LOAN AMENDMENTS AND CAPITAL STRUCTURE

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Abstract

We study amendments of loan contracts and find that loan amendments (LAs) help firms move towards their target capital structures. LAs incur lower transaction costs than new loans or bond issues. Using data on 10,375 LAs of large, US corporations during 1996-2016, we find that LA firms accelerate their speed of adjustment towards target leverage up to 24 months post-LA. This is most pronounced for under-levered firms. Amendments to loan maturity and covenants have the strongest impact. Our results are robust to using alternative definitions of leverage, loan targets, loan events, and various econometric specifications including placebo and treatment-effect models.

Keywords: Bank loan; capital structure; covenant; credit agreements, loan amendment; private debt; renegotiation; speed of adjustment; target leverage.

JEL codes: G20, G21, G30, G32.

Declaration of interest: None

Acknowledgements: We are grateful to Jonathan Berk, Michael Brennan, Shrijata Chattopadhyay, Viet Dang, Amedeo De Cesari, Marie Dutordoir, Ning Gao, Kirak Kim, Frank Hong Liu, Min Park, Masayo Shikimi, conference participants at FMA 2023, and the 5th Annual Corporate Finance Conference for helpful comments and suggestions. Support from the Economic and Social Research Council (ESRC) and Alliance Manchester Business School is also gratefully acknowledged.

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Abstract

We study amendments of loan contracts and find that loan amendments (LAs) help firms move towards their target capital structures. LAs incur lower transaction costs than new loans or bond issues. Using data on 10,375 LAs of large, US corporations during 1996-2016, we find that LA firms accelerate their speed of adjustment towards target leverage up to 24 months post-LA. This is most pronounced for under-levered firms. Amendments to loan maturity and covenants have the strongest impact. Our results are robust to using alternative definitions of leverage, loan targets, loan events, and various econometric specifications including placebo and treatment-effect models.

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1. Introduction

Given the inherent imperfections in financial contracts (Hart and Moore, 1999; Tirole, 1999), it's not surprising that a substantial number of bank loans undergo renegotiation during their lifetime. Empirical evidence indicates that 90 percent of bank loan agreements are subject to at least one renegotiation before they mature (Roberts, 2015). In this paper we propose a novel perspective on the rationale behind loan amendments (LAs). Leveraging the widespread use of bank loans (Robb and Robinson, 2014), the regularity of loan contract adjustments, and the relatively economical fees associated with amendments, we argue that firms strategically employ LAs as a cost-effective method to adjust towards their target capital structure.[1] Our results are consistent with this proposition. In line with Boot (2000) and Brounen et al. (2006), our study highlights the distinct cost advantages of using and redesigning existing bank-firm lending relationships. Specifically, our study contributes to two critical areas of the literature by: (i) shedding light on the purpose and impact of loan amendments, and (ii) exploring the determinants influencing the speed of adjustment to target leverage. To the best of our knowledge, this is the first paper to test the impact of LAs on leverage adjustment.

The trade-off theory of capital structure predicts that firms aim to move to their optimal, firm-value-maximizing capital structure over time (Myers, 1984). If a firm's leverage ratio deviates from its optimal leverage target, closing the gap creates value for the firm (Faulkender et al., 2012). How quickly the firm approaches its leverage target each year is captured by its annual speed of adjustment (SOA). The SOA is determined by trading off the benefits against the costs of adjustment to the target. Explaining the heterogeneity across firms in terms of SOA remains one of the important unanswered questions in capital structure research (Huang and Ritter, 2009; Welch, 2013; Zhou et al., 2016). Our study shows that LAs are a significant determinant of SOA.

A range of features of existing loan contracts (such as covenants, loan amount, maturity, pricing, etc.) may be subject to renegotiation and amendment, and multiple features of a loan may be

[1] Commercial and industrial loans provided by all commercial banks in the US increased from 17 trillion USD in 2009 to 28 trillion USD in 2019 (from 117% to 132% of the US GDP) (Federal Reserve 2020, https://alfred.stlouisfed.org/). Loan-amendment fees average 3,500 USD in our sample with a maximum observed fee of 6,000 USD, which is negligible relative to the average loan size of 150 million USD. The cost of renegotiating a bank loan with a single bank or small group of lenders is clearly far lower than the cost of renegotiating public debt with a myriad of bondholders (Chemmanur and Fulghieri, 1994; Berlin and Loeys, 1988).

amended. As LAs change firms' debt positions and leverage, they are likely to impact a firm's adjustment towards its leverage target and the speed at which the firm adjusts to its target.

We analyse a large dataset of 5,385 performing corporate loans in the US from 1996 to 2016. The data are from SEC filings and Bloomberg Professional and allow us to clearly distinguish between amended loans and new loans. We find that firms with recent LAs have higher SOA towards their targets than firms without recent LA. LAs help firms to close 59 percent of the gap between actual and target leverage in the year in which they take place.

In terms of amendment types, maturity and covenant adjustments in loan contracts appear to be the most significant SOA magnifiers. Our study also features "*covenant lite*" loans that have been identified by practitioners, regulators, and academics as a notable development in the syndicated loan market (Berlin et al., 2020). Lending syndicates increasingly admit to loan contracting without traditional financial covenants, also referred to as "absence of maintenance covenants."[2] We find that loan amendments in covenant-lite loans are associated with higher SOA toward firms' target debt-equity ratio. This complements and extends the findings of Devos et al. (2017) that the presence of restrictive covenants reduce SOA.

Consistent with tests on financially unconstrained firms in Faulkender et al. (2012) and Lockhardt (2014), we find that SOA accelerations are more pronounced among those firms that hold *below*-target debt levels, especially if firms rely heavily on long-term debt financing. High SOAs among large, *under*-levered firms highlight the popularity of utilising and expanding on existing bank loan relationships (Boot, 2000; Brounen et al., 2006).

In addition to examining amendments of existing loans, we also examine new loan issues (LIs). Negotiating new loans from scratch and establishing the corresponding lending consortium involves significantly higher costs than amending an existing loan with well-known parties.[3] Hence, we expect that LIs play a lesser role in moving firms to their target leverage. Our results confirm that the beneficial SOA effect is more pronounced after an LA than after an LI. This

[2] Notified e.g. by the Federal Reserve Board of Governors, Financial Stability Report - May 2019. (https://www.federalreserve.gov/publications/2019-may-financial-stability-report-borrowing.htm)
[3] The issuance of public debt involves substantial fees payable to the investment banks underwriting the debt securities. Additional fix-costs arise from filing, legal, printing and trustee fees. Underwriting fees for investment-grade corporate bonds in the U.S. have averaged about 0.7 percent of the capital raised in recent years (Thomson Reuters, 2018). U.S. syndicated loans involve upfront fees of 61bps and/or commitment fees of 38bps on average (for credit lines and term loans 1986 to 2011) (Berg et al., 2016). In contrast, our sample of public U.S. firms engaging in LAs records assignment fees of up to USD 6,000.

suggests that the motive for LIs is more likely associated with liquidity needs than leverage adjustment.

We measure firms' SOA in two stages, using a partial adjustment model as established in contemporary SOA studies (e.g. Huang and Ritter, 2009; Öztekin and Flannery, 2012; Devos et al., 2017). For robustness, we use system GMM (Blundell and Bond, 1998) and alternate definitions previously used in the literature for firm-specific, time-varying leverage targets. All target estimates are based on firm- and industry variables, ensuring that our model controls for a number of relevant determinants in firms' leverage decisions (including growth opportunities, taxes, firm-fixed effects, and median debt ratio in the industry). We analyse the *active* leverage adjustments only, which are the result of active financial decision making and require accessing the capital markets or using banks (Faulkender et al., 2012). To check the robustness of our results, we use alternate LA definitions (including early repayments as potential LA), include new loan issues as alternative loan events, and test an alternative sample period to exclude frictions attributable to the global financial crisis. To address endogeneity concerns, we conduct placebo tests on pseudo-LAs and employ a two-stage treatment effect (TE) model. Finally, to keep LA firms and control group firms as homogeneous as possible, we examine large loans of public firms only. Overall, without claiming a causal connection, the array of robust test results suggests that our main finding that loan amendments are associated with accelerated speed of adjustment towards target leverage is unlikely to be spurious.

Previous studies identify the determinants of LAs (Roberts and Sufi, 2009), and recognise that LAs may enhance contracting efficiency (Roberts, 2015; Dou, 2019), increase firm investments (Denis and Wang, 2014; Chu, 2019) and reveal private information to the market (Godlewski, 2015; Nikolaev, 2018). Only a handful of studies focus on the impact of debt covenants on capital structure and adjustments. Devos et al. (2017) analyse firms' SOA as a function of financial covenants in loan contracts, where highly restrictive covenants have been found to slow down firms' SOA. Lemmon and Zender (2019) include the restrictiveness of covenants in their model of firms' capital structure choice ex ante. None of these studies identifies LAs (i.e., changes of loan terms within existing loan contracts) as a low-cost channel for firms to move towards their leverage targets and corresponding SOA effects. Beyond the SOA effects associated with covenants (Devos et al. 2017), our study offers novel insights into the association between loan amendments and variations in firms' SOA.

Our evidence showing the role of LAs as a catalyst for firms moving toward their optimal capital structure contributes to previous findings on the beneficial effects of loan amendments outside financial distress, such as flexibility available to firms through renegotiation (Roberts, 2015), facilitating firms' investment policy (Denis and Wang, 2014; Chu, 2019), and positive signalling to the stock market (Godlewski, 2015; Nikolaev, 2018). Among all of these beneficial effects of renegotiations, the flexibility to pursue and adjust profitable investments is most important for firms' decision making amid increasing global business dynamics, pandemic shocks, geopolitical changes, and uncertainties that affect multinationals' operations and finances (Graham and Harvey, 2001; Berg et al., 2021).

Our study provides an important empirical insight into the significance of private debt renegotiations (outside financial distress) which play a fundamental role in financial practice. As far as LAs lower firms' costs and frictions as a result of being away from their capital structure targets, our empirical findings support the theoretical notion that a contract design that allows for renegotiations ex post, creates value for the contracting parties (Berlin and Mester, 1992; Garleanu and Zwiebel, 2009).

The remainder of this paper is organized as follows. Section 2 reviews the underlying literature and recent interest in studying capital structure adjustments and introduces our main hypothesis. Section 3 discusses our research methodology and data sources. Section 4 presents our results. Section 5 concludes.

2. Background and Hypothesis

Most studies of private debt renegotiation focus on renegotiations in the context of financial distress (Berlin and Mester, 1992; Gorton and Kahn, 2000). By contrast, research on debt renegotiation outside financial distress is limited. Notable exceptions include Roberts and Sufi (2009) who examine the determinants and outcome of renegotiation.[4] Denis and Wang (2014) reveal beneficial effects of renegotiation on firms' investment policy. More valuable effects of renegotiation are documented by Godlewski (2015), Roberts (2015), Lemmon and Zender (2019), Dou (2019), and Beyhaghi et al. (2019). In a recent large-scale US study, Nikolaev

[4] Roberts and Sufi (2009) use a sample of 1,000 loans for which they hand-collect loan and amendment data from SEC filings. They examine only the first renegotiation during the lifetime of a loan. By contrast, we collect data on all renegotiations for 5,385 loans.

(2018) shows that renegotiation intensity is positively related to the demand for monitoring a borrower (implying aggravated levels of agency problems).

Given the size and extent of loan contract renegotiations, they are likely to have an impact on firms' capital structure. Studies show that firms follow individual, time-varying leverage targets (Jalilvand and Harris, 1984; Flannery and Hankins, 2013). An optimal capital structure (or target debt ratio) maximizing firms' value derives from the trade-off theory (Kraus and Litzenberger, 1973; Leland and Toft, 1996). Being away from the target, i.e., having a 'leverage gap', is costly (Fisher et al., 1989;-Faulkender et al., 2012). Following on from well-researched capital structure targets, many studies conclude that the speed with which these targets are reached is unexpectedly slow (Fama and French, 2002; Flannery and Rangan, 2006; Huang and Ritter, 2009; DeAngelo and Roll, 2015). Costs tend to reduce firms' speed of adjustment (SOA). Firms will take action only when adjustment benefits more than offset the costs associated with the adjustments towards the target (Faulkender et al., 2012; Dang et al., 2012, 2014).[5] Researchers seek to identify distinct accelerators and impediments to firms' SOA, such as opportunity costs, macroeconomic factors, and institutional features across countries.[6] Explaining the observed cross-sectional heterogeneity in capital structure adjustments remains the most important outstanding question in capital structure research (Huang and Ritter, 2009; Welch, 2013; Zhou et al., 2016). Faulkender et al. (2012) show that the level of cash flow available to firms significantly determines their SOA.

Devos et al. (2017) find that firms which are restricted by debt *covenants* tend to move more slowly towards leverage targets than firms without covenants. An important point to note is that Devos et al. (2017) focus on covenants per se, rather than renegotiations of covenants, such as changes in their restrictiveness. Different from their study, we examine changes in other loan terms as well, such as loan amount and maturity.

While most studies estimate firms' SOA to leverage targets simply based on *overall* changes in a firm's leverage from one year to another, we isolate and use the *active* portion of leverage adjustments only throughout the study to measure firms' SOA - unrelated to passive, mechanical leverage adjustments (following Faulkender et al., 2012 and Dang et al., 2019).

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[5] For estimating issuance costs and the impact of transaction costs on leverage behaviour, see e.g., Altinkilic and Hansen (2000), and Shivdasani and Stefanescu (2010).

[6] See Graham and Leary (2011) for a review of empirical capital structure research on papers published after 2005, identifying firm-specific, macroeconomic, and institutional SOA determinants.

Firms' decisions may lead to specific transactions, such as accessing the capital market or applying for bank loans. Active leverage adjustments usually involve costs that may be significant (Fisher et al., 1989; Hennessy and Whited, 2007, for transaction costs incurred when firms adjust their debt-equity mix). High adjustment costs have been shown to slow down firms' SOA, such that costs tend to impede firms' activities to close down gaps from optimal targets (Faulkender et al., 2012). While large firms would generally be able to arrange for alternative forms of financing, LAs have distinct advantages in terms of their ease of access, timeliness, and cost efficiency. Within an ongoing contractual intercourse, LAs may be a relatively inexpensive, easily accessible channel for firms to optimise their capital structure. Benefits through optimisation may be achieved at low cost. Across firms, debt renegotiation seems to be a popular, proliferating, yet unexplored mechanism.

The importance of bank loans as a source of firms' funding is reflected in the considerable amount of loans compared to overall debt. Bank loans analysed in our study account for 18 percent (median: 50%) of borrowers' total debt at the time of renegotiation (for non-amended loans: proportion of loans among total debt at the time of data collection; for expired non-amended loans: proportion at the time of loan origination). With an average amount of 390 USD (median: 150 million USD) and a five-year average lifetime, these loans tend to be crucial for US firms' financing. Any loan changes would therefore be expected to take place intentionally. Firms' rationales for LA decisions might include the strategic pursuit of capital structure targets. Given the low costs involved in amending existing bank loans, firms may use LAs as an easily accessible tool for reconnecting to their targets more quickly, hence optimizing financial contracts for low contracting costs. Further, different LA types, such as amount changes and covenant amendments, may have immediate and far-reaching impacts on firms' capital structure. Our baseline analysis tests the following null hypothesis:

Hypothesis: The occurrence of loan amendments is not associated with any changes in the borrowing firm's speed of adjustment to target leverage.

3. Data and methodology

Data

To analyse firms' SOAs towards leverage targets, we obtain data on all loans available from the Bloomberg Professional Terminal Server (Bloomberg) for listed companies in the US, with both amended and non-amended loans, from 1996 to 2016. Sample companies are typically not financially distressed. The start year 1996 coincides with the SEC requirement for firms' electronic filing. The Bloomberg database provides detailed loan data reported by listed companies in the US with loan sizes from typically USD 75 million. Bloomberg aggregates information from SEC filings, and from a broad network of cooperating banks, top news providers, corporate information, and publicly available sources.[7]

Renegotiations may result in an amendment, modification, waiver, or restatement of a credit agreement (see appendices A1 and A2 for examples of loan amendments and amendment types). Bloomberg provides data on (1) amendments that involve signing a legal document, stating the name and date of the agreement being amended, and presenting a list of changes, and (2) amended and restated agreements that incorporate the changes into a revised contract. There are no material differences in economic substance between these two forms of amendments (Roberts, 2015), and we do not distinguish between "amended" and "amended and restated" in this study. Bloomberg provides detailed loan and LA information (via loan search 'LSRC'), reporting company name, loan identifier (ID) (with an identical, consistent loan ID before and after amending the existing loan), loan amount, issue date, maturity date, LA date and type, and other loan characteristics.

The advantage of the Bloomberg data source is that it offers an automated selection of amended loans by offering efficient search criteria (e.g., "Loan Amendment = Yes"). The database has a large sample of loans of both "amended" and "non-amended" contract states. Studies on private debt renegotiations (if not using Bloomberg) tend to study smaller samples of hand-collected data (e.g., Roberts, 2015) or involve text-search coding from SEC filings (e.g., Nikolaev, 2018), which are then merged with data from LPC Dealscan.[8]

Our sample contains 5,385 loan tranches of 1,669 firms ("issuers", excluding firms classified as financial institutions, utilities, and government entities). Of these 5,385 new loan issues (LIs), we observe that 4,897 loan tranches are amended. Each loan tranche may be amended more than

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[7] Bloomberg's global syndicated loan coverage for listed companies globally, and especially in the US market, is substantial: more than 5,200 loans in America; more than 4,000 loans in Europe, the Middle East and Africa; more than 3,400 loans in Asia Pacific, according to Bloomberg Professional, 2016. Bloomberg data are used in earlier studies on private debt renegotiations, such as Godlewski (2015) and Chu (2019).

[8] Unlike Bloomberg, Dealscan does not provide systematic information on loan amendments. Except from "Amendment to a Certain Credit Agreement", Dealscan enters "Amended Credit Agreement" or "Amended and Restated Credit Agreement" in the form of a completed new credit agreement incorrectly as independent loan contract, with a new loan ID (Roberts and Sufi, 2009). By contrast, Bloomberg offers detailed, consistent information on both forms of loan amendments. Compared to our sample of mostly healthy loans of large companies, studies using Dealscan also include small and mid-size loans of small cap firms' whose credit quality is more diverse and more likely to be poor than in our sample.

once, and each amendment may involve more than one characteristic of a loan (i.e., the amendment can be more than one *type*). In total, we observe 10,375 loan amendments (LAs) and 24,738 amendment *types*. Non-LA firms maintain loan terms as originated or do not hold any loans for some time during the sample period; those firms represent the control group.

We merge the Bloomberg dataset with S&P's Compustat using the *gvkey* identifier (using loan tranche, loan or facility synonymously following Cen et al., 2016) resulting in 1,352,503 loan-month observations. Compustat provides a broader range of firm characteristics which we use to estimate the firms' leverage targets. Following Devos et al. (2017), annual leverage targets are derived from firm and industry characteristics, requiring non-missing data for all target-relevant variables for at least two consecutive years. Dropping observations due to missing data over two consecutive years (such as missing R&D data and market-to-book values) results in a final panel of 934,117 loan-month observations. Macroeconomic variables are collected from the Federal Reserve Bank of St. Louis (see Appendix Table A4). All variables in our analysis are winsorized at the 1st and 99th percentiles to reduce the effect of outliers.

Methodology

3.1 Target Leverage Estimation

Following Öztekin and Flannery (2012) and Öztekin (2015), we adopt a two-stage procedure to measure firms' SOA towards capital structure targets. In the first stage, we estimate (unobserved) annual target leverage following Fama and French (2002). In the second stage, we estimate the speed of adjustment (SOA) as in Faulkender (2012).

Based on prior research (Huang and Ritter 2009; Öztekin and Flannery 2012; Devos et al.; 2017), we model target leverage L^* as determined by firm-specific variables as follows:

$$L^*_{i,t} = \beta X_{i,t-1} + \mu_i \tag{1}$$

where $L^*_{i,t}$ represents the target leverage ratio for firm i in year t; β is a vector of coefficients; and $X_{i,t-1}$ is a vector of firm- and industry-specific determinants of firms' capital structure decisions in year $t-1$. Following Devos et al. (2017), the model allows for variations across firms, industries, marginal tax rates, and time. The determinants are marginal tax rate, operating income scaled by book value of assets, market-to-book ratio of the assets, logarithm of total assets, depreciation expenses and fixed assets, both scaled by total assets, research and development expenses scaled by sales, common stock dividend by total assets, the Altman Z-score and, to account for time-varying industry factors, the industry median leverage in each calendar year. Appendix Table A3 provides a detailed definition of these variables.

Modelling target leverage in period *t* as a function of determining factors in period *t-1* helps to mitigate endogeneity concerns associated with those factors. Since variation in corporate leverage may be attributable to time-invariant, unobservable firm-specific factors (Lemmon et al., 2008), we also include firm fixed effects (μ_i) in the model.

Following Fama and French (2002) and Devos et al. (2017), we estimate Equation (1) with a two-step cross-section regression Fama-McBeth approach. We first regress actual leverage in *t+1* on the variables (in year *t*) assumed to determine target leverage. We run cross-sectional regressions for each year from 1995 to 2016, resulting in 21 estimates for each independent variable. The average of each coefficient across these 21 annual regressions is the mean coefficient. The mean coefficients are used to calculate the fitted value from this model which we use as the proxy for target leverage in Equation (1).

For additional robustness, we employ an alternative approach to estimate firms' leverage targets based on a system GMM (generalized method of moments, as in Table 9), established by Blundell and Bond (1998) to measure firms' SOA. The target leverage definition as presented in Equation (1) is now subject to the following restriction:

$$L_{i,t} = \lambda\beta X_{i,t-1} + (1-\lambda)L_{i,t-1} + \varepsilon_{i,t} \quad (2)$$

Following Faulkender (2012), the explanatory variables *X* comprise the following firm characteristics: EBIT over total assets, market-to-book value, depreciation and amortization over total assets, logarithm of total assets, fixed assets over total assets, research, and development expenses (R&D) over total assets, R&D dummy variable, the median industry debt ratio per calendar year, and firm fixed effects. Detailed variable definitions are provided in Table A3 in the Appendix. Based on the estimated parameters of Equation (2), we solve out for the implied estimate of β and substitute this into Equation (1) to compute target leverage L^*.

3.2 Measuring Speed of Adjustment (SOA)

Based on the leverage target estimate, firms' SOA is specified by a partial adjustment model (a dynamic panel data model following Hovakimian et al., 2001):

$$L_{i,t} - L_{i,t-1} = \lambda \left(L^{*}_{i,t} - L_{i,t-1}\right) + \tilde{\varepsilon}_{i,t} \tag{3}$$

where $L_{i,t}$ represents a firm's leverage ratio at time t, $L_{i,t-1}$ denotes the firm's leverage ratio at time t-1, $L^{*}_{i,t}$ represents the leverage target for the firm i in year t. $L^{*}_{i,t} - L_{i,t-1}$ represents firm i's distance from its leverage target, and λ denotes the firm's annual SOA towards its leverage target (Flannery and Rangan, 2006; Lemmon et al., 2008; Faulkender et al., 2012).

3.3 Active leverage adjustments

Following Faulkender et al. (2012), we focus on *active* leverage adjustments that are the result of active financial decision making and require accessing the capital markets or using banks, instead of merely coincidental residual changes in leverage levels arising, e.g., from retaining earnings from one year to the next. Focusing on *active* leverage adjustments also addresses potential concerns over mechanical mean reversion (Chang and Dasgupta, 2009; Dang et al., 2019). To capture active capital structure management only (implying that firms access capital markets in some way) and to address potential mechanical mean reversion, we revise Equation (3) and eliminate a firm's *passive* component of the leverage change (Faulkender et al., 2012; Jiang et al., 2017):

$$L_{i,t} - L^{P}_{i,t-1} = \lambda \left(L^{*}_{i,t} - L^{P}_{i,t-1}\right) + \tilde{\varepsilon}_{i,t} \tag{4a}$$

$$\text{where } L^{P}_{i,t-1} \equiv \frac{D_{i,t-1}}{A_{i,t-1} + NI_{i,t}} \tag{4b}$$

D denotes firm i's debt in year t-1, A are the total assets in year t-1, and NI_t is the net income in year t. For an intuitive explanation, this year's leverage $L_{i,t}$ would be $L^{P}_{i,t-1}$ if the firm did not engage in any net capital market activities throughout year t. Our adjustment measure uses $L^{P}_{i,t-1}$ as the starting point, such that the left-hand side in Equation (4) reflects firms' active leverage adjustments only.

3.4 Active leverage adjustment with loan amendments

Firms' active rebalancing decisions in the presence of renegotiations (LAs) are estimated in a partial adjustment model as follows:

$$L_{i,t} - L^{P}_{i,t-1} = \lambda_1 (L^{*}_{i,t} - L^{P}_{i,t-1}) + \lambda_{12M} (L^{*}_{i,t} - L^{P}_{i,t-1}) * \mathrm{LA}_{i,(0\text{-}12)} + \delta_{12M} \mathrm{LA}_{i,(0\text{-}12)} \quad (5)$$

$$+ \lambda_{13\text{-}24M} (L^{*}_{i,t} - L^{P}_{i,t-1}) * \mathrm{LA}_{i,(13\text{-}24)} + \delta_{13\text{-}24M} \mathrm{LA}_{i,(13\text{-}24)} + \tilde{\varepsilon}_{i,t}$$

where the dependent variable ($L_{i,t} - L^{P}_{i,t-1}$) measures firm *i*'s active leverage adjustment over the past year (from *t-1* to *t)*. The right-hand side begins with the general distance-to-target variable ("leverage gap", $L^{*}_{i,t} - L^{P}_{i,t-1}$) for all firms. The coefficient λ_1 measures firms' general SOA as shown in Equation (3) and measuring the annual adjustment speed of closing the leverage gap in percent. The general distance-to-target term is followed by distance variables interacted with LA, a dummy variable that equals 1 if a loan amendment is observed either in the previous 12 months ($\mathrm{LA}_{i,(0\text{-}12)}$) or the previous 13 to 24 months ($\mathrm{LA}_{i,(13\text{-}24)}$). The coefficients λ_{12M} and $\lambda_{13\text{-}24M}$ on these two LA interaction terms measure the LA-specific SOA, in addition to firms' general SOA λ_1. To measure the full annual adjustment speed (in percent of the leverage gap), we add the incremental loan-amendment effect λ_{12M} (or $\lambda_{13\text{-}24M}$) to λ_1 for loans that are amended in the preceding 12 months (or in the preceding 13 to 24 months).

The control group consists of firms that do not have LAs over the previous 24 months. The control group also includes firm-month observations between 1998 and 2016 where firms do not have loans on their books. We include firm-fixed effects and bootstrapped standard errors to account for generated regressors in our two-stage model (Öztekin, 2015). *Firm* fixed effects help to account for time-invariant firm-specific adjustment practices, *deal* fixed effects for similarities within syndicated financing packages (deals) that may involve more than one loan tranche, and *year* fixed-effects for time trends potentially affecting firms' LA decisions and their leverage target policy.

We hypothesize that companies use LAs as a low-cost method to optimise their capital structure and move towards their target leverage. Hence, we expect that LAs *increase* the speed of adjustment, which implies a positive coefficient on the interaction terms between the LA dummy and the leverage gap ($\lambda_{12M} > 0$ and $\lambda_{13\text{-}24M} > 0$).

3.5 Channels

A range of features of existing loan contracts (such as covenants, loan amount, maturity, pricing, etc.) may be subject to renegotiation and amendment, and multiple features of a loan may be amended at the same time. We expect amendments to the *loan amount* to have a direct and immediate impact on the capital structure. For instance, increasing the loan amount directly increases leverage. By contrast, we expect amendments to *loan maturity* to have a direct but not immediate impact on SOA. For instance, following a maturity-increasing LA, the loan stays on the firm's books and impacts its leverage beyond the original maturity date of the loan. Amendments regarding financial covenants (such as covenants requiring firms to maintain certain financial ratios) or non-financial covenants (limiting managerial decision making) may only impact capital structure gradually. In sum, any type of loan amendment may affect firms' capital structure directly or indirectly, and with or without a time lag. While amount amendments have an immediate impact on firms' debt, amendments regarding maturity or covenants will imply changes in debt- and investment-related payments at a later point in time. To capture these differences, the specification in Equation (5) is amended to allow for different types of LAs, such as amount, maturity, financial and non-financial covenant amendments.

In line with previous literature (e.g., Dang et al., 2012) that reports asymmetric SOAs depending on whether firms are above or below their leverage targets, we recognise that adjustments towards the target can involve either a leverage increase towards a higher target, or a leverage decrease towards a lower target. Therefore, our analysis differentiates between under- and over-levered companies, that is, firms above or below their target leverage.

4. Results

Loan characteristics of LA firms and control firms in our sample are presented in Table 1. LA firms are defined as borrowing firms that have loans for which loan amendments are observed in the Bloomberg database over the sample period 1996-2016, while all other firms are classified as non-LA firms. Non-LA firms may have loans and maintain them as agreed upon loan origination, or they may not hold any loans during the sample period. The average *loan size* (mean 390 million USD, median 150 million USD) is large which is to be expected given that our sample consists of relatively large, listed US firms, and our database, Bloomberg Professional, covers loans of at least 75 million USD. During our sample period 1996 and 2016, we observe 10,375 *LA dates*. Each loan amendment on average involves 2.9 LA types. In total, we observe 24,738 LA types, with changes in the definitions of key terms, changes in amounts, amendments to (non-)financial covenants and maturity amendments being the most frequent types.[9] If amounts are amended, the average change is an increase of 37 million USD, and the average change in maturity is an increase of 3.6 years, which is substantial given that the average lifetime of a sample loan is approximately five years.

The assignment fees for loan amendments average at 3,500 USD with a maximum fee of 6,000 USD. Given that the loans in our sample are large, the magnitude of fees is relatively small. We confirm our data by cross-checking with the original amended credit agreements in SEC filings which also corresponds with amendment fees documented in Berlin et al. (2020).

[Insert Table 1 here]

Table A5 in the Appendix reports firm- and industry characteristics for LA and non-LA firms in our sample. Panel A presents variables determining firms' leverage targets. *Target leverage* centres around 0.27 (mean) and 0.26 (median) for all firms. Although statistically significant, the differences in target leverage between LA firms and non-LA firms are small (0.01 for both mean and median). This suggests that while LA and non-LA firms differ in the means they use to move towards their targets, they do not differ in terms of the target itself.

Examining actual leverage, we find no significant differences between LA and non-LA firms in terms of *total leverage* ratios which average around 0.32 (mean, 0.29 median). There are small but significant differences between LA and non-LA firms in *long-term leverage* but there are more pronounced differences in *market leverage*. Comparing actual leverage with target leverage, we find firm are on average below target with a mean of *distance from target* of -0.05 and a median of -0.02. There is no significant difference in *distance from target* between LA and non-LA firms.

Decomposing the full sample into above-target and below-target firms shows that below-target firms are further away from their targets than above-target firms. Differences between LA-firms and non-LA firms are small and only marginally significant. In USD values, the mean distance of all below-target firms translates into -871 million USD (median -167 million USD), while for

[9] These results are in line with earlier studies. Roberts and Sufi (2009) report changes to initial maturity for 64 percent of loans and amount amendments for 43 percent of loans. Similar figures are reported in Denis and Wang (2014).

above-target firms it is on average 653 million USD (median 135 million USD). Overall, these figures emphasize the economic magnitude of the leverage adjustments that are required.

Examining active leverage adjustments, we find that firms on average increase their leverage by 4 percentage points. Separating the subsample of increases and decreases, the average active increase in leverage is 16 percentage points and the average active decrease is 7 percentage points. Thus, the leverage changes we observe from year to year are considerable particularly bearing in mind that these changes are merely the active or intentional part of firms' leverage adjustments.

4.1 Loan renegotiation and leverage adjustments

In our baseline analysis, we estimate the association between active adjustments to target leverage and the prior occurrence of a loan adjustment test based on Equation (5) above. The dependent variable is the active leverage adjustment. The key explanatory variables are the distance from the target and interaction terms between the distance from target leverage and one of two binary indicators that are one if an LA is observed either (i) over the preceding 12 months or (ii) during the previous 13 to 24 months (0 otherwise). The distance from the target is defined as the leverage target in *t* minus adjusted leverage in *t-1* measured as [debt over (total assets plus net income)] as in Equation (4b) above. We expect positive coefficients on all three variables of interest measuring the overall speed of adjustment (SOA) and the incremental SOA due to LAs. The results are presented in Table 2a. For robustness, we use a range of alternate leverage-target definitions used in the recent literature (Faulkender et al., 2012; Devos et al., 2017) and alternate measures of debt as shown in the Column headings.

Consistent with our expectations, we find a positive SOA towards leverage targets in general, and an LA effect in the form of an incremental SOA among firms with LAs. Our results show that, consistent with previous findings, all firms move towards their leverage targets, closing the gap between actual and target leverage ratios at an annual adjustment speed of 48.4 percent each year for total leverage (based on results in Column 1). For *long-term* leverage targets, based on a recent target definition proposed by Devos et al. (2017), the SOA is even higher at 61.5 percent (Column 2). Testing long-term leverage isolates the more strategic strand of firms' debt contracts and financing decisions. These results are consistent with previous SOA estimates reported in the existing literature.

Importantly, our novel finding is the statistically and economically significant incremental effect of LAs on SOA. Our results show that firms with a preceding LA speed up their adjustments towards leverage targets, and this finding is robust across various target and leverage definitions. For LAs during the previous 12 months, we observe an incremental annual adjustment speed of 10.6 percentage points for total leverage in Column (1) and 12.1 percentage points for long-term leverage in Column (2). For LAs recorded during months -13 to -24 months, the incremental SOA is 11.4 percentage points for total leverage in (1) and 14.0 percentage points for long-term leverage in (2). These results are highly significant at the 1 percent level. Hence, for firms that have completed an LA during the preceding twelve months, the total SOA (equal to the sum of the coefficients of *Distance to Target* and of the interaction term) amounts to 59.0 percent per year for total leverage and 73.6 percent for long-term leverage. Similarly, the total SOA is 59.8 percent per year if an LA has been observed during months -13 to -24 months for total leverage and 75.5 percent for long-term leverage. This level of adjustment speed falls into the higher range of SOAs documented in the leverage adjustment literature (e.g., Brisker and Wang, 2017). Economically, the potential increase in SOA due to LAs is substantial amounting to 45 percent of the non-LA related SOA ((0.106 + 0.114)/0.484). It is interesting that the impact of LAs during the more remote period (month -13 to -24) is no less than the impact of more recent LAs during the prior 12 months. This suggests that amending some contract terms may take time (up to 24 months or more) to become effective and to be reflected in firms' capital structures.[10]

For robustness, we estimate alternate leverage targets as defined by Faulkender et al. (2012) who use less variables in their target estimation (excludes tax variables and Altman Z metrics, Table A3 in the Appendix for details). SOA measures based on the alternative target definition confirm a high general SOA, significant at 1 percent level (Table 2a, Column 3). In addition to the general SOA, the incremental SOA due to an LA is significant and in line with our earlier results but the magnitude of the effect is lower using Faulkender et al. (2012)'s target definition. The effect of an LA over the past 12 months is to speed up adjustment by 4.4 percentage points in Column 3. Similarly, for the effect of an LA during month -13 to -24 we find an increase in SOA of 5.5 percentage points.

[10] We also include fixed effects for the loan purpose based on "Use of Loan Proceeds" provided in the Bloomberg database, with qualitatively unchanged results as the baseline analysis (untabulated here for brevity but available from the authors upon request).

[Insert Table 2a here]

Next, we address concerns about potential endogeneity due, e.g., to non-random sample selection and reverse causality. We estimate a two-stage treatment effect (TE) model. See also our discussion of alternative econometric specifications above. The first stage models the latent dependent variable, LA, as a function of firm-, loan-, and financial-market characteristics that have been identified as LA determinants in the literature (e.g., Roberts and Sufi, 2009). The Inverse Mills Ratio (IMR) is based on estimates from the first-stage binary model of LA and is included in the second stage to address potential bias. The results of the first and second stage of the TE model are presented in Table 2b. The second stage in each column is based on the corresponding first stage in the same column.

The magnitude of the LA-specific SOA effect is between 2.9% and 11.2% and remains highly significant both 12 months and 13-24 months after an LA. The instrumental variable (IV) estimates are consistent under the assumption that the IVs are correlated with the potentially endogenous LA variable but have no direct or indirect effect on the outcome studied. For assessing the relevance of our IV, we compute the *F*-statistic and the partial *R*-squared on the instrument in the first- stage regression. The predicted LA (based on LA determinants identified in previous studies, e.g., Roberts and Sufi, 2009) is highly correlated with the endogenous variable with an *F*-statistic of at least 30.2 and a partial *R*-squared of 0.225 (Table 2b). As a rule of thumb, an *F*-statistic below 10 is suggestive of a weak instrument, as discussed in Staiger and Stock (1997.)

These results alleviate potential concerns that our coefficient estimators may suffer from biases due to a weak instrument. Predicted LAs based on empirically established LA determinants may therefore be considered as a valid instrument for the main LA variable (i.e., satisfying the *relevance* condition). We expect a variety of separate firm-, loan-, and macroeconomic variables not to be directly correlated with firms' active leverage adjustment decisions, except through the LA channel. This satisfies the exclusion condition (Bound et al., 1995). Moreover, the variables used in the first stage are not included in the second model such that estimates are subject to exclusion restrictions (Lennox et al. 2012). The second-stage regression results with instrumented LAs continue to indicate accelerated SOAs among firms that conclude an LA over the previous 24 months. Results remain qualitatively unchanged from the baseline analysis (Table 2a). We interpret the results from the TE model as further validation of our main findings.

[Insert Table 2b here]

As a further robustness check, and in order to test the counterfactual, we perform a placebo test (Roberts and Whited, 2012). We use pseudo LAs instead of actual LAs to test for potential SOA effects (falsification). Pseudo LAs are created in two different ways. Firstly, we assume that pseudo LAs occur two years after loan origination (analogous to the average time at which actual LAs are observed among the amended loans). Secondly, pseudo LA dates are assigned to each loan in a random month of the sample period of 1996 to 2016 (Dunbar, 1995; Guo and Mech, 2000). Besides the general SOA, we do not expect to see any additional SOA component attributable to pseudo LA dates. Further, we test whether there is a spurious LA effect on SOA among firms that have no access to LAs. To do so, we use an interaction term that measures the additional SOA component derived from firm-months in which no loans are in place.

Table 2c reports the results of our placebo tests. As in the baseline test, we see a positive coefficient on the general adjustment-to-target variable among all firms across our placebo tests (Columns 1 to 3). The general SOA implies that all firms tend to move towards their leverage targets (51.5%, 52.1%, and 52.7% per year, significant at 1 percent, in Columns 1, 2, and 3). Beyond the general SOA, however, we find no significant additional SOA effects over the subsequent 12 or 13-24 months after a pseudo-LA that is assumed to take place two years after loan origination (the coefficients are very small and insignificant in Column 1). Similarly, if pseudo LAs are assigned to non-amended loans in random months during the sample period, the additional SOA components are again insignificant (-0.04 and 0.01, Column 2). This is in line with our expectation that artificial, pseudo LA dates, that are not associated with material changes to existing loans, are unrelated to firms' speed of adjustment towards their leverage targets.

For firms that do not have access to LAs (Column 3), leverage adjustments are solely attributed to the general SOA. As expected, we observe no additional acceleration effect among firms that do not have loans on their books and so cannot make use of LAs to increase their SOA (insignificant coefficient -0.01 using total leverage targets).[11] Unsurprisingly, firms that do not have a loan in place do not exhibit any additional SOA effect of LAs over and above the general

[11] We also test additional SOA effects against GMM-based leverage targets as defined in Faulkender et al. (2012), with similar results (untabulated): a highly significant general SOA across all firms, along with a non-significant coefficient of -0.0 for firms that do not hold loans.

SOA. In sum, the results of our placebo tests confirm that the results of our baseline analysis are not spurious.

[Insert Table 2c here]

4.2 Leverage adjustments in over- and under-levered firms

Next, we extend our baseline analysis by differentiating between over- and under-levered firms. Previous studies highlight an asymmetric pattern of SOA for firms above and below their target leverage and find higher SOAs for financially constrained, over-levered firms (Dang et al. 2012; Mukherjee and Wang 2013). Faulkender et al. (2012) and Dang et al. (2012) conclude that firms' SOA is determined by the costs of deviating from target leverage and the cost of adjusting to the target. The asymmetric pattern of SOA is therefore likely due to asymmetries in firms' costs (e.g., Byoun, 2008). These asymmetries likely include differences in tax shields, financial distress costs, and relative issuance costs of debt and equity.[12] Our sample consists of mostly high-value loans of financially healthy firms. To the extent that issuance costs influence the leverage change decision, the low costs of LAs make maintaining and extending debt positions more attractive. This is likely to reduce the costs of exceeding target leverage for over-levered firms and may reduce their speed of returning to lower leverage targets. Hence, we expect the SOA of over-levered firms in our sample to be lower than the SOA of equivalent under-levered firms.

The mean distance from target leverage is -0.20 for *above*-target (over-levered) firms and 0.15 for *below*-target (under-levered) firms in Table A5, Panel B (in the Appendix). We test whether the LA-related SOA acceleration is more pronounced for *above* target leverage firms that benefit from large debt tax shields, or for *below*-target leverage firms with lower tax shields and higher unused debt capacity (DeAngelo and Roll 2015).

Our results are reported in Table 3. We find LA-related SOA enhancements for both over- and under-levered firms, but the effect is more pronounced for under-levered firms. The general annual SOA is 56.7 percent for total leverage (Column 1) and 68.6% for long-term leverage (Column 3). Firms with LAs over the last 24 months increase their speed of active adjustment by

[12] Previous studies suggest further reasons for asymmetries in SOA. Jalilvand and Harris (1984) show that large firms typically adjust faster to targets than smaller ones. For large, under-levered firms, Faulkender et al. (2012) find that having a bond rating more than doubles a firm's SOA. Lockhart (2014) finds that under-levered firms with access to (unutilised) credit lines exhibit higher SOAs compared to firms without open credit lines.

another 10.2 percentage points for total leverage in (1) and 12.7 percentage-points for long-term leverage in (3).[13] *Under*-levered firms show an additional acceleration of adjustment by 3.4 percentage points for total leverage in (1), and 4.5 percentage-points for long-term leverage in (3); both results are significant at 1 percent. Against the background of previous findings that under-levered firms have lower SOA, our results suggest that LAs can be particularly useful to under-levered, healthy firms to help them accelerate their SOA. *Under*-levered LA firms adjusting on average more quickly than over-levered firms is remarkable since increases in leverage (which may be indicative for the opposite: over-leverage) have been found to increase the likelihood of LAs occurring (Roberts and Sufi, 2009), which is consistent with our study modelling LAs (see Δdebt over assets, 1st stage of the TE model, Table 2b).

In terms of the impact of LAs, we observe above that the SOA-increasing effect of LAs is greater for *under*-levered firms. Nevertheless, the effect is also present for *over*-levered firms, where over-levered LA firms have still higher SOA than non-LA firms. The fact that we observe an LA effect in a sample of firms that are unlikely to experience financial distress suggests that LA effects are not driven by distress-related concerns.

Further, it is reasonable to expect that LAs are particularly important as a means of adjusting to target leverage for firms that rely heavily on bank loans. We argue that firms with high long-term debt relative to total assets are typically more reliant on bank financing.[14] In line with our expectations, we find that the SOA acceleration effect after LAs is particularly pronounced for the subsample of *under*-levered firms that rely heavily on long-term debt (captured by the binary indicator *Top 5% most long-term levered firms*). For this subsample we observe a 27.3 percentage-point increase in SOA (significant at 1%) in Column (2). These results extend our baseline finding that firms use LAs to adjust to their leverage targets, showing that LAs are particularly effective for increasing SOA in under-levered firms that rely on long-term (bank) debt.

In sum, our results suggest that the over-levered financially healthy firms in our sample face little pressure to pay off their debt and reduce leverage. We document an asymmetry in SOA

[13] We use a single LA indicator here (for LAs over the past 24 months) rather than two separate indicators (for LAs in the past 12 months and in Months -13 to -24, respectively) as in the baseline analysis to reduce the numbers of variables and interaction terms to simplify the specification.

[14] Among debt financing, the majority of debt is private (72%) with debt taking mostly the form of bank loans (Hackbarth et al., 2007; Khang et al., 2014).

with under-levered firms having substantially higher SOA than over-levered ones. The impact of LAs is particularly pronounced for firms that are below their leverage target even if they have high levels of long-term debt relative to assets already.

[Insert Table 3 here]

Factors other than size and financial strength may also explain the asymmetric SOA pattern of firms above and below leverage targets. Firstly, adjustment costs for extending a loan in an existing bank-firm relationship are relatively low (a maximum of 6,000 USD in our sample, with an average loan size of 390 million USD, Table 1). Increasing their loan exposure is therefore an easily accessible and inexpensive way for firms to extend and make use of an existing source of funds. Consistent with Graham and Harvey (2001), Bancel and Mittoo (2004), and Brounen et al. (2006), firms use bank loans as "general purpose" funds. Lockhardt (2014) reflects on the alternative uses of credit lines, for instance, for funding both investments as well as liquidity needs. 71% of all bank loans in our analysis have universal uses such as general corporate purposes, refinancing, recapitalization, backup, or capital expenditure indicated as the purpose. Stretching existing loans might be a convenient and readily available option for firms' financial needs.

The renegotiation literature documents that renegotiations are mostly initiated by borrowers (Roberts and Sufi, 2009; Garleanu and Zwiebel, 2009; Dou, 2019). The wording in amendment agreements also reflects that borrowing parties are taking the initiative (rather than the syndicate consortium). The wording in introductory paragraphs of LA agreements reads as "The Borrower has made Loan Modification Offers to the Lenders …" [15]

4.3 Impact of Various LA Types

Some amendment *types* may have a stronger impact on firms' SOAs than others. Amending the loan *amount* might be expected to affect firms' leverage immediately, while other amendment types (such as *maturity* changes or *covenant* LAs) may influence leverage in a less timely fashion sometime after the renegotiation date. Debt covenants are of clear importance in

[15] E.g., SEC file 8-K EX-10.1 "Loan Modification Agreement" Weight Watchers International Inc, dated as of April 8, 2010, lending syndication led by Credit Suisse and JP Morgan, https://www.sec.gov/Archives/edgar/data/0000105319/000119312510080072/dex101.htm
Within a normal course of business, bankers would certainly be more interested in arranging new deals than in re-contracting loans already on their books - for obvious reasons (making money, and sales incentives on new deals). E.g., McKinsey (2018): "Sales incentives that boost growth."

financial contracting (e.g., Nini et al., 2009; Denis and Wang, 2014) and in firms' leverage adjustments to their targets (Devos et al., 2017). We expect that *covenant amendments* also play a role in moderating the LA effect on SOA. Next, to assess the relative impact of different amendment types, we break down our analysis of LAs by amendment type.

Table 4 reports the LA effect on SOA by amendment type. The analysis reveals that the increasing effects of LAs on firms' SOAs are particularly strong for maturity changes. In addition to the general speed of active adjustment of 49.4 percent per year for total book leverage in Column 1, LAs involving *maturity* changes during the last 12 months are followed by an increase in the speed of active adjustment of 14.6 percentage points for total leverage in Column (1) of Table 4. For long-term leverage in Column (2), the corresponding results are 62.4% and 9.2 percentage points. All results are highly significant at 1%. Maturity amendments have a similar or even larger impact in the longer-term: Amount amendments during Months -13 to -24 are associated with a 13.9 percentage point increase in the speed of active adjustment for total book leverage, and this impact is even higher at 14.7 percentage for long-term leverage. Both effects are highly significant at 1 percent.

Notably, 97 percent of maturity amendments in our high-value loan sample are *increases* in the original loan lifetime, and 70 percent of maturity-amended loans remain on firms' books for more than 24 months after the maturity LA. Thus, loans are still in place beyond the test period of up to 24 months. This indicates that LA-related increases in SOA are unlikely to be driven by loans expiring within the test period.

By contrast, the evidence of the impact of amount and covenant amendments is more mixed. There is a significant impact of amount amendments on SOA based on long-term leverage and if the amendment occurred in the past 12 months. However, the corresponding impact for total book leverage is only 2.9 percentage points. Moreover, the impact of amount amendments that take place in the more remote window Months -13 to -24 months have only a small impact of 2 percentage points or less. and tend to have a similar or even larger impact in the longer term, 13 to 24 months after the LA. While the impact of amount amendments is stronger in the shorter term, the impact of covenant amendments is more pronounced in the longer term. A covenant amendment in Months -13 to -24 is associated with a 6.5-6.7 percentage point increase in SOA for long-term and total book leverage, respectively. Both results are highly significant at 1 percent. By contrast, a covenant amendment in the past 12 months is associated with a 4.8 percentage point increase in SOA for long-term leverage (statistically significant at 1 percent) but this result is not robust as we observe no corresponding significant impact on SOA for total book leverage.

In sum, in line with expectations we find that amount amendments have an immediate impact on SOA but this impact is unexpectedly small. Maturity amendments have a much more substantial and significant impact on SOA. Somewhat surprisingly, their effect is of similar magnitude in both the shorter (12 month) and longer (24 month) term. Our finding that covenants amendments impact SOA gradually is in line with expectations. By showing that covenant amendments impact SOA we add a novel consequence of the restrictions imposed by covenants on corporate borrowers to the literature (Denis and Wang, 2014; Devos et al., 2017). Our finding that amendments to loan amount, maturity and covenants impact SOA adds to existing research showing that non-price terms are important elements of corporate credit agreements (Nini, 2018).

[Insert Table 4 here]

Next, we focus on LAs that result in a reduction of loan amount or maturity. These LAs may be perceived as risk-reducing in that smaller and shorter loans imply less credit risk than larger and longer loans. Table 5 shows the SOA effect of LAs involving risk reducing amount or maturity decreases. The results for the general SOA and for the impact of LAs on SOA are qualitatively comparable to those in Table 2. The marginal negative impact of risk-reducing LAs on SOA more than offsets the SOA-increasing effect of LAs. We find that while firms' SOA is increased by 12.6 percentage points by an LA in the past 12 months, this effect is more than offset by the 19-percentage points reduction in SOA if the LA (within the past 12 months) involves an amount or maturity reduction. Similarly, for LAs that occurred in Months -13 to -24, we find that the LA effect of 12.6 percentage points is more than offset by the marginal risk-reduction effect of 13.1 percentage points. These results are significant at 1% with the exception of the marginal effect of risk-reducing LAs in Months -13 to -24 which is significant at 5%. In line with expectations that amount changes have a more immediate impact on SOA than maturity changes, we find that the dampening effect on SOA is most pronounced for amount decreases within the past 12 months and maturity decreases in Months -13 to -24. Amount decreases reduce SOA over the 12 months following the LA by 19.9 percentage points, and maturity decreases in Months -13 to 24 months reduce SOA by 20.4 percentage points. Both results are significant at 1%. In sum, the effect of amount- and maturity-reducing LAs is in most cases to reduce SOA to below the SOA of non-LA firms.

Next, we differentiate between firms that are above or below target leverage given our earlier findings of an asymmetric SOA and an asymmetric effect of LAs. We find that 66 percent of firms engaging in risk-reducing LAs are over-levered. While risk-reducing LA firms do move toward targets, under-levered LA firms tend to adjust to targets more quickly compared to over-levered firms (SOA effect of -0.14 for an over-levered firm the year following a risk-reducing LA, significant at the 10% level). Lower SOA implies that risk-reducing LA firms may not return all the way down to lower targets, holding on to flexible, cost-efficient and general-purpose financing sources in an existing bank-firm relationship (Boot, 2000; Brounen et al., 2006). The less pronounced SOA effect from risk-reducing LAs (compared to risk-enhancing LAs) is consistent with our findings that over-levered firms tend to adjust more slowly to targets than under-levered firms do (Table 5).

[Insert Table 5 here]

4.4 Leverage adjustments after LAs versus initial loan issues (LIs)

Our analysis so far has focused on amendments of existing loans. Next, we consider both loan amendments as well as the issue of new loans. Our focus on loan amendments so far has been motivated by our intuition that loan amendments are more likely to be used to adjust to leverage targets than new issues, among other things due to the lower costs of loan amendments compared to new issues. Moreover, while new loan issues are likely to be motivated by investment and financing policies, the main purpose of amending existing loans is to optimise existing financial contracts (Roberts 2015) which is likely to be linked to firms' efforts of optimising capital structure and reverting to leverage targets. LAs are available to firms not only as a one-off transaction when investment decisions are made (one particular point in time for *LI*s), but also throughout the lifetime of every bank loan, with adjustments being common corporate practice at low cost.

However, one may argue that the omission of new loan issues in our baseline analysis may result in omitted-variable bias. To address this concern, we now examine new loan issues alongside loan amendments. Our sample contains 5,385 loan tranches issued by 1,669 firms, and for these loans we observe 10,375 loan amendments (LAs). While our previous analysis focused on the LA events, we now extend the baseline analysis by including new issue events. The analysis reported in Table 6 examines whether the result of our baseline analysis, i.e., the impact on SOA of recent LAs, remains robust when we include new loan issue (LI) events. We find that both LAs and LIs are associated with an increase in SOA over and above the general SOA of all firms (closing 48.2% of leverage gaps each year). We find that the effect of LAs is statistically more significant and around double the size of the LI effect. While LAs completed over the last 24 months tend to speed up firms' annual adjustments by additional 10.1 percentage points, firms with a new loan over the last 24 months tend to accelerate the general annual SOA by 4.8 percentage point (statistically significant at the 1 and 5 % level, respectively). The stronger effects of LAs as compared to LIs seems consistent with Godlewski's (2015) finding that loan revisions are associated with more significant excess stock returns than new loans.

Decomposing the 24-months loan-event window into the most recent 12 months and the preceding 13 to 24-months period (as in the baseline test in Table 2a), our results confirm that the additional SOA effect is more pronounced among LA firms than among LI firms for both time periods: we observe 9.5 and 11.5 percentage-point increases in SOA, respectively, for LA firms, as compared to 5.7 and 4.1 percentage-point SOA increases, respectively, for newly issued loans. The SOA effect of LAs is also statistically more significant than LIs. In sum, our results confirm our baseline results that loan amendments have an economically and statistically significant impact on the speed of adjustment to leverage targets, and this impact dominates the effect of new loan issues.

[Insert Table 6 here]

4.5 Additional Robustness Tests

Our analysis so far has already included various robustness checks. We have employed (1) alternative leverage measures and (2) alternative measures for leverage targets involving a broad range of firm- and industry-based control variables. (3) We use different econometric models: OLS including fixed effects and a two-stage TE model as an alternative econometric specification to re-estimate the LA variable, to further address potential endogeneity concerns, e.g., due to selection bias. (4) We have conducted placebo tests based on pseudo LAs. (5) In alternate test specifications, we examine different types of loan amendments and compare below- to above-target firms. (6) We have considered alternative loan events to compare and contrast LAs versus new loan issues. We obtain positive SOA sensitivity to LAs under each of these measures and estimations.

Now we conduct further robustness checks. (7) We augment the definition of LAs to also include alternative loan events such as early repayments as amendments to the original loan contract. (8) We condition SOA effects on distinct firm- and loan characteristics. (9) We test market leverage instead of book leverage and use another econometric model: System GMM. (10) We redefine our sample period to remove the global financial crisis time window from our sample, given heightened LA activity.

Instead of amending an existing loan, an over-levered firm may choose to simply repay the loan early. Early loan repayments, in part or in full, are not required to be reported to the SEC. While they are recorded, they are not identified as loan amendments in the dataset. We check the robustness of our earlier results by including early repayments as an additional form of loan amendment in our analysis and re-estimate our analysis for over- and under-levered firms. Equivalent to amendments of the loan amount ('amount-LAs'), examined previously, early repayments affect firms' leverage and may influence our test results for below- and above-target firms. We re-estimate the SOAs of over- and under-levered firms based on an augmented LA definition that includes early repayments using data on 24,738 LAs, of which 2,957 LAs relate to the loan amount, and an additional 2,065 early-repayment events. Early repayments are included in the month at which the loan size drops to zero, whenever this drop is observed ahead of the agreed loan maturity.

The results are reported in Table 7. Based on the augmented LA definition including early repayments, under-levered firms still show an additional increase in SOA of 2.3 percentage points for total leverage in Column (1) (and 4.3 percentage points for long-term leverage in Column (2)), both highly significant at the 1 percent level. Hence, our modified test confirms our baseline results reflecting asymmetric SOAs for below- and above-target firms. Even when considering early repayments in addition to formal LAs, financially unconstrained, under-levered firms tend to use low-cost amendments of loans within existing bank loan relationships to adjust toward higher leverage targets at a higher speed than above-target firms do. This is consistent with our earlier results and conclusions in Table 3. Previous studies find higher SOAs among over- rather than under-levered firms, but they consider financially constrained firms while our sample consists of healthy, liquid firms.

[Insert Table 7 here]

One may argue that the distance from leverage targets could be the underlying trigger or necessity for firms' engagement in loan renegotiations in the first place. However, we estimate a Probit model and find that firms' leverage gaps do not have explanatory power for LAs taking place over the next 12 months.[16] We note that the firm-specific, time-varying target estimation (Eq. 1) employed to measure leverage gaps does already account for a range of firm- and industry-specific control variables that have been identified in the literature as determinants of capital-structure choices.

While we control for various firm characteristics and fixed effects in our target definitions and baseline analysis already, one may argue that SOA effects and target adjustment costs are influenced by firms' performance paths, creditworthiness, and other contractual aspects. We therefore test explicitly for a range of financial features by interacting the main explanatory leverage-gap variable of LA firms with (i) their *performance* at the time of an LA relative to their pre-origination performance; (ii) firms' *Altman Z* score (Column 2; with higher scores indicating higher distance to default); (iii) contract facilitators such as "*covenant lite*" upon loan origination; (iv) the timing of LAs ("*Young Loan*" specifying early renegotiations observed in the first half of a loan lifetime, Column 4), (v) as well as LAs recorded in the *final year* prior to original loan maturity (Column 5).

We compare firms' EBITDA-to-total asset ratio at the time of loan amendment and at loan origination (Denis and Wang, 2014). Only a small proportion of firms report lower performance at the time of an LA than at loan origination (2.2% of sample LA observations follow a performance decline). The correlation between performance decreases and firms being over-levered is weak.[17] We find no significant marginal SOA effects for low performers and no evidence that performance declines drive our baseline results. Coefficients that measure the SOA effect of LA firms with downward performance trends are small and insignificant in Column (1) of Table 8. Declining performance is therefore not a significant determinant of firms' active leverage adjustment decisions.

Next, we examine the SOA effect from variations in LA firms' distance to default measured by Altman Z scores (Table 8, Column (2)). The correlation between above-average Altman Z

[16] The coefficient of the leverage gap in the Probit model is small at -0.007 and insignificant. The coefficient remains the same when we control for firm- and year-fixed effects. The results are untabulated here for brevity but are available from the authors upon request.

[17] The correlation coefficient is -0.04, and the correlation remains weak irrespective of whether we use binary or continuous measures of performance decreases and leverage levels above target.

scores (i.e., above-average distance to default) and sample firms being under-levered is weak (correlation coefficient of 0.07). The magnitude of SOA effects from variations in the Altman Z score in our sample of large-cap, healthy firms is small (less than -0.01). As the costs of being away from their targets may be low, firms with high Altman Z scores tend to adjust more slowly to their targets than firms with lower Altman Z score (consistent with Dang et al., 2012). Given the low coefficient on the Altman Z interaction term in Table 8, we conclude that variation in the Altman Z distance-to-default is not a significant driver of the SOA results in this study.

Next, we include an interaction term that captures "*covenant lite*" (a dummy variable equal to 1 if a loan contract is recorded as "covenant lite", zero otherwise). As the pace of commercial lending has quickened in recent years, Berlin et al. (2020) highlight the marketing and growth of so-called covenant-lite loans—loans without traditional financial covenants— which sparks debates in the financial industry and media (Financial Times, 2019). Policy makers have interpreted the rising proportion of covenant-lite loans as a sign of alleviating banks' monitoring and control. 2.6 percent of our high-value loan observations are recorded as covenant lite (consistent with the study by Berlin et al., 2020, classifying roughly 2% of term loans as covenant-lite). LA-associated SOA tends to be higher among firms with covenant-lite contracting: by 0.12 percentage points within 12 months after an LA, and by 0.14 within 13 to 24 months after amending loans that do not have financial covenants (significant at the 5% level, respectively). The accelerating LA effect of covenant-lite loans is in line with the finding of Devos et al. (2017) that (strict) financial covenants tend to slow down the SOA, although Devos et al. examine merely the presence of covenants but not *amendments* of covenants or of other loan characteristics.

Now, we interact firms' leverage gap with LAs completed early in a loan's lifetime ("*Young Loan*": equal to 1 if loans are renegotiated before half of the loan lifetime has elapsed, and 0 otherwise). Early LAs may be considered to reflect more surprising information or unforeseen changes in companies' affairs (Roberts and Sufi, 2009). However, we do not find a significant Young-Loans renegotiation effect on firms' SOA in our large-sample study. The estimated coefficients are small and statistically insignificant.

Lastly, we analyse LAs observed in the final year of the original life of the loan (Table 8, Column (5)). Increased LA activity shortly before loans expire may reflect that borrowing firms may not be confident or may hesitate to pay back large loans on time. For loans that are amended in our sample, the average time between LA and the original maturity date is 1.7 years. We do not find a statistically significant SOA effect if loans are amended within a year of the original loan maturity. The estimated coefficients on the interaction term specifying LAs during the final year before the original maturity date are insignificant. We conclude that the results in our study are not driven by LAs shortly before original maturity, and there is no evidence for roll-over or near-distress problems in our sample consisting of mostly high-value loans.

[Insert Table 8 here]

For robustness, we now examine market leverage. We estimate alternate market leverage targets using OLS and system GMM for further robustness as presented in the Method Section, Equation (2) (based on Blundell and Bond, 1998; Flannery and Hankins, 2011). Using market leverage with targets as defined in Faulkender et al. (2012), we find the general SOA to be 42.8 percent per year using OLS estimates (Table 9, Column (1)) and 41.2 percent using GMM in Column (2). Our results are in line with Faulkender et al. (2012), who find that SOAs based on book leverage and market leverage are very similar.[18] Compared to the baseline test, different SOAs from OLS and GMM-target tests are consistent with Warr et al. (2012) who find stronger SOA effects using OLS-estimated leverage targets. Consistent with our earlier results, we find a significant LA-effect in terms of an incremental SOA of 5.8 percentage points for LAs completed over the past 12 months using either OLS or GMM-estimated targets in (1) and (2). For LAs during months -13 and -24 month, the incremental SOA is 4.1 percentage points using OLS targets in Column (1) and 4.0 percentage points using GMM-estimated targets in Column (2), both highly significant at 1 percent. Both methodologies, system GMM and fixed-effects OLS approach, yield the same conclusion. In sum, our results are broadly robust to using alternate definitions of leverage and alternated methods of estimating leverage targets.

[Insert Table 9 here]

One may argue that borrowers' financing policies and target behaviour cannot compensate for severe market disruptions, such as frictions and economic uncertainty during the global financial crisis 2008/09 (Ivashina and Scharfstein, 2010; Warr et al., 2012). As a further robustness check, we exclude observations during the years 2008 and 2009 from our baseline test and estimate firms' SOAs over an alternative sample period. The results reported in Table 10 show that our findings are robust to that change. All firms in our reduced sample tend to

[18] For a discussion on the primarily tested book-valued versus market-value leverage see Welch (2011).

actively adjust towards total leverage targets (Column 1) at an annual SOA of 48.3 percent (corresponding with our baseline results). Firms that have renegotiated their loans over the preceding 12 months speed up their active adjustment by an additional 10.2 percent, and they do so by an additional 11.2 percent if loans have been renegotiated over the previous 13 to 24 months (equivalent to the acceleration measured in the full sample period), significant at the 1 percent level. All firms, in the reduced loan sample, tend to actively adjust their long-term debt with an annual SOA of 59.5 percent (close to the full-sample estimate of 61.5%), which is accelerated by 10.6 percent if LAs have been observed over the last 12 months, or by 13.3 percent if loans have been renegotiated over the preceding 13 to 24 months (significant at the 5% and 1% levels, respectively, and corresponding to the additional SOA components identified for the full sample period).[19] While informational uncertainty and the economic environment may have provoked a pronounced need for firms to amend loan terms (Godlewski, 2015), we conclude that the main results remain robust when excluding observations during the global financial crisis, with SOA estimates similar to those found over the entire sample period.

[Insert Table 10 here]

A range of robustness checks substantiate our main findings and indicate that loan amendments help to significantly speed up firms' adjustments to capital-structure targets. Overall, the range of test results suggest that LAs serve as a feasible conduit for firms to adjust towards their targets more quickly. Our findings bring to light novel benefits of private debt renegotiation and corroborate previous studies documenting the distinct value of loan amendments to firms that are not in financial distress (Denis and Wang, 2014; Roberts, 2015; Godlewski, 2015; Chu, 2019).

5. Conclusions

Firms tend to renegotiate their bank loans frequently: Nine out of ten bank loans undergo a loan amendment (LA) at least once during their lifetime. LAs allow for short-term and up-to-date adjustments of loan terms. Either a particular term or a combination of terms can be modified at any time and more than once during a loan's lifetime (e.g., Roberts, 2015). Nevertheless, there are to date few empirical studies examining the role of LAs for healthy, non-distressed firms.

[19] We also reduce the sample period even further (to 1996 to 2006 only) in order to eliminate potentially uncommon target behaviour observed in the aftermath of the global financial crisis. The main results of LA effects remain in place (untabulated).

Our study provides large-sample empirical evidence (covering a period from 1996 to 2016) on firms' use of debt renegotiation and LAs as a tool to move to leverage targets more quickly. This paper contributes to our understanding of whether, how and when firms move towards their leverage targets. To our knowledge, it is the first study to link LAs to firms' speed of adjustment (SOA) to target leverage.

Our empirical specification follows a well-established two-stage model for measuring firms' SOA and is based on the *active* part of firms' leverage adjustments exclusively (Faulkender et al., 2012). Our baseline analysis provides empirical evidence that LAs serve as a functional channel for firms to speed up their return to capital structure targets. The result is robust to using a variety of target definitions and estimation methods adopted in the recent capital structure literature, including the system generalized method of moments (GMM) estimation technique that explicitly accounts for the dynamic nature of firms' capital structures. Alternative empirical specifications, such as placebo tests and the treatment-effects model, are used to address endogeneity concerns and confirm that our baseline results are robust. Examining a broad range of different LA types, relating to amendments of different aspects of loan contracts, we identify maturity and covenant changes to be the main drivers of the impact of LAs on the speed of adjustment (SOA) to target leverage. "*Covenant lite*" contracts are a noticeable, recent development in the competitive commercial lending market (Berlin et al., 2020). We find that loan contracting on a covenant-lite basis helps LA firms to move towards their target leverage more quickly. We examine newly issued loans in addition to LAs and find that the associated increase in SOA is more pronounced after LAs than after the new issues of loans. New loan issues may be driven by firm's financing requirements while LAs play a stronger role in adjusting to target leverage.

We find that LAs speed up adjustment more in *under*-levered firms, consistent with tests on financially unconstrained firms in Faulkender et al. (2012) and Lockhardt (2014). By contrast, previous evidence for financially constrained firms shows that constrained *over*-levered firms adjust to target leverage more quickly (Byoun 2008; Dang et al. 2012). Increased SOAs following LAs among under-levered firms indicate that amending existing bank loans is a popular financing option to adjust towards higher leverage targets. Our findings are robust to (i) alternate definitions of leverage targets used in the recent capital-structure literature; (ii) alternative loan events (including early repayments as well as new loan issues) and (iii) a variety of econometric specifications, including OLS with borrower fixed effects, generalized method of moments (system GMM, Blundell and Bond, 1998), placebo tests, a two-stage treatment-effects model and an alternate sample period excluding the global financial crisis.

Our study highlights distinct cost advantages to firms amending loans within existing bank-lending relationships given median amendment fee of just 3,500 USD (0.001% of median loan amount). The ease and flexibility of LAs within the normal course of business with their banks is valuable to firms. The novel LA benefits identified in this study help explain the attractiveness of bank loans and the popularity of the syndicated loan market relative to bond issuance and other sources of financing, even for very large, public corporations (Sufi, 2007; Berlin et al., 2020).

This paper contributes to the limited existing literature on bank debt renegotiation outside of financial distress that shows that LAs are associated with benefits such as higher firm investments (Denis and Wang, 2014; Chu, 2019) and increases in stock prices (Godlewski, 2015). Key contributions of our empirical study to this emerging research area are new insights on the role and impact of private debt renegotiation based on a large, novel dataset.

Evaluating target adjustments beyond the US market might lead to a slightly different or more complete picture of renegotiation benefits. Moreover, we know little about the lenders' role in loan re-contracting (Beyhaghi et al., 2019, shed some light on loan renegotiations and the role of nonbanks in lending syndicates recently). Do banks that face tighter regulatory restrictiveness approve less generous renegotiation outcomes than banks that have more comfortable capital buffers? The influence of geographic proximity between lender and borrower is also an area for future research.

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Appendix

A1: Examples of Loan amendments

The following examples are intended to give an idea of the context and impact of loan amendments (LAs) observed in our sample focusing particularly on the effect of the LA on the leverage gap. Examples and wording of amendment agreements are collected for case-based illustration, context, and verifying data quality from the EDGAR database (www.sec.gov/edgar for 10-K, 10-Q or 8-K files).The table provides two examples of loan amendments: one amount amendment and one maturity amendment. In each case, the LA results in the firm moving closer to its leverage targets than without the LA.

Example 1: Amendment of Loan Amount

The first example relates to an Ohio-based company, Andersons, Inc. At the end of 2010, Andersons was *under*-levered with a leverage gap of 0.046. In January 2011, the company and its lenders increased the loan amount by around 18% which more than closed the leverage gap and resulted in the company moving from below its leverage target to slightly *over* its target with a post-LA leverage gap of -0.002. The SEC announcement of the LA is available on Edgar.[20]

Example 2: Amendment of Loan Maturity

The second case relates to Power Integrations, Inc., a Delaware corporation. In early 2014, Power Integrations Inc. is under-leveraged with a leverage gap of 0.229. In April 2014, the company and its lenders agree to extend the maturity of a large loan by two years (from 2015 to 2017). After this loan amendment, the company's leverage gap is slightly lower at 0.220 in 2016. While the gap is only slightly narrower than in 2014, the principal impact of the loan amendment is to stop the widening of the leverage gap which would have occurred had the substantial loan of $100,000,000 been repaid as originally contracted in July 2015. The SEC announcement of the LA is available on Edgar.[21]

[20] The SEC 8-K (Current report) EX-10.45 amendment file is available as follows: https://www.sec.gov/Archives/edgar/data/0000821026/000129993311000113/exhibit1.htm

[21] For the 10-Q (Quarterly report) EX-10.1 amendment file, along with the initial Credit Agreement July 5, 2012:
https://www.sec.gov/Archives/edgar/data/0000833640/000083364014000110/powi-ex101_creditagreement.htm
https://www.sec.gov/Archives/edgar/data/0000833640/000083364012000183/ex101creditagreement.htm

Table A2. Description of Amendment Types

This table provides a comprehensive list of different types of amendments included in the Bloomberg database. Data source: Bloomberg Professional.

- Borrowed Amount: Change of the amount borrowed.
- Borrowing Base Amount: Change of the borrowing base amount, which is the value assigned to a collection of a borrower's assets (such as accounts receivable or inventory), used by lenders to determine the initial and/or ongoing loan amount, and/or compliance with one or more debt covenants.
- Covenant Financial: Change in financial covenants (enforcing minimum financial performance against the borrower, such as coverage, leverage, current ratio, tangible net worth, or maximum capital expenditure).
- Covenant Non-Financial: Change in non-financial covenants, either affirmative (which states what action the borrower has to take to comply with the loan) or negative (which limits the borrower's activities).
- Definition Change: Change of the definition of key terms in the loan agreement (e.g., the definition of an accounting ratio used as a benchmark for a financial covenant, such as the equity-to-assets ratio).
- Early Repayment: Dummy equals one if the loan size has dropped to zero before the maturity date (and the loan amount was non-zero in the preceding month); zero otherwise.
- Facility Amount: Change in facility amount.
- Loan Fee: Change in loan fees (e.g., upfront fee, commitment fee, facility fee, etc.)
- LOC Amount: Change in the line of credit amount which serves as a guaranteed umbrella provided by lenders to pay off debt or obligations if the borrower cannot.
- Maturity Change: Change of the loan maturity.
- Pricing Grid: Change in the pricing grid such as altering the level of applicable margin contingent on the borrower's leverage (e.g., when the borrower's average leverage is greater than 1.75, the applicable margin becomes Libor +2.00 + Prime rate +0.25 + Commitment fee +0.50, whereas when its average leverage drops below 1.00, the applicable margin equals Libor +1.25 + Prime rate +0.00 + Commitment fee +0.25).
- Outstanding Amount: Change of the loan's outstanding amount.
- Prepay Amount: Change of the prepay amount.
- Tranche Amount: Change of the tranche amount.

Table A3: Firm Variables in Leverage Target Calculation

Ia. Variables underlying the target definition in Devos et al. (2017).

▪ Actual tax rate:	Actual income taxes paid, scaled by pre-taxable income in the preceding year (for an alternative target measure).
▪ Altman Z-score:	The company's likelihood of bankruptcy. (1.2*working capital / total assets) + (1.4*retained earnings / total assets) + (3.3*EBIT / total assets) + (0.6*book value of equity / book value of total liabilities) + (0.99*sales / total assets)
▪ Depreciation:	Depreciation expenses over total assets.
▪ Dividends:	Common stock dividend scaled by total assets.
▪ Fixed assets:	Plant, property, and equipment, scaled by total assets.
▪ Industry-median debt ratio:	Calculated as the median debt ratio of the industry. Industry is defined by the first two digits of the SIC code of the firm.
▪ Long-term leverage:	Long-term debt scaled by book value of assets (measured as the sum of a firm's long-term debt, excluding long-term debt due in one year (mnemonic *dd1*) at time *t*, scaled by total assets).
▪ Marginal tax rate:	Equal to the statutory tax rate (35% since 1993) if the firm reports no net operating tax loss carry forward (from Compustat) and positive pre-tax income.
▪ Market leverage:	Total liabilities divided by the sum of liabilities plus market value of equity.
▪ Market-to-book ratio:	Market over book value of assets. Market value is calculated by total assets minus total equity minus deferred taxes plus market value of equity.
▪ Operating income:	Operating income scaled by book value of assets.
▪ R&D:	Research and development expenses, scaled by sales.
▪ R&D dummy:	Dummy variable that equals one if the firm reports missing R&D, and zero otherwise.
▪ Total assets:	Natural logarithm of total assets.
▪ Total leverage:	Total debt scaled by book value of assets.

Ib. Variables underlying the target definition in Faulkender et al. (2012) and based on Lemmon et al. (2008) and Flannery and Rangan (2006).

▪ Depreciation:	(Depreciation + amortization) / total assets.
▪ EBIT:	(Income before extraordinary items + interest expenses + income taxes) / total assets.
▪ Fixed assets:	Net property, plant, and equipment, scaled by total assets.
▪ Industry-median leverage:	Median debt ratio for the firm's Fama and French (1997) industry (as in Hovakimian et al., 2001).

- Leverage: Total liabilities over total assets (Lev^B: in book values; Lev^M: in market values).
- Market-to-book value: (Book liabilities + market value of equity) / total assets.
- R&D: Research and development expenses scaled by total assets (missing R&D expenses are treated as zero).
- R&D dummy 1 if research and development expenses are reported, else zero.
- Total assets: Natural logarithm of total assets deflated by the consumer price index to 1983 dollars.

All variables that are winsorized at the 1st and 99th percentiles.
Data source: Standard & Poor's Compustat.

Table A4: Determinants of Loan Amendments (Variables Included in Estimations in Table 2b)

a. *Borrower characteristics:*

Data source: Standard & Poor's Compustat.

- ΔDebt over Assets: Change in debt over total assets.
- ΔEBITDA over Assets: Change in EBITDA over total assets.
- Equity Return: The growth rate of the firm's market capitalization.
- ΔLog Assets: Change in the logarithm of total assets (*t* minus *t-1*, change versus last year, as well as change against pre-loan origination).

b. *Macroeconomic financial variables:*

Data source: Federal Reserve Bank of St. Louis, https://fred.stlouisfed.org.

- ΔBank Leverage: Change in total liabilities over total assets for commercial banks in the United States.
- ΔCredit Spread: Change in credit spread between BB-rated and AAA-rated bonds.

c. *Loan characteristics*

Data source: Bloomberg Professional.

- Financial Covenant: Dummy variable equal to one if the loan contract includes financial covenants, and zero otherwise.
- Young Loan Indicator equal to one if the loan is renegotiated before half of the maturity has elapsed.
- Log Maturity: Natural logarithm of the loan's maturity.

Table A5: Firm characteristics and leverage targets

Panel A of this table presents statistics of variables used to estimate firms' leverage targets, along with key firm characteristics over the 1996-2016 sample period, collected from the S&P Compustat database. Panel B contains target leverage estimates, where *Active leverage change* ($L_{i,t} - L^{P}_{i,t-1}$) measures firms' active adjustment towards capital structure targets, after separating a firm's leverage change into a passive, mechanical part and an active adjustment decision; $L^{P}_{i,t-1}$ is defined as the firm's leverage excluding active leverage adjustments (calculated as the previous year's total debt divided by the sum of total assets plus their increase by net income, *NI*, in the current year), as presented in Eq. 4. *Active change* in book leverage is capped at two to reduce the effect of extreme income realizations. *Actual tax rates* are income taxes paid (TXPD) divided by net income (NI) in the previous year. *Altman* (1968) defines the Z-score to discriminate healthy and problematic firms, where *Z*-scores above 2.99 indicate firms unlikely to go into bankruptcy, while a *Z* below 1.81 classifies firms two years prior to bankruptcy (the area between 1.81 and 2.99 defines a "grey area"). *Distance from target* ($L^*_{i,t} - L_{i,t-1}$) is the firm's leverage target less the leverage in the previous year. *Long-term leverage* does not consider liabilities that are due in up to one year. *Marginal tax rate* (MTR) accounted for in firms' leverage target estimation (Devos et al., 2017) is equal to the statutory tax rate if the firm has no net operating tax loss carry forward and positive pre-tax income. *Market leverage* is defined as total liabilities divided by liabilities plus the market value of equity. *Target leverage* $L^*_{i,t}$ denotes firm-individual leverage targets estimated for every year *t* based on firm and industry characteristics in *t-1*. *Total debt* includes both firms' long-term debt and current liabilities (abbreviation "*DT*" in Compustat). *Total leverage* is the ratio of total debt to total assets. Detailed variable descriptions are provided in the Appendix, Tables A3 and A4.

Panel A:	Overall sample 1996-2016 (N = 1,669 US firms)			Firms with LA (N = 1,024 US firms)			Non-LA firms (N = 645 US firms)			Differences in	
Variables determining firms' time-varying targets and related variables										Mean T-test	Median Wilcoxon
	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	(p-value)	(p-value)
Total Assets in million USD	4,353	1,042	20,638	4,239	1,061	20,837	6,015	859	17,416	0.02**	0.86
Fixed Assets over Total Assets	0.28	0.22	0.23	0.28	0.22	0.23	0.29	0.22	0.23	0.03**	0.33
Depreciation + Amortization / TA	0.04	0.04	0.04	0.05	0.04	0.04	0.04	0.03	0.03	0.00***	0.00***
Operating Income over Total Assets	0.11	0.13	0.29	0.11	0.13	0.26	0.08	0.13	0.55	0.00***	0.00***
R&D expenses over Total Assets	0.02	0.00	0.08	0.02	0.00	0.07	0.04	0.00	0.12	0.00***	0.05**
R&D dummy	0.41	0.00	0.49	0.40	0.00	0.49	0.41	0.00	0.49	0.11	0.11
EBIT over Total Assets	0.03	0.00	0.13	0.03	0.02	0.13	0.02	0.00	0.13	0.00***	0.01***
Dividend over Total Assets	0.01	0.00	0.02	0.01	0.00	0.02	0.01	0.00	0.03	0.00***	0.47
Actual Tax rate	0.14	0.15	1.70	0.14	0.15	1.69	0.11	0.16	1.80	0.73	0.03**
Marginal Tax rate	0.14	0.00	0.17	0.14	0.00	0.17	0.13	0.00	0.17	0.35	0.35
Altman Z-score	3.32	3.57	0.42	3.67	3.74	0.23	3.25	2.88	0.42	0.36	0.28
Market-to-Book ratio	1.76	1.38	3.21	2.19	1.46	3.24	1.73	1.38	1.65	0.00***	0.01***
Median Industry Debt ratio	0.23	0.22	0.12	0.22	0.22	0.12	0.24	0.22	0.14	0.04**	0.22
Long-term Leverage	0.27	0.24	0.23	0.27	0.24	0.23	0.27	0.22	0.26	0.06*	0.03**
Market Leverage	0.43	0.41	0.23	0.44	0.42	0.23	0.41	0.37	0.23	0.00***	0.00***
Total Leverage	0.32	0.29	0.24	0.32	0.29	0.23	0.32	0.30	0.28	0.61	0.18
Total Debt in million USD	1,572	281	10,956	1,546	287	11,245	1,943	177	5,168	0.44	0.00***
Panel B:										Mean	Median
Target measurements	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	(p-value)	(p-value)
Target Leverage	0.27	0.26	0.12	0.27	0.26	0.11	0.28	0.27	0.14	0.06*	0.00***
Distance from target $L^*_{i,t} - L_{i,t-1}$	-0.05	-0.02	0.23	-0.05	-0.02	0.23	-0.06	-0.03	0.26	0.73	0.77

• Above-target firms	-0.20	-0.16	0.17	-0.20	-0.16	0.17	-0.22	-0.18	0.19	0.59	0.86
in million USD	-871	-167		-848	-170		-1,323	-155			
• Below-target firms	+0.15	+0.13	0.12	+0.15	+0.13	0.11	+0.16	+0.12	0.14	0.08*	0.33
in million USD	+653	+135		+636	+138		+962	+103			
Active change $L_{i,t} - L^P_{i,t-1}$	0.04	0.00	2.35	0.05	0.00	2.41	0.01	0.00	0.47	0.71	0.80
• Active increase $L_{i,t} - L^P_{i,t-1}$	+0.16	+0.04	3.35	+0.17	+0.04	3.46	+0.12	+0.05	0.51	0.88	0.10*
in million USD	+892	+56		+935	+57		+794	+58			
• Active decrease $L_{i,t} - L^P_{i,t-1}$	-0.07	-0.03	0.46	-0.07	-0.03	0.46	-0.10	-0.02	0.41	0.17	0.96
in million USD	-794	-58		-794	-58		-532	-10			

Table 1: Loan and LA characteristics

This table presents loan characteristics and LA statistics in the loan sample of US firms from 1996 to 2016. A loan or credit facility is recorded as "Loan Tranche" in the Bloomberg database. "Loan Deals" may comprise more than one loan tranche (1.6 tranches per deal on average). One loan tranche can comprise several "loan paths". Detailed variable descriptions are provided in the Appendix, Tables A2 to A4.

	Overall sample 1996-2016 (N = 5,385 loans)			Amended loans (N = 4,863 loans)			Non-amended loans (N = 522 loans)			Differences in	
(in million USD)	Mean	Median	SD	Mean	Median	SD	Mean	Median	SD	Mean T-test (p-value)	Median Wilcoxon (p-value)
Loan size	390	150	821	358	150	692	693	200	155	0.00***	0.00***
	(min: 0.1	max 22,060)		(min: 0.1 max 12,500)			(min: 0.1 max 22,060)				
Original loan amount	455	159	982	405	150	771	759	200	177	0.00***	0.00***
Ratio loan size to borrowers' total debt	17.7%	50.2%	6.31	22.0%	51.9%	5.10	9.7%	39.2%	15.45	0.00***	0.00***
Loan lifetime in years (from origination to maturity)	5.3	5.0	2.7	5.3	5.0	2.7	5.5	5.0	2.6	0.08*	0.00***
Number of LA dates (events)				10,375							
Number of LA Types per LA date [a]				2.9	2	2.7					
Number of LA Types per loan				5.1	3	23.4					
Number of total LAs recorded (ie. LA types; excl early repayments)				24,738							
Amount changes				3,502							
plus early repayments				2,065							
Maturity changes				2,680							
LAs financial covenants				3,017							
LAs non-financial covenants				3,176							
Definition change				8,267							
Pricing grid change				2,422							
Loan fee change				1,622							
Collateral change				52							
Amount Change (million USD)				37	31	76					
				(min: -12,400 max 4,570)							
Maturity Change (in years)				3.6	2.8	3.1					
				(min: -4.7 max 17.6)							
Time to 1st LA				1.3	1.0	1.4					
Avg time between origination & LA				2.4	1.7	2.4					
Assignment Fee (in USD)				3,490	3,500	403					

Current Margin (in bp)	244 (min -100[b] max 1,800)	200	173	245 (min -100 max 1,800)	200	171	237 (min 0 max 1,000)	175	189	0.36	0.01***
Loan Spread at Close (in bp)	226 (min -100 max 10,000)	200	233	226 (min -100 max 10,000)	200	240	223 (min 10 max 1,000)	175	174	0.82	0.27
Loan Default Spread (in bp)	228 (min 0 max 1,800)	200	95	227 (min 0 max 1,800)	200	94	233 (min 0 max 1,200)	200	109	0.85	0.81
Secured loans (% of all loans)	3,176 (59%)			2,847 (59%)			329 (63%)			0.05**	0.05**

[a] Most LA dates comprise more than one LA *type* (eg., amount *and* maturity change).

[b] A (temporarily) negative margin can occur when the reference interest rate (eg., LIBOR) increases, but the interest rate charged for the loan is not (yet). An alternative explanation may be that the default risk spread (as part of the overall margin charged) has increased above the current margin.

Table 2a: Impact of Loan Amendments on Speed of Adjustment – Various Leverage-Target Definitions

This table presents the baseline test of the association between the occurrence of a loan amendment (LA) and firms' active adjustments towards their leverage targets. The dependent variable is the firm's active adjustment towards target leverage defined as the *active* change in leverage over the last year shown in Eq. (4a). The key variables of interest are the two interaction terms between the distance from target leverage and a binary indicator that is one if an LA is observed (i) over the preceding 12 months or (ii) between 13 and 24 months ago (0 otherwise). The distance from the target is defined as the leverage target in *t* minus adjusted leverage in *t-1* measured as [debt over (total assets plus net income)] as in Eq. (4b). Column (1) shows the SOA based on total book leverage targets as defined by Devos et al. (2017); Column (2) shows the SOA based on their long-term book leverage definition, and Column (3) shows firms' SOA calculated from total book leverage as defined by Faulkender at al. (2012) (consistent with Flannery and Rangan, 2006, and Lemmon et al., 2008; Faulkender et al., 2012, do not define a long-term leverage variable). Control variables (i.e., variables used in the estimation of target leverage) are not reported for brevity. Fixed effects are included at the firm level. Bootstrapped standard errors are used to account for generated regressors. Coefficients significant at 1%, 5%, and 10% levels are indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage (*t* – *t-1*)		
	(1)	(2)	(3)
Distance from target	0.484***	0.615***	0.313***
	(0.000)	(0.000)	(0.000)
Distance from target × LA (last 12M)	0.106***	0.121***	0.044***
	(0.000)	(0.002)	(0.000)
Distance from target × LA (-13 to -24M)	0.114***	0.140***	0.055***
	(0.000)	(0.000)	(0.000)
LA (last 12M) (binary)	0.019***	0.011***	0.047***
	(0.000)	(0.000)	(0.000)
LA (-13 to -24M) (binary)	0.010***	0.007***	0.040***
	(0.001)	(0.039)	(0.578)
Control variables (estimating Lev targets)	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Adj. R-squared	0.414	0.378	0.427
Number of observations	934,117	909,939	1,010,225

Table 2b: LA Impact on SOA in Two-stage Treatment-effects Model

This table presents the regression results of the treatment-effects model in a two-stage format, which accounts for potential endogeneity of the LA variable. Panel A of the table (stage 2) shows firms' general SOA plus the SOA effect following an LA, while correcting for the LA outcome potentially being biased (stage 1). The dependent variable in Panel A is the active change in Total Leverage over the last year ($L_{i,t} - L^{P}_{i,t-1}$), that is, after separating a firm's leverage change into a passive, mechanical part and an active adjustment decision (consistent with the baseline test, as presented in Eq. 4). The main explanatory variable in stage 2 is the distance from the firm's leverage to its target (leverage gap, $L^*_{i,t} - L_{i,t-1}$) interacted with a dummy variable representing whether an LA occurs over the preceding 12 months, or between 13 and 24 months ago (1 if so, 0 otherwise). As in the main baseline test, the leverage target definition follows Devos et al. (2017). The model adjusts for LA-related endogeneity by including the Heckman (1979) Inverse-Mills ratio (IMR) as additional regressor. The IMR is estimated with a probit model, including regressors potentially affecting the firm's decision to renegotiate a loan. Panel B: The first stage estimates the probability of an LA occurring (1 in the loan month an LA is observed, 0 otherwise) based on firm-specific, loan-specific, and macroeconomic determinants of LAs drawn from prior literature (especially in Roberts and Sufi, 2009). Variables are explained in Appendix Tables A3 and A4. Changes in these variables are measured over the last year (*t-1* to *t*) in Columns (1a) and (1b); alternatively, we measure changes in those characteristics in stage 1 against the period preceding loan origination in Columns (2a) and (2b). Including firm-, year-, and deal-fixed effects and other control variables (as in Devos et al., 2017) adds further robustness to our SOA measures. Coefficients significant at the 1%, 5%, and 10% levels are denoted by ***, **, and *. Intercepts are not reported.

Panel A: Second-stage regression	Active change in Leverage ($t - t$-1)			
	LA-IV by Δdeterminants over pre-LA year		LA-IV by Δdeterminants since loan origination	
	(1a)	(1b)	(2a)	(2b)
Distance from target	0.592*** (0.000)	0.643*** (0.000)	0.558*** (0.000)	0.608*** (0.000)
Distance from target × LA (last 12M)	0.051*** (0.000)	0.045*** (0.000)	0.068*** (0.000)	0.057*** (0.000)
Distance from target × LA (-13 to -24M)	0.075*** (0.000)	0.044*** (0.000)	0.109*** (0.000)	0.076*** (0.000)
LA (last 12M)	0.003 (0.196)	0.000 (0.976)	0.005* (0.097)	0.001 (0.827)
LA (-13 to -24M)	0.001 (0.740)	0.001 (0.740)	0.004 (0.323)	0.003 (0.369)
Inverse Mills Ratio	-0.011 (0.148)	-0.004 (0.534)	-0.067*** (0.000)	-0.055*** (0.000)
Controls (Lev-target characteristics)	No	Yes	No	Yes
Firm FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes
Deal FE	Yes	Yes	Yes	Yes
Adj. R-squared				0.460

Panel B: First-stage probit model	Binary dependent variable: LA			
LA determinants:	by Δdeterminants over preceding year ($t - t\text{-}1$)		by Δdeterminants since loan origination ($t - t_{pre\ loan}$)	
ΔLog Assets	-0.078***	-0.096***	-0.016*	-0.017*
	(0.000)	(0.000)	(0.075)	(0.058)
ΔDebt over Assets	0.011**	0.010*	0.107***	0.099***
	(0.048)	(0.070)	(0.000)	(0.000)
ΔEBITDA over Assets	0.010**	0.010*	0.042***	0.038***
	(0.050)	(0.052)	(0.000)	(0.000)
Equity Return	-0.001	-0.001	-0.003**	-0.003*
	(0.651)	(0.653)	(0.048)	(0.053)
Log Maturity	0.125***	0.126***	0.103***	0.102***
	(0.000)	(0.000)	(0.000)	(0.000)
Financial Covenant in place	1.473***	1.466***	0.285***	0.293***
	(0.000)	(0.000)	(0.000)	(0.000)
Young Loan	-0.299***	-0.300***	-0.365***	-0.362***
	(0.000)	(0.000)	(0.000)	(0.000)
ΔBank Leverage	8.403***	8.475***	6.922***	6.980***
	(0.000)	(0.000)	(0.000)	(0.000)
ΔCredit Spread	-0.029***	-0.029***	-0.012***	-0.012***
	(0.000)	(0.000)	(0.000)	(0.000)
Partial R^2 of excluded instruments	0.229	0.445	0.225	0.022
F-test of excluded instruments	368.96	944.70	30.20	172.89
Hausman test (p-values)	0.000	0.000	0.000	0.000
Number of observations	934,117	934,117	187,563 [22]	187,463

[22] Pre-origination values to track changes in determinants in Column (2a) and (2b) can only be observed for loan-months linked to a loan. For changes in those determinants, their value is compared to the pre-origination value. Unless we introduce non-real assumptions, the sample size therefore reduces to firm-month observations that can be assigned to a loan outstanding. Changes over the last year, on the other hand (Column 1a and 1b), can be calculated for any firm's characteristics in the overall sample, regardless of a loan being outstanding or not.

Table 2c: Testing the Counterfactual (Placebo)

This table presents the results of robustness tests. We employ placebo tests to test false LAs. In Column (1) and (2), pseudo LAs are generated for loans in the control group (i.e., firms that hold non-amended loans). In Column (1), the pseudo LA is generated two years after loan origination (analogously to the average time at which actual LAs are observed among amended loans). In Column (2), pseudo LA dates are assigned to a random month during the sample period of 1996 to 2016 (Dunbar, 1995; Guo and Mech, 2000) for loans that have never been amended. The dependent variable in Columns (1) to (3) is the active change in total book leverage over the last year (with the leverage ratio calculated as debt over total assets in *t*, minus adjusted leverage ratio in *t-1*, Equ 4). For the variable of interest, we interact the general leverage gap variable with a dummy variable equal to one if there was a pseudo-LA date over the preceding 12 (or 13-24) months, zero otherwise. The test employed in Column (3) captures the SOA effect of firms' target adjustments in the absence of access to LAs (i.e. firm-months during which no loan is recorded). The explanatory variable of interest in Column (3) is the distance of a firm's total book leverage in *t-1* from its target in *t* (leverage gap) interacted with a dummy variable representing firm-months in which *no loans* are recorded (1 in the absence of a loan as it excludes firms from accessing LAs as an adjustment tool, 0 otherwise). Fixed effects are included at the firm level. Bootstrapped standard errors are included to account for generated regressors. Coefficients λ represent the annual adjustment speed toward leverage targets (Eq 3 and 5); significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage (*t* – *t-1*)		
	Pseudo LA: Two years after loan origination date (1)	Pseudo LA: random month during sample period (2)	Identification: No-loan firms (LA option not available) (3)
Distance from target	0.515*** (0.000)	0.521*** (0.000)	0.527*** (0.000)
Distance from target × Pseudo LA (last 12M)	0.003 (0.386)	-0.040 (0.302)	
Distance from target × Pseudo LA (-13 to -24M)	0.002 (0.954)	0.012 (0.835)	
Distance from target × No-loan			-0.007 (0.507)
Pseudo LA (last 12M)	0.002** (0.019)	0.004 (0.267)	
Pseudo LA (-13 to -24M)	0.006 (0.100)	-0.002 (0.835)	
No-loan			0.006 (0.100)
Control variables (estimating Lev targets)	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Adj. R-squared	0.351	0.350	0.351
Number of observations	934,117	934,117	934,117

Table 3: Impact of LA on SOA for Under-levered Firms

This table presents the effect of LAs on firms' adjustments to leverage targets over the last 24 months, specified for firms whose leverage is below their leverage target (versus those firms whose leverage is above their leverage target). We measure the effect in addition to the general, non-LA-related target adjustments. The dependent variable is the active change in total book leverage over the last year, with leverage as "debt over total assets" in *t* minus the leverage ratio in *t-1* as "debt over (total assets plus net income)". The main explanatory variable is the distance between the firm's leverage target in *t* and the leverage in *t-1* as "debt over (total assets plus net income)" interacted with two variables: a dummy variable indicating whether the firm's leverage is observed to be above or below its leverage target (1 if below, 0 otherwise), and another dummy variable representing whether we observe an LA over the preceding 24 months (1 if we observe an LA, 0 otherwise). The Top 5 percentile of long-term debt financed firms identifies firms that rely strongly on long-term debt (proportional to total assets). The dummy variable *Top 5 percentile long-term debt* takes a value of one if a firm's long-term debt proportion is higher than 90% of the long-term debt ratios observed in our sample, zero otherwise. Firm and year fixed effects are included. Bootstrapped standard errors are included to account for generated regressors. Coefficients λ represent the annual adjustment speed toward leverage targets (Eq 3 and 5); significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage (t – t-1)		
	Total Lev-Target		Long-term Lev-Target
	(1)	(2)	(3)
Distance from target (general SOA)	0.567***	0.614***	0.686***
	(0.000)	0.000	(0.000)
Distance from target × Under-levered	0.054***	0.012	0.289***
	(0.000)	(0.640)	(0.000)
Distance from target × LA (last 24M)	0.102***	0.092***	0.127***
	(0.000)	(0.000)	(0.000)
Distance from target × LA (last 24M) × Under-levered	0.034***	0.040	0.045***
	(0.000)	(0.543)	(0.000)
Distance from target × LA (last 24M) × Under-levered × Top 5% of most highly levered firms		0.273***	
		0.000	
LA (last 24M)	0.021***	0.015***	0.020***
	(0.000)	0.000	(0.000)
Under-levered (binary)	-0.170***	-0.165***	-0.189***
	(0.000)	(0.000)	(0.000)
LA (last 24M) × Under-levered	-0.028***	-0.023***	-0.034***
	(0.000)	(0.004)	(0.000)
Top 5% most highly levered firms		0.176***	
		(0.000)	
Control variables	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Adj. R-squared	0.575	0.606	0.599
Number of observations	934,117	934,117	909,939

Table 4: Impact of LA on SOA by Amendment Type

This table presents the LA effect on firms' adjustments to leverage targets by amendment type (over the last 12 and the last 13 to 24 months). We measure the SOA effect in addition to the general, non-LA-related target adjustments. The dependent variable is the active change in total book leverage over the last year (leverage as "debt over total assets" in *t* minus leverage in *t-1* as "debt over (total assets plus net income)"). The main explanatory variable is the distance between the firm's leverage target in *t* and the leverage in *t-1* as "debt over (total assets plus net income)" interacted with two variables: one dummy variable representing whether we observe an LA over the preceding 12 months or between 13 and 24 months ago (1 if we observe an LA in the timeframe in question, 0 otherwise), and another dummy variable reflecting the LA type (1 if the corresponding amendment type is observed, 0 otherwise).. Fixed effects are included at the firm level. Bootstrapped standard errors are included to account for generated regressors. Coefficients λ represent the annual adjustment speed toward leverage targets (SOA) (Equations 3 and 5). Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage (*t* – *t-1*)	
	Total Lev-Target (1)	Long-term Lev-Target (2)
Distance from target	0.494*** (0.000)	0.624*** (0.000)
Distance from target × Amount LA (last 12M)	0.029*** (0.000)	0.090*** (0.000)
Distance from target × Amount LA (-13 to -24M)	0.008 (0.104)	0.021*** (0.000)
Distance from target × Maturity LA (last 12M)	0.146*** (0.000)	0.092*** (0.000)
Distance from target × Maturity LA (-13 to -24M)	0.139*** (0.000)	0.147*** (0.000)
Distance from target × Covenant LA (last 12M)	0.001 (0.748)	0.048*** (0.000)
Distance from target × Covenant LA (-13 to -24M)	0.067*** (0.000)	0.065*** (0.000)
LA (last 12M) (binary)	0.017*** (0.000)	0.008*** (0.000)
LA (-13 to -24M) (binary)	0.009*** (0.000)	0.006*** (0.000)
Control variables	Yes	Yes
Firm FE	Yes	Yes
Adj. R-squared	0.412	0.376
Number of observations	934,117	909,939

Table 5: Firms' SOA after Risk-reducing LAs.

This table presents SOA effects that include risk-reducing (versus risk-enhancing) specifications of LAs examined in the baseline test (Table 2). The dependent variable is the firm's active adjustment towards leverage targets (Eq. 5), defined by the active change in total book leverage over the last year ($L_{i,t} - L^{P}_{i,t-1}$). The main explanatory variable is the firm's deviation from the target, or leverage gap ($L^*_{i,t} - L_{i,t-1}$), interacted with a dummy variable indicating whether we observe an LA (i) over the preceding 12 months or (ii) between 13 and 24 months ago (1 if we observe an LA in the particular time period, 0 otherwise). We interact the distance to target of LA-firms with (1) the *risk-reducing* LA specification (dummy equal to 1 if the LA involves decreasing the loan amount or shortening the original maturity, zero otherwise). In Column (2), risk reduction is decomposed into *maturity reductions* and *amount decreases*. The test in (3) interacts risk-reducing LAs with a indicator for firms being *over-levered* (1 if the actual leverage is above the target, zero otherwise). We also include the individual variables used in the interaction terms. Control variables (i.e., variables used in the estimation of target leverage) are not reported for brevity. Fixed effects are included at the firm level. Bootstrapped standard errors are included to account for generated regressors. Coefficients λ denote the annual adjustment speed toward leverage targets (Eq 3 and 5); significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage ($t - t\text{-}1$)		
	(1)	(2)	(3)
Distance from target	0.484*** (0.000)	0.484*** (0.000)	0.594*** (0.000)
Distance from target × LA (last 12M)	0.126*** (0.000)	0.126*** (0.000)	0.096*** (0.000)
Distance from target × LA (last 12M) × Risk-reducing LA	-0.193*** (0.000)		-0.043 (0.371)
Distance from target × LA (last 12M) × Amount-decreasing LA		-0.199*** (0.000)	
Distance from target × LA (last 12M) × Maturity-decreasing LA		-0.166** (0.030)	
Distance from target × LA (last 12M) × Risk-reducing LA × Over-levered firms			-0.142* (0.052)
Distance from target × LA (-13 to -24M)	0.126*** (0.000)	0.126*** (0.000)	0.092*** (0.000)
Distance from target × LA (-13 to -24M) × Risk-reducing LA	-0.131** (0.013)		-0.110** (0.022)
Distance from target × LA (-13 to -24M) × Amount-decreasing LA		-0.120** (0.025)	
Distance from target × LA (-13 to -24M) × Maturity-decreasing LA		-0.204*** (0.007)	
Distance from target × LA (-13 to -24M) × risk-reducing LAs × over-levered firms			0.017 (0.812)

LA (last 12M)	0.017***	0.018***	0.008***
	(0.000)	(0.000)	(0.000)
LA (-13 to -24M)	0.010***	0.009***	0.004
	(0.001)	(0.002)	(0.115)
Risk-reducing LA (binary)	-0.003***		-0.003**
	(0.000)		(0.021)
Maturity decreasing LA (binary)		-0.003***	
		(0.000)	
Amount decreasing LA (binary)		-0.003	
		(0.378)	
Over-levered firm (binary)			0.171***
			(0.000)
Control variables	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Adj. R-squared	0.426	0.426	0.645
Number of observations	934,117	934,117	934,117

Table 6: Firms' SOA and Alternative Loan Events LAs versus New Loan Issues (LIs)

This table compares the SOA impact following an LA compared to a similar, yet more substantial event: the issue of a new loan (LI). The dependent variable is the firm's *active adjustment* towards leverage targets (Eq. 5), defined by the active change in total book leverage over the last year ($L_{i,t} - L^{P}_{i,t-1}$). The main explanatory variable is the firm's *deviation from the target*, or leverage gap ($L^*_{i,t} - L_{i,t-1}$). Active leverage adjustments are regressed on all firms' *deviation from target* (indicating the general SOA component), as well as on *deviation from targets* if a firm has amended a loan (interacted with *LA*) or, for an alternative loan event, "issued a new loan over the last 24 months (*LI*). LAs and LIs have a value of 1 if the event has been observed over the last 24 months, respectively (0 otherwise). The regression in Column (2) decomposes the annual SOA measured in the 24-months window after the LA or loan issue in Column (1): The *LA* or *LI* may have taken place during the last 12 months or during the preceding 13 to 24 months, which indicates whether an SOA effect is more or less pronounced if the event is more or less than a year ago. We also include the individual variables used in the interaction terms. Control variables (i.e., variables used in the estimation of target leverage) are not reported for brevity. Fixed effects are included at firm and year level. Bootstrapped standard errors are used to account for generated regressors. Coefficients λ represent the annual adjustment speed (SOA) toward leverage targets (Equations 3 and 5). Significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage (*t – t-1*)	
	(1)	(2)
Distance from target (general SOA)	0.482*** (0.000)	0.481*** (0.000)
Distance from target × LA (last 24M)	0.101*** (0.001)	
Distance from target × LI (last 24M)	0.048** (0.025)	
Distance from target × LA (last 12M)		0.095*** (0.000)
Distance from target × LA (-13 to -24M)		0.115*** (0.000)
Distance from target × LI (last 12M)		0.057** (0.046)
Distance from target × LI (-13 to -24M)		0.041* (0.051)
LA (last 12M)		0.011*** (0.000)
LA (-13 to -24M)		0.009*** (0.000)
LA (last 24M)	0.013*** (0.000)	
LI (last 12M)		0.021*** (0.000)
LI (-13 to -24M)		0.014*** (0.000)
LI (last 24M)	0.017*** (0.000)	
Control variables	Yes	Yes
Firm FE	Yes	Yes
Adj. R-squared	0.416	0.416
Number of observations	934,117	934,117

Table 7: Impact of LAs Plus Early Repayments on SOA

This table is similar to Table 3 on the effect of loan amendments (LAs), including under- versus over-levered firms, but unlike Table 3 this table includes the effect of *early repayments* as an additional form of LA. Early repayments are included in the month in which the loan size drops to zero, whenever this drop is observed ahead of the agreed loan maturity (2,065 early repayments are observed in the sample period, in addition to 2,995 LAs by amount). As in Table 3, we measure the effect in addition to the general, non-LA-related target adjustment. The dependent variable is the active change in total book leverage over the last year, with leverage as "debt over total assets" in t minus the leverage ratio in t-1 as "debt over (total assets plus net income)". The main explanatory variable is the distance between a firm's leverage target in t and leverage in t-1 as "debt over (total assets plus net income)" both un-interacted and interacted with two variables: a dummy variable indicating whether the firm's leverage is observed to be above or below its leverage target (1 if below, 0 otherwise), and another dummy variable representing whether we observe an LA or early repayment over the preceding 24 months (1 if observed, 0 otherwise). Fixed effects are included at the firm level. Bootstrapped standard errors are included to account for generated regressors. Coefficients λ denote the annual adjustment speed toward leverage targets (Eq. 3 and 5); significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage (t – t-1)	
	Total Lev-Target (1)	Long-term Lev-Target (2)
Distance from target (general SOA)	0.568***	0.686***
	(0.000)	(0.000)
Below-target firms' distance from target	0.053***	0.289***
	(0.000)	(0.000)
Distance from target × LA (last 24M)	0.090***	0.127***
	(0.000)	(0.000)
Distance from target × LA (last 24M) × Under-levered	0.023***	0.043***
	(0.000)	(0.000)
LA (last 24M)	0.017***	0.020***
	(0.000)	(0.000)
Under-levered	-0.171***	-0.189***
	(0.000)	(0.000)
LA (last 24M) × Under-levered	-0.021***	-0.034***
	(0.000)	(0.000)
Control variables	Yes	Yes
Firm FE	Yes	Yes
Adj. R-squared	0.575	0.599
Number of observations	934,117	909,939

Table 8: LA Impact and Firms' SOA Conditional on Distinct Financial Features

For a deeper understanding of firms' adjustment behaviour, this table presents regression results including specifications in addition to the baseline test (Table 2, which shows how LAs may affect firms' active adjustments towards leverage targets in addition to the general adjustment to target absent any LA). The dependent variable is the firm's active adjustment towards leverage targets (Eq. 5), defined by the active change in total book leverage over the last year ($L_{i,t} - L^{P}_{i,t-1}$). The main explanatory variable is the firm's deviation from the target, or leverage gap ($L^*_{i,t} - L_{i,t-1}$), interacted with a dummy variable indicating whether we observe an LA (i) over the preceding 12 months or (ii) between 13 and 24 months ago (1 if we observe an LA in the particular time period, 0 otherwise). The test examines particular SOA effects of (1) *low performers* engaging in LAs (i.e., firms whose current EBITDA over total asset ratio dropped below this ratio observed in the month prior to loan origination, Denis and Wang, 2014). The test in Column (2) interacts the leverage gap of LA-firms with firms' *Altman Z score* (as a continuous variable, with higher scores indicating higher credit quality). Test (3) specifies the SOA effect following LAs of loans agreed as „*Covenant lite*" (i.e. without financial covenants), implying that LAs can go ahead more easily. Columns (4) measures a *Young-loan* effect (i.e., loans renegotiated during the first half of a loan lifetime). (5) presents SOA effects conditional on LAs arranged in the *final loan year* (i.e., during the 12 months before the maturity date as stated in the loan contract at origination. We also include the individual variables used in the interaction terms. Control variables (i.e., variables used in the estimation of target leverage) are not reported for brevity. Fixed effects are included at the firm level. Bootstrapped standard errors are included to account for generated regressors. Coefficients λ denote the annual adjustment speed toward leverage targets (Eq 3 and 5); significance at the 1%, 5%, and 10% levels is indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage (SOA)				
	(1)	(2)	(3)	(4)	(5)
Distance from target (general SOA)	0.491*** (0.000)	0.484*** (0.000)	0.496*** (0.000)	0.485*** (0.000)	0.484*** (0.000)
Distance from target × LA (last 12M)	0.096*** (0.001)	0.115*** (0.000)	0.079*** (0.003)	0.104*** (0.000)	0.105*** (0.000)
Distance from target × LA (last 12M) × Performance below Origination	0.024 (0.525)				
Distance from target × LA (last 12M) × Altman Z		-0.009*** (0.000)			
Distance from target × LA (last 12M) × CovenantLite			0.122** (0.020)		
Distance from target × LA (last 12M) × LA of Young loans				0.008 (0.849)	
Distance from target × LA (last 12M) × LA in Final loan year					0.007 (0.897)
Distance from target × LA (-13 to -24M)	0.116*** (0.000)	0.118*** (0.000)	0.084*** (0.001)	0.133*** (0.000)	0.117*** (0.000)
Distance from target × LA (-13 to -24M) × Performance below Origination	-0.009 (0.801)				
Distance from target × LA (-13 to -24M) × Altman Z		-0.007** (0.038)			

Distance from target × LA (-13 to -24M) × CovenantLite			0.140**		
			(0.028)		
Distance from target × LA (-13 to -24M) × LA of Young loans				-0.059	
				(0.143)	
Distance from target × LA (-13 to -24M) × LA in Final loan year					-0.056
					(0.520)
LA (last 12M)	0.007***	0.017***	0.019***	0.016***	0.019***
	(0.003)	(0.000)	(0.000)	(0.000)	(0.000)
LA (-13 to -24M)	-0.002	0.008***	0.010***	0.007**	0.010***
	(0.432)	(0.005)	(0.000)	(0.039)	(0.001)
Performance below origination	0.018***				
	(0.000)				
Altman Z score		0.000			
		(0.451)			
Covenant lite			0.003**		
			(0.016)		
Young loan				0.010***	
				(0.000)	
LA in final year (ie. close to original maturity)					-0.002***
					(0.000)
Control variables	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
R-squared	0.415	0.415	0.437	0.415	0.414
Number of observations	934,117	934,117	934,117	934,117	934,117

Table 9: SOA of firms' market leverage (robustness test)

This table presents the association of firms' active market-leverage adjustments towards their market leverage targets, including the occurrence of a loan amendment (LA). The key variables of interest are the two interaction terms between the distance from target leverage and a binary indicator that is one if an LA is observed (i) over the preceding 12 months or (ii) between 13 and 24 months ago (0 otherwise). The distance from the target is defined as the market leverage target in *t* minus adjusted market leverage in *t-1* as in Eq. (4b), measured as [debt over (firm's market value, ie. book liabilities + market value of equity, plus net income)]. Column (1) shows the SOA based on OLS-estimated total market leverage targets; Column (2) shows the SOA based on GMM-estimated total market leverage targets, as defined by Faulkender at al. (2012). Control variables (i.e., variables used in the estimation of target leverage) are not reported for brevity. Fixed effects are included at the firm level. Bootstrapped standard errors are used to account for generated regressors (from first-stage target estimations). Coefficients significant at 1%, 5%, and 10% levels are indicated by ***, **, and *. Intercepts are not reported.

	Active change in Leverage (*t* – *t-1*)	
	(1)	(2)
Distance from target	0.428***	0.412***
	(0.000)	(0.000)
Distance from target × LA (last 12M)	0.058***	0.058***
	(0.000)	(0.000)
Distance from target × LA (-13 to -24M)	0.041***	0.040***
	(0.002)	(0.003)
LA (last 12M) (binary)	0.004	0.004*
	(0.104)	(0.051)
LA (-13 to -24M) (binary)	-0.003	-0.002
	(0.217)	(0.351)
Control variables (estimating Lev targets)	Yes	Yes
Firm FE	Yes	Yes
Adj. R-squared	0.284	0.264
Number of observations	1,009,977	1,009,977

Table 10: LA Impact on SOA Excluding the Global Financial Crisis

This table presents the results of re-estimating the baseline analysis (corresponding to the baseline test in Table 2, Columns (1a) and (1b)) using an alternate sample period that excludes the years of the Global Financial Crisis of 2008/09 (Ivashina and Scharfstein, 2010) and consists of 1996-2007 and 2010-2016. The dependent variable equals the firm's active adjustment towards target leverage (Eq. 5), defined by the active change in total book leverage over the last year (leverage ratio as "debt over total assets" in *t* minus the leverage ratio in *t-1* as "debt over total assets plus net income in *t*"). The main explanatory variable is the firm's (active) deviation from the target, or leverage gap, defined as leverage target in *t* minus leverage in *t-1* as "debt over (total assets plus net income)", interacted with a dummy variable indicating whether we observe an LA (i) over the preceding 12 months or (ii) between 13 and 24 months ago (1 if we observe an LA in the particular time period, 0 otherwise). As for the components of our interaction variable, we also include the general distance-to-target variable (leverage gap) as well as individual dummy variables equal to one if there is an LA (i) over the preceding 12 months or (ii) in months -13 to -24, zero otherwise. Firms' SOA is tested against leverage targets, for both total leverage (1) and long-term leverage (2). Fixed effects are included at the firm level. Bootstrapped standard errors are included to account for generated regressors. Significance at the 1%, 5%, and 10% levels is indicated by ***, **, *. Intercepts are not reported.

	Active change in Leverage (*t* – *t-1*)	
	Total Lev-Target (1)	Long-term Lev-Target (2)
Distance from target (general SOA)	0.483*** (0.000)	0.595*** (0.000)
Distance from target × LA (last 12M)	0.102*** (0.000)	0.106** (0.018)
Distance from target × LA (-13 to -24M)	0.112*** (0.000)	0.133*** (0.001)
LA (last 12M)	0.022*** (0.000)	0.010*** (0.000)
LA (-13 to -24M)	0.011*** (0.001)	0.007* (0.072)
Control variables	Yes	Yes
Firm FE	Yes	Yes
Adj. R-squared	0.416	0.360
Number of observations	830,846	808,659