the stock consideration in the deal is equal to at least 50% of the acquirer's market value 4 weeks prior to the acquisition announcement.

TLCF_d = 1 if the acquirer has an aggregate net operating loss carryforward (Compustat variable: tlcf).

Z is a vector of the determinants of acquisition financing. Column (1) includes announcement year and acquirer industry (1-digit SIC) fixed effects. Column (2) includes announcement year by acquirer industry (1-digit SIC) interactions. These coefficients are not reported.

The sample includes 500 acquisitions involving U.S. public acquirers and targets announced between 1995 and 2016. The sample is restricted to transactions in which the acquirer's aggregate net operating loss as reported in Compustat is non-missing. *TLCF_d* is equal to 1 in 319 deals and 0 in 181 deals.

z-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by acquirer industry (1-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively

Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *TLCF_d*.

	(1)	(2)
	Acquirer_382_Trigger	***Acquirer_382_Trigger***
TLCF_d	-0.517**	-2.968***
	(-2.14)	(-4.48)
Acquirer Characteristics		
MTR	-6.690***	-22.310***
	(-7.33)	(-5.41)
Q	0.065	0.874**
	(1.01)	(2.11)
Return	-0.600**	-4.589***
	(-2.57)	(-3.19)
Cash	1.155*	5.800
	(1.79)	(1.58)
PPE	-1.502**	-2.392*
	(-2.26)	(-1.81)
D/E	0.366	-0.861
	(0.86)	(-0.84)
R&D	9.967***	52.668***
	(6.55)	(3.59)
InstOwn	0.557	2.403**
	(0.75)	(2.52)
Target Characteristics		
NOLC_d	0.497***	1.374**
	(2.89)	(2.04)
Q	-0.034	-0.633
	(-0.90)	(-1.62)
Return	-0.166	1.970**
	(-0.59)	(2.05)
Volatility	-1.622	-6.876**
	(-0.98)	(-2.52)
EBITDA_SD	-1.540***	-6.018***
	(-4.74)	(-2.81)
Intangibles	0.859*	7.703***
	(1.79)	(6.93)
Capex	-2.001	-26.161***
	(-1.29)	(-2.99)
R&D	-6.212***	-29.407***
	(-5.55)	(-3.14)
Accruals	-2.384*	-14.384***
	(-1.73)	(-3.37)
InstOwn	-2.087***	-12.901*
	(-2.89)	(-1.94)
Deal Characteristics		

Tender	-	1.390**
		(2.27)
Competition	0.537	-2.141***
	(1.18)	(-2.82)
Horizontal Deal	-0.036	-
	(-0.16)	
Hostile	-	0.289
		(0.69)
Pooling	0.272	30.682***
	(0.89)	(3.45)
Relative Size	9.943***	0.982**
	(8.02)	(2.08)
Deal Size	0.330***	-12.127**
	(3.00)	(-2.24)
Taxable	-2.941***	1.390**
	(-5.68)	(2.27)
*Taxable * InstOwn*	0.123	5.884
	(0.16)	(1.38)
*CG * InstOwn*	-0.015	-0.494
	(-0.40)	(-1.13)
*Taxable * CG*	0.016	0.115
	(0.40)	(0.89)
*Taxable * CG * InstOwn*	-0.186***	-0.433***
	(-2.93)	(-5.15)
Constant	43.394	65.358
	(0.44)	(0.74)
N	500	317
Pseudo R2	0.665	0.834

Marginal Effects

	(1)	(2)
	Acquirer_382_Trigger	***Acquirer_382_Trigger***
dydx(*TLCF_d*)	-0.040**	-0.152***
	(-1.99)	(-4.86)

Table 13

Probability of Deal Completion
Conditional on the Change in the Acquirer's §382 Loss Limit

This table reports the coefficients from the following probit regression:

$$\Pr(Completed) = \alpha + TLCF\_ln * Acquirer\_\Delta 382Limit\_d\ * Acquirer\_382\_Trigger + \beta_k C + \varepsilon$$

The model includes main effects and lower order interactions.

Completed = 1 if the transaction is completed and 0 if it is withdrawn.

TLCF_ln = natural logarithm of 1 plus the acquirer's aggregate net operating loss carryforward (Compustat variable: tlcf)).

Acquirer_382_Trigger = 1 if the estimated value of the stock consideration in the deal is equal to at least 50% of the acquirer's market value 4 weeks prior to the acquisition announcement.

Acquirer_Δ382Limit_d = 1 if the change in the acquirer's §382 loss limit is negative. The change in the acquirer's §382 loss limit is computed as:

$$Acquirer\_\Delta 382Limit = [(FLTR_{ClosingDate} * MV_{ClosingDate}) - (FLTR_{AnnDate} * MV_{AnnDate})]$$

Where $FLTR_{ClosingDate}$ and $MV_{ClosingDate}$ are the adjusted federal long-term tax-exempt rate and the acquirer's market value as of the date on which the transaction closes. The closing date is the date on which the transaction is either completed or withdrawn. $FLTR_{AnnDate}$ and $MV_{AnnDate}$ are computed as of 4-weeks prior to the initial acquisition announcement date.

C is a vector of the determinants of acquisition completion. The vector includes announcement year and acquirer industry (1-digit SIC) fixed effects. These coefficients are not reported.

Variable definitions and data sources are reported in Appendix C.

The sample includes 295 acquisitions involving U.S. public acquirers and targets announced between 1995 and 2016. The sample is restricted to transactions in which *TLCF* is non-missing and *TLCF* is greater than the acquirer's announcement date §382 loss limit ($FLTR_{AnnDate} * MV_{AnnDate}$).

In column (2), *Acquirer_Δ382Limit_d* is replaced with (*Acquirer_Δ382Limit_%* *-1) which is equal to *Acquirer_Δ382Limit* scaled by the acquirer's announcement date §382 loss limit ($FLTR_{AnnDate} * MV_{AnnDate}$) and multiplied by negative one.

z-statistics are reported in parentheses and are estimated using heteroskedasticity-robust standard errors clustered by acquirer industry (1-digit SIC).

*, **, and *** indicate two-tailed statistical significance at the 10%, 5%, and 1% level, respectively.

Marginal effects, reported at the bottom of the table, are computed as the partial derivative of the regression equation with respect to *Acquirer_382_Trigger* conditioning on values of *Acquirer_Δ382Limit_d* and *TLCF_ln*. Marginal effects for the regression reported in column (2) are presented in Figure 3.

	(1) ***Completed***	(2) ***Completed***
TLCF_ln	-0.318 (-1.47)	0.346*** (4.46)
Acquirer_382_Trigger	-0.879 (-0.67)	0.161 (0.10)
*TLCF_ln * Acquirer_382_Trigger*	0.188 (0.71)	-0.083 (-0.26)
Acquirer_Δ382Limit_d	-7.920*** (-4.38)	
*TLCF_ln * Acquirer_Δ382Limit_d*	1.048*** (3.46)	
*Acquirer_382_Trigger * Acquirer_Δ382Limit_d*	2.057 (1.14)	
*TLCF_ln * Acquirer_Δ382Limit_d * Acquirer_382_Trigger*	-0.630 (-1.40)	
(*Acquirer_Δ382Limit_%* * -1)		-7.150* (-1.81)
TLCF_ln * (*Acquirer_Δ382Limit_%* *-1)		0.723 (1.17)
Acquirer_382_Trigger * (*Acquirer_Δ382Limit_%* *-1)		6.240** (2.02)

*TLCF_ln * (Acquirer_Δ382Limit_% *-1) * Acquirer_382_Trigger*		-1.223*
		(-1.89)
Acquirer Characteristics		
MTR	5.249**	3.208*
	(1.96)	(1.72)
Q	0.037	0.036
	(0.38)	(0.35)
InstOwn	-2.308***	-1.343
	(-3.85)	(-1.39)
Target Characteristics		
Q	-0.039	-0.059
	(-0.44)	(-0.68)
Forecast_Error	-0.324***	-0.068
	(-3.04)	(-0.56)
Analyst	0.059	-0.152
	(0.47)	(-0.83)
AAER	-1.731***	-1.663***
	(-6.36)	(-4.47)
Deal Characteristics		
aCAR3	-2.162	-1.197
	(-1.53)	(-0.83)
tCAR3	0.127	-0.266
	(0.15)	(-0.32)
>0% BankFin	2.730***	2.740***
	(3.88)	(2.93)
Tender	-0.223	-0.359
	(-0.31)	(-0.52)
Competition	-1.349***	-0.909**
	(-3.46)	(-2.47)
Horizontal Deal	0.507	0.357

	(1.36)	(0.76)
Hostile	-4.654***	-5.309***
	(-7.16)	(-4.35)
Pooling	1.745*	1.702**
	(1.90)	(2.50)
Relative_Size	-3.362**	-4.451**
	(-2.57)	(-2.23)
Deal Size	-0.401***	-0.277**
	(-3.00)	(-2.43)
Constant	6.237***	0.934
	(2.74)	(0.65)
N	295	295
Pseudo R2	0.640	0.621

Marginal Effects

	(1)	
	Completed	
dydx(*Acquirer_382_Trigger*)	*Acquirer_Δ382Limit_d* =	
at *TLCF* ($ millions) =	1	0
$10	0.021	-0.006
	(0.16)	(-0.51)
$50	-0.086	-0.003
	(-1.09)	(-0.22)
$100	-0.113*	-0.0003
	(-1.70)	(-0.02)
$500	-0.130**	0.011
	(-2.06)	(0.36)
$1000	-0.128**	0.018
	(-2.04)	(0.43)
$1500	-0.125**	0.022

	(-2.02)	(0.46)
$2000	-0.122**	0.026
	(-2.00)	(0.48)