

Covenant Violations, Collateral and Access to Funding: Public and Private Firms

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Abstract:

We study the impact of covenant violations on credit access for both privately-held and publicly-traded firms, using a rich supervisory dataset of syndicated loans from 2006-2012. Leveraging the unique information on covenant compliance, collateral and default risk in the data, we show that banks are substantially less likely to forgive covenant violations by private firms. Hence private firms, particularly firms with assets below \$1 billion, experience more severe credit access consequences after violations relative to comparable public firms. Recessions aggravate these credit constraints due to increased violations and tighter lending standards. Private firms that are established in the loan market or have an external rating face smaller cuts. We also find that collateral plays an important role in alleviating credit rationing for private firms after violations, with over-collateralized loans experiencing much smaller cuts. Our results shed new light on how access to the public markets can influence bank intermediation, and the financing constraints faced by firms.

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1. Introduction

Banks use covenants as the primary contractual mechanism to resolve information asymmetry vis-a-vis borrowers, since covenants facilitate continuous monitoring and renegotiation of debt contracts (Smith and Warner (1979), Aghion and Bolton (1992), Berlin and Mester (1992), Dewatripoint and Tirole (1994), Garleanu and Zwiebel (2009), Denis and Wang (2014)). Many empirical papers have studied the consequences of covenant violations for public firms, finding that lenders use the threat of terminating or accelerating the loan to influence borrower's policies, such as the type of investments, employment, and financing (Dichev and Skinner (2002), Chava and Roberts (2008), Roberts and Sufi (2009a), Nini, Smith and Sufi (2009, 2012), Falato and Liang (2015)). However, despite the large share of private firms in the economy (see Ferre-Mansa (2015)), there is little evidence about how covenant violations impact private firms. Understanding the consequences of violations on credit access for private firms is important, because loss of bank financing is likely to have a larger effect on their investment and employment decisions, since they cannot turn to other sources of financing like public firms (Ivashina and Becker (2014), Adrian, Colla, and Shin (2013) and Acharya et al. (2014))¹.

In this paper, we use supervisory data on syndicated loans to investigate banks' response to covenant violations across public and private firms, focusing on credit access outcomes. We find that private firms are less likely than comparable public firms to obtain waivers and covenant amendments after violations, and hence they suffer larger reductions in credit access. We show that private firms can reduce this disadvantage with sufficient collateral, consistent with the role of collateral in mitigating credit rationing (see Steijvers and Voordeckers (2009)). Similarly, having a reputation in the loan market can help private firms. Credit retention is affected more during recessions, when violations increase, collateral values decrease and bank lending standards tighten.

Our paper is related to the broader literature on bank intermediation, emphasizing the role and ability of banks to monitor opaque borrowers and make efficient loan continuation or liquidation decisions (see for instance, Diamond (1984), Diamond (1991), Rajan (1992), Chemmanur and Fulghieri (1994)). While it may seem surprising that the public or private status of a firm affects the bank decision after a violation, it follows from recent research showing the impact of public market access on the financing options and

¹ Chodorow-Reich (2014) and Duygan-Bump, Levkov and Montriol-Garriga (2015) provide evidence on how credit supply impacts employment for smaller firms and firms without bond market access relative to larger, rated firms. Campello et al. (2011) study the link between access to lines of credit and investment and other corporate spending, and show that provided firms had internal liquidity, being able to access a line of credit led to greater spending during the recent crisis; it is not clear if public or private firms had more internal liquidity.

policies of a firm (Brav (2009)). On account of more limited access to financing, especially long-term financing, private firms are more vulnerable to financial stress and economic downturns (see Diamond (1991), Almeida et al. (2012) and Harford, Klasa and Maxwell (2013)).² Further, they also have less bargaining power vis-à-vis creditors thus impacting renegotiation outcomes, as shown theoretically in Gorton and Kahn (1993, 2000) and empirically across different types of public firms in Roberts and Sufi (2009a and 2009b). Renegotiation outcomes may also be more contingent on the ability of private firms to provide adequate collateral, since higher liquidation values help align incentives of creditors and borrowers (Rajan and Winton (1995), Park (2000), Benmelech and Bergman (2008)) and also provide more protection against potential defaults and losses. Thus, we expect that private firms will become more credit-constrained after violations. We investigate this general hypothesis using a unique dataset as described below.

Our data is drawn from the supervisory review process undertaken annually for Shared National Credit (SNC) loans, with the review criteria over-weighting non-investment grade and criticized loans. The reviewed loans contain unique information about covenant compliance, collateral and other firm characteristics compiled by bank examiners, in addition to typical information in SNC. Our sample contains data on 13,000 reviewed loan-year observations of 4,300 firms over 2006-2012 accounting for about 30% of the overall SNC data over this time.³ We know if a specific loan is subject to covenants, and whether the firm is compliant with all the covenants on a loan unconditionally, compliant as a result of a waiver or covenant amendment by the bank, or non-compliant with covenant terms.⁴ We have around 3,200 loan-year observations with covenant violations, at an average violation rate of 23%.⁵ Most of the loans in our data are secured, though the level of collateralization varies.

A matching of SNC data to Compustat indicates that about 30% of observations in the sample correspond to public firms, a proportion quite similar to the overall SNC data. Our data has a good mix of public and private firms of size above \$100 million, though public firms are larger with over 75% of public firms having assets above \$1 billion relative to only 35% of private firms. While the financial information for private firms is limited to asset size, sales and leverage, we have several measures of bank assessment of

² While cash holdings could reduce refinancing risk as found by Harford, Klasa and Maxwell (2013) for public firms, Gao, Harford and Li (2013) and Ferre-Mansa(2015) find that private firms of all sizes surprisingly hold less cash than comparable public firms, due to agency costs and disclosure costs resulting from the listing decision.

³ We exclude about 4,195 observations from the reviewed loans dataset with 17,854 observations, with the main exclusion being loans already in distress prior to the violation, details in the data section.

⁴ We do not know the specific covenant being violated or the covenant thresholds, nor can we identify unconditional waivers. The data does contain detailed examiner comments that provide anecdotal evidence on these aspects.

⁵ At a firm-year level, the violation rate in our sample for public firms is 16%, somewhat higher than the figure reported in most other studies. However, the violation rate across public and private firms is comparable to that in Campello et al. (2011).

firm credit quality across public and private firms. About 75 percent of the public firms and 25 percent of the private firms are externally rated by S&P or Moody's. Both the internal data and external ratings indicate that our sample mostly contains non-investment grade equivalent firms, which would be more likely to face credit cuts and thus are most relevant for our study.⁶ The composition of loans along other dimensions such as loan type, purpose, size, industry, etc. is generally similar to the overall SNC population.

We first show that the effect of violations on credit access is largely felt by firms that do not receive a waiver/amendment, whether public or private, measuring reduction in credit access in several ways both at the loan level and at the firm level. For instance, the limit to assets ratio reduces by 1,100 bps (or 35% of its value) across all loans for violating firms that are denied waiver/amendment in the following year and only by 400 bps (or 18% of its value) for violators that receive waiver/amendment. Controlling for credit quality, firm size, collateral, economic conditions, firm SNC experience, bank relationships, loan type and other loan characteristics, we find that the waiver/amendment decision is still a strong predictor of credit access reduction. Loans denied a waiver/amendment experience a 200 bps larger reduction in the limits to assets ratio than non-violators over the next year, whereas there is no statistically significant difference in credit outcomes for violators receiving a waiver/amendment relative to non-violators.

We then test if banks' decision to grant a waiver/amendment varies across public and private firms, focusing on the sub-sample of covenant violators. Overall, only 15% of public firm loans with violations are denied a waiver/amendment compared to a denial rate of 41% for private firms. There remains a fairly large 15 percentage points differential across public and private firms in obtaining waivers/amendments, once we include all the controls mentioned above in a logit regression framework. We find that the other important determinants of the banks' waiver/amendment decision are credit quality, firm size, level of collateral, and economic conditions. The public-private difference is robust to using propensity score matching techniques and selection techniques.

In the third part of our analysis, we directly investigate how the impact of covenant violations on credit access varies across public and private firms. We find that violations do not have a significant effect on credit access for the very large public or private firms with assets above \$1 billion, which is consistent with the conventional wisdom that these firms have better refinancing ability and bargaining power. However, for middle market firms with assets below \$1 billion, violations are associated with a greater loss of credit access for private firms relative to public firms in the year following the violation. This

⁶ While higher-quality firms also violate covenants, typically these violations do not result in severe consequences and are most likely to receive unconditional waivers (Roberts and Sufi (2008) and Barakova and Parthasarathy(2012)).

result holds across all credit access measures. For instance, controlling for various firm and loan characteristics, the marginal impact of a violation is a reduction of about 100 bps in the limit-to-assets ratio for private firms, whereas the effect is insignificant for public firms.⁷ Consistent with the alternative financing hypothesis, private firms that are established in the loan market or externally rated suffer less severe credit cuts after violations. Thus, the marginal effect of a violation is a reduction of 200 bps in the limit-to-asset ratio for private firms that are less established in the SNC market and 120 bps for unrated private firms, but insignificant for their private counterparts.

We also find that the extent of collateralization has a direct impact on the magnitude of the limit cut or balance reduction. Public firms suffer limit cuts and balance reductions primarily when loans are unsecured. For private firms, a significant amount of over-collateralization is required to avoid limit cuts and balance reductions. For example, the marginal effect of a violation on a partially secured private firm loan (with loan to value above 70%) is a reduction of 350 bps in the limit to assets ratio, whereas the marginal effect is insignificant for a well secured private firm loan. The impact of violations on limit cuts for private firms is also somewhat larger during recessions, when outside funding options are more limited and lending standards are tighter. Our results suggest that within the size range of firms that are the focus of our syndicated loan sample, loan access becomes more tenuous and collateral-dependent for private firms after violations, whereas public firms generally retain loan access, albeit with greater creditor control and influence over various firm actions.

We extend the empirical literature that examines how banks react to covenant violations by public firms (see Chen and Wei (1993), Denis and Wang (2014), Wang and Xia (2014) and Chava, Wang and Zou (2015)) by comparing the bank's waiver/amendment response across both public and private firms. We find that after violations banks deny waivers and amendments to public firms primarily when credit risk is significantly elevated or firms are new to the SNC market. By contrast, a significant number of non-distressed private firms are denied waiver/amendments, especially if they are smaller, poorly collateralized, are new to the SNC market, do not have an external rating or the economy is in a downturn. Our results suggest that covenant violations would affect private firms more in terms of real outcomes such as investment and employment as well, though we lack the data to do this analysis.

Our results are also directly related to the papers that look at credit access consequences of violations using data on public firms (Sufi (2009), Roberts and Sufi (2009a), Campello et al. (2011), Barakova and Parthasarathy (2012), Chaderina and Tengulov (2016), Berrospide, Meisenhazl and Sullivan (2012),

⁷ This magnitude of reduction in the limits to assets ratio of 100 bps for private firms is similar to the effect of violations on net debt issuance for public firms reported in Roberts and Sufi (2009a).

Acharya et al. (2014)). Whereas these papers mainly look at how violations affect limits and balances on revolving lines of credit, we compare the impact on both public and private firms, and look at both term loans and revolvers since private firms rely on banks for funding, not just liquidity. Our findings also add to the growing public-private literature focusing on financing advantage of public firms (Brav (2009), Schenone (2010), Saunders and Steffen (2011) and Campello et al. (2011)) by showing that loan access is more tenuous for private firms. However, our results should not be construed as implying that it is optimal for firms to be public, since there are many other costs and benefits to being public or private (see for e.g. Pagano, Panetta and Zingales (1998), Pagano and Roell (1998), Boot, Gopalan and Thakor (2006) or Ferre-Mansa (2015)).

Our paper also extends the literature on collateral and credit rationing (see for e.g. Stiglitz and Weiss (1981), Steijvers and Voordeckers (2009), Berger et al. (2011) and Cerqueiro, Ongena & Roszbach (2016)), by shedding light on how different loan features such as collateral and covenants are used together to mitigate informational asymmetries. Our evidence shows that as firm risk increases, collateral and covenants act as complements in bank monitoring, consistent with Gordon and Kahn (1993, 2000), Rajan and Winton (1995) and Park (2000). We demonstrate that the renegotiation outcome after violations is highly dependent on the value of the collateral especially for private firms, whereas collateral has a much smaller impact on credit access when a firm has not violated a covenant. We also add to the literature showing that the type of collateral and its characteristics matter to credit access outcomes by showing that redeployable assets offer more protection against credit cuts (Williamson (1988), Benmelech and Bergman (2009), Campello and Giambona (2013) and Berger, Frame and Ioannidou (2015)).

Next we discuss related literature and develop our hypotheses. Section 3 describes our data and sample design in more detail. The empirical results are presented in section 4. Section 5 describes the robustness tests. Section 6 concludes.

2. Hypothesis development

Hypothesis 1 – The impact of covenant violations on credit access will be larger when banks do not offer waiver or covenant amendments.

Covenants are central to the analysis of creditor control outside of bankruptcy since they enable the optimal allocation of control rights between creditors and firms in a state-contingent manner, and mitigate agency problems (Jensen and Meckling (1976), Smith and Warner (1979), Aghion and Bolton (1992) and Dewatripont and Tirole (1994)). Upon covenant violations, banks have the ability to accelerate debt

payment, increase the loan rate, and terminate unused credit line facilities, but also to take much less onerous actions such as modifying the covenants, and/or waiving the violation for a period during which they can exercise their control rights to influence firms' operational and investment decisions.

Substantial research has shown that covenant violations have important effects on a firm's investment, employment and financing outcomes, including early papers in the accounting literature (Beneish & Press (1993), Chen & Wei (1993), Smith (1993), Sweeney (1994)), as well as papers in the last decade that use larger data samples and confirm the causal impact of violations on investment, financing policies and employment (Chava & Roberts (2008), Roberts and Sufi (2008a) and Nini, Sufi and Smith (2009, 2012), Acharya et al. (2014) and Falato and Liang (2015)).

More recently, papers have focused on showing that lenders are judicious in exercising their control rights. Dennis and Wang (2014) show that while covenants are frequently relaxed in advance of a likely imminent violation (consistent with creditors being granted strong ex ante control rights (Garleanu and Zwiebel (2009))), nevertheless renegotiations of covenant limits are not automatic. Instead, creditors take into account the borrower's specific operating conditions and prospects, such as quality of borrower's investment opportunities for evaluating investment-related covenants or long term profitability prospects for evaluating covenants related to debt coverage or earnings. Other empirical papers also confirm that lender actions after violations carefully distinguish between firms as well as specific projects or investments within firms (Mariano and Tribo (2015), Chava, Nanda and Xiao (2015) and Ersahin, Irani and Le (2015)).

Drawing on these papers, our first hypothesis is that banks will make decisions about whether and how much to restrict or reduce credit access based on their sorting of firms. Firms deemed viable after the assessment will get waivers/covenant amendments, and covenant violations will have relatively little impact on their credit access (even though these firms may face additional restrictions on other actions such as investments, etc.). Banks would be less likely to forgive or adjust covenants for a smaller number of firms whose covenant violations are considered warning signals of continued future problems or firms that may be less able to recover from the difficult circumstances they are in; these firms would be more likely to see their loan access reduced or revoked entirely. Our argument is broadly consistent with Diamond (1991) theory on bank monitoring wherein banks monitor middle tier borrowers most closely while employing credit rationing for the worst borrowers.

Hypothesis 2 - Private firms will be less likely to receive waivers/amendments than comparable public firms.

We draw on papers focusing on renegotiation that illustrate why covenant renegotiations would be influenced by availability of outside funding options. Roberts and Sufi (2009b) find that in addition to the information about changes in credit quality of the borrower and macroeconomic conditions, borrower's outside options – be it other lenders or other capital markets - alter the relative bargaining power of the lender and the borrowers, and can play a key role in influencing the outcome of the renegotiation. Similarly, Gorton and Kahn (2000) show theoretically that, the availability of alternative financing along with firm credit quality and collateral influences the distribution of bargaining power between creditors and borrowers and affects banks' renegotiation decisions, thereby reducing the likelihood of such inefficient liquidation following violations.

Private firms have relatively fewer financing options and pay more than comparable public firms for loans, as shown by several recent papers. For instance, Brav (2009) shows that the cost of equity relative to debt is higher for private firms than for public firms, and that this makes private firms more dependent upon debt for financing. Saunders and Steffen (2011) and Campello et al. (2011) show that private firms have to pay more for bank loans relative to public firms. The relative financing advantage of public firms is also evident from papers that look at mergers (Maksimovic, Phillip and Yang (2013) and Erel, Jang and Weisbach (2015)). Moreover, private firms are particularly disadvantaged in terms of access to long term funding, which increases refinancing risk and can affect firm decisions and prospects, as shown for in the context of public firms by Almeida et al. (2012) and Harford, Klasa and Maxwell (2013). Thus, alternative financing is less available and more expensive for private firms. Not only does this reduce their bargaining power, but it also may make them more vulnerable to changing credit conditions where sources of finance get more limited. A different stream of literature (Fama (1980), Holmstrom and Tirole (1993), Dow and Gorton (1997), Subrahmanyam and Titman (1999), and Edmans (2009)) emphasizes the information production of public equity markets that serve as an aggregator of investor information about firm value and as a disciplining mechanism for firm management, a mechanism that is absent for private firms. Thus, we hypothesize that the private firms will be at a disadvantage in obtaining waivers/amendments relative to similar public firms.

Hypothesis 3 - Violations result in greater reductions and restrictions in access for private firms, especially when collateral protection is insufficient.

There is almost no research on how covenant violations impact credit access for private firms. To the best of our knowledge, only Campello et al. (2011) include private firms in the sample while examining effects of violations. They find using survey data from the 2008-2009 period that on a basis, only about (10% of firms have their lines canceled upon violating covenants, while about half of the firms experience

some limit cut or increase in collateral requirements, and many firms experience increase in the cost of the line. However, they do not differentiate between the public and private firm violators.

Evidence of whether violations cause public firms to lose access to funding is mixed. For example, Sufi (2009) finds that firms have limited access to their credit lines in low cash flow states that lead to violations. Roberts & Sufi (2009a) show that creditors exert significant control over firm financial policy, with violations resulting in reduced leverage and net debt issuance over the long run. Berrospide, Meisenhazl and Sullivan (2012) find that covenant-induced reduction of credit supply was small during the crisis. Barakova and Parthasarathy (2012) demonstrate that credit lines provide a high degree of liquidity insurance to most public firms, with violations only resulting in credit cuts when the firm is rated as high risk by banks. Chaderina and Tengulov (2016) show that covenant violations only led to a higher likelihood of credit line revocations during the 2007-2008 crisis, but not otherwise. Acharya et al. (2014) find that only about 1 in 5 of the covenant violations by public firms receives an unconditional waiver and that most other consequences are associated with substantial future decreases in line usage and availability.

A few papers have looked at how economic and credit conditions impact credit access for public and private firms differently, but also find mixed results. While Campello et al. (2011) find that smaller, private firms had larger lines to asset ratios during the recent crisis and drew more on their lines and Allen and Paligorova (2015) find that banks cut lending more for public firms than to private firms in Canada, Demiroglu, James and Kizilaslan (2009) find that the poorer the borrower's credit quality and the more limited its access to capital markets the more contingent is access to credit lines and Barakova and Parthasarathy (2012) find that banks constrain unused credit availability more for private firms. Thus, it is far from clear from this literature if private firms will be at a disadvantage vis-a-vis public firms in retaining access to credit following covenant violations.

We believe that private firms will suffer more severe credit access consequences than comparable public firms after violations, as a result of being less likely to receive waivers/amendments. We also believe that the extent of collateralization will affect covenant violations consequences, with better collateral protection resulting in reduced credit rationing especially for private firms.

There is substantial literature showing the importance of collateral in enabling firms with greater information asymmetry to obtain loans with collateral addressing both adverse selection concerns and moral hazard problems (for e.g. Stiglitz and Weiss (1987), Steijvers and Voordeckers (2009), Berger et al. (2011) and Cerqueiro, Ongena & Roszbach (2014) and papers referenced/surveyed therein). Recent

empirical papers also illustrate in more detail how collateral values shape loan terms. For example, Chaney, Sraer and Thesmar (2012), Cvijanovic (2014) and Ersahin and Irani (2015) examine the impact of changes in real estate prices on investment, leverage and employment, and show that higher collateral values increase the ability of firms to obtain financing and undertake investments. Cerqueiro, Ongena and Roszbach (2014) show that banks respond to an exogenous reduction in collateral value by increasing interest rates and reducing monitoring on collateral, increasing the delinquency of borrowers. Campello and Larrain (2016) show that when collateral laws in Eastern Europe changed to allow movable assets to be pledged, firms operating movable assets could borrow more and increase investments, employment and profitability. Keil and Muller (2016) show that in industry sectors with better liquidations values, borrower obtain better loans terms and fewer contract restrictions. Papers have also shown that significant declines in the value of widely pledged assets can amplify the business cycle through procyclical changes in credit availability. (e.g., Bernanke and Gertler (1989), Kiyotoki and Moore (1997), Peek and Rosengren (2000) and Gan (2007).

While these papers show that more collateral improves access to credit, direct evidence on how collateral and covenants are used together is limited. On the theoretical side, Rajan and Winton (1995), Gorton and Kahn (1993 and 2000) and Park (2000) show that covenants alone do not provide sufficient incentives to the bank to monitor borrowers. Instead, the presence of collateral is important because it enables banks to have a more credible threat to liquidate the loan unless the borrower acts in way that protects the interests of the creditor, and it incentivizes the main bank to monitor the borrower when there are other creditors. Bergman and Benmelech (2008) find empirical evidence consistent with this idea showing that airlines successfully renegotiate their lease obligations downwards when their financial position is sufficiently poor and when the liquidation value of their fleet is low. In the context of covenant violations, Roberts and Sufi (2009b) and Acharya et al. (2014) show that banks ask for additional asset pledges as part of the renegotiation process.⁸ Chava, Nanda and Xiao (2015) show that when laws protecting creditor rights over collateral were strengthened, violations resulted in less severe reductions to firms' research and development efforts. However, the data available used in these papers is confined to public firm violations, and they do not have any detailed information on collateral values. Thus, we believe that our analysis of the role of collateral in determining credit access consequences of violations for private firms will extend this literature considerably.

3. Data, sample design and variables

⁸ Bao and Kolasinski (2015) do not find any evidence that covenant violations lead to with unsecured debt getting converted to secured debt.

3.1 Data sources

We use regulatory data on syndicated credits from the Shared National Credit program, a joint program established in 1977 by the three main bank regulators in the US (Federal Reserve Board, Federal Deposit Insurance Corporation (FDIC) and Office of the Comptroller of the Currency (OCC)) to review syndicated loans that have a value over \$20 million and are funded by 3 or more regulated entities. Banks are required to provide information on syndicated loans meeting these criteria that they have acted as an agent bank for on an annual basis, resulting in an unbalanced panel. Variables available in the data are obligor name and industry, exposure balance and limit, origination and maturity dates, facility ratings, type and purpose and payment status, as well as syndicate structure. For more details on the general SNC data, please see Barakova and Parthasarathy (2012) and (Bord and Santos (2012) and (2014)), and Irani and Meisenzahl (2015).

In addition to this information on the overall SNC data, we also obtain information on other variables from the supervisory review of SNC loans conducted each year. We believe that this is the first paper to leverage the unique information obtained through this review process. Every year, the three regulatory agencies review a sample of the SNC credits to evaluate the appropriateness of regulatory ratings and the adequacy of resulting charge-offs and loan loss allowance applied by the banks. For example, in 2015, the agencies examined \$1.04 trillion in credit commitments covering 26.5 percent of the \$3.9 trillion SNC portfolio.⁹ In making the annual selection of loans to review, the agencies put more weight towards non-investment grade, special mention and classified credits. The regulatory agencies obtain additional information from banks for the syndicated loans that are selected for review. Such information covers delinquency status of each facility, the collateral type, its value, and the source of valuation, borrower compliance with covenants, and whether the bank has waived covenant violations or amended covenant terms, and has been systematically recorded and preserved on a loan by loan basis since 2006. Note that due to the samples being chosen each year, the data is largely cross-sectional in nature, with very few loans being sampled in consecutive years.. Specific on type of covenants on the loan or covenants that have been violated are not available in the form of data fields, but detailed comment fields about covenants and collateral provide anecdotal evidence. We use these comments to enhance our understanding of the data, but due to the difficulty associated with using these comments consistently and systematically, rely on the hard-coded information fields for our analysis in the paper.

⁹ See the Shared National Credit Program Review report dated November 2015 issued publicly by the three regulatory agencies, federal reserve, Office of the Comptroller of the Currency and the Federal Deposit Insurance Corporation.

We match the SNC data to Compustat by matching on obligor name, both directly and by using the Dealscan-Compustat merging file kindly provided by Prof. Roberts, leveraging the similarity of obligor names in Dealscan and SNC. This matching enables us to identify public firms, obtain firm financials for them and to obtain S&P rating information. We also match the SNC data to firms in Moody's DRD database, and obtain the senior unsecured firm rating for them.

3.2 *Sample design*

We start with the set of loans reviewed by examiners in each year that contain more detailed information, and merge these data with the general SNC data using common variables such as obligor and loan identifiers. We have data for the general SNC population since 1996, and the combined examiner-SNC data for the period 2006-2013. We do not use the last year of data directly in our analysis, except to look at the credit access consequences of violations that happen in 2012. There are a total of 17,854 loan-observations over the period 2006-2012 in the examiner data. We apply a few exclusions to this dataset to arrive at our sample of reviewed loans. The primary one is that we do not include 1,943 loan-year observations that have a classified rating as of the end of the previous year. The likelihood of these loans having prior violations and/or experiencing credit cuts prior to the start of our analysis is very high, and thus we believe that these loans should be omitted to better capture the impact of a violation on credit access. This also makes it more likely that we are capturing the first violation within each facility, paralleling the empirical approach in other papers that leave out repeat violations. The other exclusions totaling about 2,250 observations are for enhancing comparability of the impact of violations between public and private firms.¹⁰

We are thus left with a sample of 13,659 loan-year observations with 3,192 observations that have violations that we use in our analysis. The set of observations with information on asset size and leverage is smaller at 9,362 observations with 2,487 observations with violations. If we look at the dataset containing all the control variables including various firm and loan characteristics, most of our multivariate analysis relies on 8,464 observations across all firms or 4,399 observations when we restrict attention to middle market firms (firms with asset size below \$ 1 billion).

¹⁰ We also leave out an additional 619 observations corresponding to construction loans from the sample, since public firms do not have this loan type. We exclude 563 observations corresponding to international firms, since they could be different from the broader sample of North American firms that we focus on. We lose another 1,070 observations that do not have covenant information.

3.3 Variables

The key variables of interest are whether a firm is public or private and externally rated or not, firm size, covenant violations and bank actions, measures of credit quality, collateralization, relationships and economic conditions. We describe these variables below, and Table 1 contains the full list of variable definitions.

We define as public, Compustat firms that are traded on the three main stock exchanges. These firms enjoy access to public equity markets, and also have better financing options due to greater transparency.

We use S&P ratings data from Compustat Moody's ratings from the DRD database to identify if firms are externally rated or not. We define a firm as rated if it is rated by either Moody's or S&P, since external certification expands financing access. About 3/4th of the public firms and 1/4th of the private firms in our sample have an external rating in the year of the loan.¹¹

Another key variable is the covenant violation variable. The data contains information on whether or not the firm is compliant with covenants as of the end of the year. There are three categories of covenant compliance - credits that are compliant with all covenants unconditionally, credits that are compliant with covenants on account of having received waivers or amendments, and credits that are not compliant at the end of the year and do not have their violations renegotiated.¹² We characterize the first category as non-violators and the subsequent two categories as violators; the last category corresponding to loans non-compliant at year-end are treated as loans being denied waiver/amendment. While we do not know the specific covenant that is being violated in each loan, SNC loans contain both performance covenants and capital covenants similar to the Dealscan syndicated loan universe. As shown in Figure 1, the types of covenants in SNC are similar for public and private firms, with the leverage covenant being the most common. For example, this data suggest that 37% of public loans have a capital expenditure covenant, similar to the figure in Nini, Sufi and Smith (2009) that about one-third of loan contracts have such a covenant.

¹¹We do not use the actual rating assigned to the firms in our empirical analysis, since this would result in our losing most of the private firm loan sample. When we report summary statistics on actual ratings, for firms rated by both agencies, we report the worse rating as the firm external rating.

¹² An additional field in the SNC examiner data shows that about half of the facilities that are non-compliant at the end of the year had received a waiver or amendment earlier during the year. The fact that they are non-compliant at year-end indicates that either the amendment to covenant terms was not substantial enough for the firms to have become fully compliant at the end of the year or that there was further deterioration over the year, causing them to still be in violation. In unreported robustness checks, we use this information to further confirm our results.

The other bank action we consider in addition to the waiver/amendment decision is the credit cuts. We measure the impact on credit access in 3 different ways to better relate to different papers in the literature and also to ensure robustness of findings. First, we examine whether or not the bank cuts the limit (fully or partially, looking at different thresholds for the size of the limit cut), controlling for loan type since term loans naturally experience limit reductions as the loan is paid back. Second, we look at the value of the reduction in the limit as a percentage of firms assets. In unreported results, we also look at these limit cuts separately within samples of just revolving lines or just term loans. We also look at the reduction in the balance to assets ratio, limiting our sample to revolving lines of credit. In addition to these loan level measures, we also look at corresponding measures on the firm level as well as the likelihood of firm exit in a distressed condition. In all our credit access measures, we need to distinguish between a loan that is fully paid back by the borrower voluntarily or matures, from a loan that is terminated by the bank. . We treat loans that exit the data after having had a performing rating in the previous year as being paid back voluntarily, while the loans that exit the data with a classified rating in the previous year are treated as loan cancellations. Thus, the former would be treated as a 0% limit cut or balance reduction, while the latter would be treated as a 100% limit cut or balance reduction. Table 1 provides exact definitions of all our credit access variables.

Another variable important to our analysis is firm size. While there is information of the assets and sales of firms in the examiner data, relative to information on covenants and collateral, this size information is less well populated. Further, examiners were not asked to collect this information from 2011 onwards, thus the information is only available until 2010. We make a couple of adjustments to the assets and sales information to make it more usable 1) if any loan to a give firm has information about firm sales and assets, we use it for all the loans of the firm in the year. 2) if the assets or sales information for a given firm is not available in any year, we check if the information is available in the immediate previous or subsequent year, and if so fill in the same values for that firm in the missing year. We check that results are robust to using only observations where asset size information is originally available in the data for a given year. Further, in most of the analysis, we use information about firm size in size buckets which should be relatively unaffected by this adjustment approach. We classify firms with assets above \$ 1 billion as large corporate firms, and classify firms with assets below \$ 1 billion as middle market firms, further split into two size buckets, middle market firms above \$ 250 mn in assets and middle market firms below \$250 million in assets. Due to the assets size data stopping in 2010, while we can use data from the years 2006-2011 for all our analysis, we can only use information from 2012 for determining credit access outcomes of violations occurring at the end of 2011 or for specifications that do not use firm size information.

We measure credit quality using several variables, loan ratings assigned by banks, whether loans are delinquent on either loan principal or interest payments or not, firm leverage, level of utilization of a loan that is especially important for revolvers and finally a measure of how large the loan limit is as a function of firm assets, relative to other firms with similar assets. Of these variables, the most important variable is the loan rating. The common credit risk assessment scale (uniform loan classification standards) used in this process has been in place for more than a century, ensuring consistency across banks and time. There are five categories of facility ratings in increasing order of credit risk: Pass, Special Mention, Substandard, Doubtful and Loss. Whereas Pass loans are performing loans, Special Mention loans have a somewhat increased risk of default and the last three ratings indicate severe firm distress (very high probability of default) and are categorized as 'Classified' facilities. The leverage variable is defined as total firm debt to total assets; data availability for the total debt variable has the same data limitations as discussed for firm sales and assets. We use a similar approach to fill in missing data for total debt, as for total assets.

The reviewed data also contains information about the amount and type of collateral, as well as source of collateral valuation. The majority of facilities (70%) are secured with 'all business assets' or 'other business related collateral', similar to facilities in Moody's DRD database, and we classify these as less redeployable or firm-specific assets. The other assets that are pledged as collateral are considered redeployable assets and include the following: 12% of facilities are secured with 'working capital collateral' (including both inventories and accounts receivables) and 11% are secured with 'real estate collateral', 6% are secured with 'fixed assets' that includes property, plant and equipment and office furniture, and only a tiny proportion have 'liquid collateral', such as cash or marketable securities. Some loans are secured with multiple collateral types. In these cases, we calculate the collateral coverage from each collateral type, and use the collateral type with the largest collateral coverage as the primary collateral type. We obtain the aggregate collateral coverage by aggregating the collateral values across all the assets that are pledged as collateral for a given loan. We find that the median loan-to-value ratio (LTV) is around 50%, but there is considerable variation in the extent of collateral coverage with the LTV being around 18% at the 25th percentile across all loans and 93% at the 75th percentile. There are also some large outliers. Rather than using the LTV measure as a continuous variable, we create three categories of collateralization based on LTV – Unsecured, Partially Secured (LTV>70%) and Well Secured (LTV<70%). Our measure is consistent with how banks treat wholesale credits, in that safer borrowers get unsecured loans, whereas most other borrowers start off with over-collateralized loans. The value of the collateral can however reduce over time, leading to partially secured loans. Only 7% of the observations are unsecured, which is expected given that reviewed facilities are riskier or have

deteriorated in credit quality since origination. 37% of loans in our sample are partially secured, while the remaining 56% are fully secured or over-collateralized. Our results are, however, robust to using more granular measures of collateralization.

We also use the general SNC data starting in 1996 to identify how established each firm is in the syndicated loans market. We treat a firm as a new borrower if it has only been in the general SNC data for 2 years or less (looking at the entire 1996-2012 period) at the time of the violation. For established borrowers, we measure the length of relationship as the difference between the time the firm experiences a violation on the loan under consideration with a given agent bank and the time the firm first initiated any SNC loan with the same bank as agent.. Our measure of relationship is intended to capture if the length of time the bank knows the firm makes any difference to its waiver decision or credit cut decision. We bucket relationships length into two buckets, either an established firm has a relationship (at least 2 years) with a given bank or it does not. Results do not change if we use a different cutoff for characterizing a relationship. We also try other alternatives such as the number of relationships a firm has and the exclusivity of the relationship with a single bank, but neither of these variables appears related to the bank decision. Other relationship measures typically used in the academic literature for public firms such as time since previous loan, or same agent bank as on previous loan, or share of total borrowing with the same agent bank over the past few years, are less relevant to our sample, as private firms borrow far less often than public firms and so are less likely to have multiple loans in the data at a close enough frequency.

Finally, we define the years 2007 and 2008 as recession years with tight credit conditions, whereas the other years in the data are treated as normal years.

3.4 *Summary statistics*

We compare the characteristics of firms and loans in the overall SNC data to our sample in Table 2. Panel A contains information on firm level variables, while Panel B shows loan level characteristics for the overall SNC data (Column 1) and two samples of interest – the set of reviewed firms (Column 2) and the reviewed firms that violate covenants (Column 3). The rate of violations in the reviewed sample is about 23%, leading to 3,192 loan year observations for violators. As seen from Column 2, there are 13,610 loan-year observations in our sample, relative to 59,656 observations in the overall SNC data over the years 2006-2012. The industry composition, public-private composition as well as the firm age in the SNC data is relatively similar across the overall SNC data and our sample. Within our sample, a third of observations in our sample are for public firms. Most of the public firms have agency ratings whereas

most private firms are unrated, though the share of rated private firms is somewhat larger in our sample than the general SNC population. The firms in our sample are relatively large, with around 50% of loans corresponding to firms with \$1bn or more in assets. Table 2 also shows that smaller firms and private firms have a higher rate of violation than large firms or public firms.

The distribution of loan type and loan purpose is similar for the full sample and the reviewed sample as shown in Panel B of Table 2. Our data contains an equal share of term loans and lines of credit, somewhat different from papers that focus on public firms alone, since private firms use the term loan market as the primary source of long-term funds. The main purpose is for Working Capital and General Business Purpose.

While in the full SNC data 85% of credits are rated Pass, only 66% are rated Pass in our sample as shown in Figure 3, since the supervisory review focuses on loans with elevated risk. To better understand the relative riskiness of our sample, we show the distribution of the overall SNC data and our reviewed sample by agency ratings aggregated to six broad rating categories in Figure 4. We immediately see that the reviewed sample contains firms with higher default risk with the majority of observations rated as BB and B; as expected the violators among the reviewed loans are riskier with most of them having an external rating of B or C.

To summarize our dataset relative to other papers on covenant violations, our sample has data on both public and private firms. The public firms in our sample are larger than the median Compustat firm, and we have relatively few public firms that are of size below \$ 250 mn. Our sample is also median firm is somewhat riskier than the sample in other covenant violation papers due to the focus on reviewed syndicated loans.

4. Empirical analysis and results

As described in Section 2, we structure our empirical analysis in terms of investigating three hypotheses.

1. The first hypothesis looks at the credit access impact of the bank decision whether or not to grant a waiver/amendment to a loan/firm that has violated covenants.
2. The second hypothesis investigates whether banks are less likely to give a waiver/amendment to private firms as compared to similar public firms.
3. The third hypothesis checks as a result of the above, covenant violations result in greater loss of credit access for private firms, especially when the collateralization is insufficient.

In this section, we present the univariate statistics for various firm and loan characteristics in relation to the waiver/amendment decision and credit access outcomes and multivariate models that test the three hypotheses. We measure whether a firm violating any covenants on its loans over the period (t-1) to year (t) receives a waiver/amendment at the end of year (t), and relate this to credit reduction measured as the difference in limits and balances at the end of year (t+1) and end of year (t). In other words, we measure all independent variables, including covenant compliance status and measures of credit quality at the end of year (t), and then evaluate what happens to credit access in the following year.

4.1 Results for Hypothesis 1

We begin by looking at differences in credit retention across loans using different credit access measures for the three different values of covenant compliance, no violation, and violation with waiver/amendment granted, and violations with the loan remaining non-compliant at year-end. The graphs in Figure 5 show the impact of not receiving a waiver/amendment on our three different credit access measures, namely share of loans facing a limit cut, value of the average limit cut relative to assets and value of the average balance reduction relative to assets visually. It is evident from all three Panels that the key differentiator in credit access outcomes is whether or not a loan with violation receives a waiver/amendment or not. Looking at univariate statistics across these three cases of covenant compliance in Table 3, we see for instance that the limit to assets ratio reduces by 1,100 bps on average for loans that remain non-compliant, relative to a reduction of only 390 bps for violating loans that receive a waiver/amendment and a reduction of 140 bps on average for non-violators. However, the limit to asset and balance to asset ratios are also higher for violators than non-violators, and thus part of the reduction may be driven by the bank managing its exposure to these firms, which can only be controlled for in multivariate analysis. In parts D and E of Table 3, we evaluate credit access reductions at the firm level. We see that 19% of violating firms that remain non-compliant exit the SNC market in distress, relative to only 7% of the violators that receive a waiver/amendment and just 2% of the firms with no covenant violations.

Since several factors can influence banks' credit limit management decisions, we estimate a multivariate model of credit access reduction using as controls, measures of credit quality, firm asset size, economic conditions, how established is the firm in the SNC market, and other loan features such as time to maturity, level of collateral, loan type, loan purpose, and collateral type. Thus, we estimate the following model:

$$\mathbf{Credit\ access\ reduction} = f(\text{covenant compliance status, firm credit risk, collateral category, firm size bucket, agency rated indicator, firm age and bank relationship indicators, economic conditions, loan maturity, loan type, loan purpose}) \quad (1)$$

where f is the logistic or linear function and *credit access reduction* is measured in one of three ways: Binary variable with value of 1 if $\Delta\text{Limit}/\text{Limit} > 5\%$, $\Delta\text{Limit}/\text{Assets}$, and $\Delta\text{Balance}/\text{Assets}$, credit reduction is the difference between the value of the limit/balance in year (t+1) relative to the value in year (t), with t being the year-end period where we observe covenant compliance status, assets, and starting value of limits or balances and all other explanatory variables.

Table 6 reports the marginal effects of each explanatory variable on the credit access reduction measure of interest, from each of the three models of credit access reduction. Column 1 and 2 are from a logistic regression based on whether the firm has a reduction in limit after covenant violation (1 if $\Delta\text{Limit}/\text{Limit} > 5\%$), Columns 3 and 4 are from linear regressions of reduction in the limit to assets ratio for all the loans in our sample of reviewed loans ($\Delta\text{Limit}/\text{Assets}$), whereas Columns 5 and 6 are from linear regression of the reduction in the balance to assets ratio for revolving exposures in our sample ($\Delta\text{Balance}/\text{Assets}$) respectively. For each measure, in the first column we only consider two values of the covenant compliance variable, namely unconditional compliance (no violation) vs violation, whereas in the subsequent column we split the violators into those receiving waiver/amendment versus those remaining non-compliant.

It is again evident that loans that remain non-compliant are associated with the most reduction in credit availability. The explanatory power of our models is reasonably high, with for instance an R-squared value of around 30% for the linear regression model for reduction in limit to assets ratio, giving us confidence that we are able to capture the important factors that influence limit cuts. In fact, it can be seen from Column 4 that the average limit cut level is indistinguishable between firms with no violation and violators who have received a waiver/amendment as compared to reduction in the average limits to assets ratio of 200 bps for those violators remaining non-compliant. A similar trend is seen when we look at the average reduction in balances relative to assets in Columns 5 and 6. The magnitude of the reduction due to covenant non-compliance is smaller than in our univariate results since the internal loan rating, a measure of credit quality, is the most important factor in determining credit access outcomes.

Note that it is possible that the year-end loan rating that we use as the control is influenced to some extent by the violation itself; however, we believe that it is appropriate to control for credit quality using year-end ratings since it is the key factor influencing credit access outcomes for both violators and non-violators, as evident from all the columns of Table 6. By using year-end rating as the control, we can control effectively for credit quality differences across firms, possibly at the risk of under-stating the effect of violations and waiver/amendment, the effect we want to find. In the robustness section, we use another related supervisory database that contains quarterly SNC data since 2009, to check the robustness of our results to using alternate measures of credit quality that are less likely to be influenced by the

violation itself, namely mid-year ratings and probability of default estimates assigned to the firm by various lending banks.

Overall, the multivariate results in Table 6 provide strong evidence on favor of our first hypothesis that banks sort firms upon violation of covenants; those deemed viable receive waivers/amendment and continue to retain access to loans, while banks reduce their exposure to firms whose future prospects appear more bleak by reducing loan limits and balances. The multivariate models also confirm that the level of collateral matters in determining the extent of credit reduction, whether measured as limit cuts or balance reductions. Other variables that matter are firm size, economic conditions, and whether the firm is new to SNC or not. We also see that the control variables behave in a similar fashion in the balance reduction model as in the limit cut model.

4.2 Results for Hypothesis 2

Next we investigate the factors that influence banks' waiver/amendment decision after violations, especially the role of the public or private status of firms. While we do not know exactly which covenant was violated or how tight it was, we do not believe that our empirical analysis suffers from this since available data and research does not indicate that these factors vary across public and private firms in a way that would explain our results. A couple of papers (Ackert, Huang and Ramirez (2007) and Khang and King (2015)) look at the number of financial covenants for public and private firms at loan initiation. They find that private firm loans have fewer financial covenants or are less likely to have financial covenants than comparable public firms at loan initiation. We believe that this is unlikely to affect our results since we are only looking at firms with covenants. Moreover, underwriting surveys performed in the context of SNC data indicate that there is not much variation across public and private firms in the types of covenants that are commonly used, as shown in Figure 1. To the best of our knowledge, no paper has compared whether covenant tightness varies across public and private firm loans, either at loan initiation or thereafter. Theories that view covenants as ex ante mechanisms designed to "protect" lenders in the face of asymmetric information (e.g. Garleanu and Zwiebel(2009) would imply that covenants for private firms would be set more tight at inception, and lenders should be more willing relax the covenant limits via ex post renegotiation, as more information becomes available. If covenants are indeed set tighter for private firms as suggested above, banks should be more likely to offer waivers/amendments to private firms, which would work against us.

We show univariate statistics on how different firm and loan characteristics influence the rate of violations and the bank decision whether or not to grant a waiver/amendment after a violation for both

public and private firms in Table 4. It can be seen that the overall rate of violation is 23% and private firm loans with violations are denied a waiver/amendment in 41% of the cases whereas only 15% of public firm loans with violations fail to receive waiver/amendment. This difference in obtaining waiver/amendment across private firms and public firms holds when we further partition the sample by asset size, credit risk, collateralization, economic conditions at the time of the violation, etc. For example, the difference in the rate of being denied waivers/amendments after violations is 20 percentage points across large corporate public and private firms as well as between middle-market private and public firms. As loans become riskier, the difference between public and private firms widens. Similarly, when loans are well secured, the difference in the denial rate is only 23 percentage points between public and private firms, but increases to 32 percentage points when loans are only partially secured or unsecured.

Generally, most factors other than collateral affect the waiver/amendment rate in a similar manner across public and private firms, though the rate of denial is always higher for private firms. The level of collateral matters more for private firm loans, with well secured loans with violations being more likely to obtain waivers/amendment by at least 15 percentage points relative to partially secured and unsecured loans. By contrast partially secured loans are slightly less likely to get a waiver/amendment for public firms and unsecured loans with violations obtain a waiver/amendment at the same rate as well secured loans. Other factors, such as credit risk controls and downturn conditions affect the waiver/amendment decision for both public and private firms in a similar manner. Having an external rating matters more for private firms, while being new to the SNC market reduces the likelihood of obtaining a waiver/amendment for both public and private firms.

In Figure 6 we present how the violations and waivers evolve throughout our sample period for private (A) and public firms (B). It can be seen that (A) more loans are reviewed in downturn years as firms become riskier, increasing our sample size in years 2008-2009. At this time, covenant violations also increase. The share of loans with violations denied renegotiation is higher for private firms in each year, and ranges between 30% and 54%, reaching its peak in 2008; for public firms, the share of loans denied renegotiation is generally ranges between 5% and 20%, except in 2011 and 2012, when it is artificially high at 33% because of the extremely small number of loans with violations in these years.

Since there are many factors that affect the waiver/amendment decision, a multivariate analysis is needed to see the relative importance of different factors. Thus, we implement the following multivariate logit model for the probability of a loan with violations receiving a waiver/amendment.

$$P(\text{waiver/amendment})=f(\text{public firm indicator, firm credit risk, size and relationship with bank, economic conditions, loan collateral, other loan characteristics as controls}) \quad (2)$$

Table 7 reports the marginal effects from a logistic regression estimated on all the loans with violations in our sample (Columns 1-3) as well as on sub-samples of private firm loans with violations (Column 4) and public firm loans with violations (Column 5). We start with minimal controls that are available for the full sample of 3,192 loans in Column 1, and then introduce more control variables such as size and leverage in the specification in Column 2, and then collateral controls in Column 3. It is evident that marginal effect of being public on the waiver/amendment likelihood is strongly significant across all three specifications. The specification in Column 3 shows that, keeping other factors fixed, the likelihood of a bank granting a waiver/amendment is higher by 14 percentage points when the violating firm is public rather than private. The multivariate model preserves the univariate relationships we observed in Table 4 across the different control factors, with the year-end loan rating and other measures of credit quality as well as firm size making the largest difference to the waiver/amendment likelihood.¹³ We find that banks are less likely to forgive violations for firms that are relatively new to the syndicated loan market than for established firms, and that agency rating makes a difference only for private firms. The models in Columns 4 and 5 also confirm that collateral matters to bank decisions for private firms, since partially collateralized loans are less likely by 6 percentage points to receive waiver/amendment relative to over-collateralized loans. Unsecured loans are less likely than well secured loans to receive a waiver/amendment for both public and private firms.

Finally, we turn to our third hypothesis that tests whether the difference in waiver/amendment likelihood across public and private firms translate to varying credit access consequences of violations for them

4.3 Results for Hypothesis 3

Our objective is to look at the impact of covenant violations on credit access across public and private firms. In Table 5, we look at how firm and loan characteristics affect credit reductions, separately for loans with violations and those without, looking at the three measures of credit access one by one in each Panel. We show these effects separately for public and private firms, with our main interest being to compare the difference in credit reduction across violators and non-violators for each firm type. Below, we discuss in detail univariate results regarding the number of firms affected by limit cuts and the average

¹³ For public firms, even when we control for financials, we find that the bank internal rating is the strongest predictor of the waiver/amendment decision and credit access outcomes, although factors such as income are also significant. This confirms that bank internal ratings are an informative summary statistic capturing credit quality based on both quantitative and qualitative factors. Thus we believe that the internal bank rating control goes a long way in ensuring that that any impact we find is not due to omitted factors related to credit quality.

magnitude of the limit cut shown in Panels A and B respectively. Results in Panel C that looks at the average balance reduction within revolving loans are similar to those in Panel B and are not discussed separately.

Table 5 Panel A shows the impact of covenant violations on the share of loans with a limit cut across public and private firms along different characteristics. We see that there is not much difference in the share of loans facing limit cut across public and private firm loans when there are no violations; however among violators, the share of private firm loans experiencing a limit cut from year t to year $(t+1)$ is 10 percentage point higher. A similar trend is seen when we look at the average limit cut as a share of firm assets, as the credit access measure in Table 5, Panel B. Violations result in the average limit cut to assets ratio increasing by 5.4 percentage points for private firm loans and only 3.6 percentage points for public firm loans.

It can also be seen in both Panels A and B that many other factors such as firm asset size, measures of credit quality including loan rating and leverage, economic conditions and collateralization affect credit reductions. Credit quality measures such as loan rating have a strong independent effect on the share of loans facing limit cuts, across violators and non-violators and public and private firms, showing that it is important to control for these factors in the multivariate regression to isolate the impact of covenant violations. Most other factors such as asset size, collateral, economic conditions and collateral affect credit access for violators more than for non-violators, with some differences across public and private firm loans. For such factors, multi-level interactions would be needed to better understand the effect of a violation on credit access. For instance, asset size affects the share of loans with limit cut in Panel A and average limit cut to assets ratio in Panel B of Table 5 especially for loans with violations but the univariate statistics do not show much difference in the effect of violation across private firms and public firms. In the multivariate analysis, we look at results both overall and within the middle-market firms to test differences in impact of violations on credit access across public and private firms. It can be seen from Panel B of Table 5 that collateral level is more important factor to preserving credit access for private firm violators. The impact of violations on reduction in credit access becomes larger during downturns, for both public and private firm loans, though the level of reduction is larger for private firm violators. External credit rating, and SNC relationships do not affect credit access much for either public firms or private firms, though as seen in Panel B, private firms newer to SNC suffer a larger reduction in the limit to assets ratio after violations relative to more established firms.

The differences in credit access reduction for the public and private firms with and without covenant violations hold within each year of our sample in general. Figure 7 has graphs that depict the variation in

credit cuts for these 4 groups over time, for all the firms in our sample (left graphs) and restricting the sample only to middle market firms (right graph). The top panel in Figure 7 shows the share of loans facing limit cuts, for each of the 4 segments, namely public and private firm loans, with and without violations. The peak occurs in 2008 across all four groups with the share of firms experiencing a cut ranging from 10% for public firm loans with no violation to more than 50% for the private firm loans with a violation. The other two credit access measures bring out the relative impact of violations on public and private firms even more sharply. Results in the graphs to the right based on middle market firms only are generally similar, except that the differences between public and private firms are less stark.

Next we turn to our multivariate models to test whether the impact of a covenant violation on credit access is really larger for private firms, when we control for all the firm and loan characteristics in our data.

The models that we estimate are similar to those presented in Table 6 except that now we only compare violators and non-violators and add an interaction between covenant violation status and the public firm indicator.

$$\text{Credit access reduction} = f(\text{covenant status*public/private indicator or covenant status*public/private*middle market indicator, controls}) \quad (3)$$

Table 8 shows the marginal effects of various firm and loan characteristics on our 3 credit access outcomes, specifically from a logistic regression of the likelihood of limit cut and the linear regressions of limit cut and balance reduction as a percent of assets. In Columns 1, 3, 5 we interact the covenant violation variable with the public-private firm type, and include other variables as controls for the three models. In Columns 2, 4, and 6 we further interact the covenant violation and public-private interaction term with an indicator for firm size (that is middle market firm below \$1 billion in assets or not) to separately capture the effect of a violation on credit access for large corporate firms separately from middle market firms. We see that for private firm loans, violations result in an increase in the share of loans facing limit cuts as well as the magnitude of limit cut and balances, while violations only have a statistically significant and smaller effect on the share of public firms facing limit cuts. Column 5 suggests that there is no impact of violations on balance reduction for either type of firm. When we further interact the violation-public interaction with firm size, we see that middle market private firm loans with violations are at most risk of limit and balance cuts. Across all measures, the effect of violations on credit access for middle market public firms is both smaller and weaker than that for private

firms. By contrast, large corporate firms, whether public or private do not experience credit reductions; rather, some of them even increase their borrowing. The results for collateral levels and downturn conditions are similar in direction and magnitude as in Table 6.

We further investigate the same set of models restricting our attention to middle market firms, in order to see if our results on public and private firm differences hold within this sub-sample, in Table 9. We add an additional measure of credit access, namely the share of loans with a more significant limit cut of 25% or more (Column 2) rather than just the minimal 5% cut threshold reported in Column 1. While private firms with violations appear with a significant reduction in limit under all metrics, it is clear that public firms experience a small limit cut after violations but do not face the larger level of limit cuts suffered by private firms with violations. ,

As discussed in the univariate analysis, we would like to test the impact of violations on public and private firms further by level of collateral, economic conditions, etc. This is because, as noted earlier, the effect of these factors on credit access is magnified when a firm has violated covenants, and they also impact public and private firms somewhat differently. Hence, we repeat the regressions in Table 9 on middle-market firms by further inter-acting the firm type-covenant violation indicator interaction with additional variables, one at a time. Since it becomes messy to report regression results with several layers of interactions, in Table 10, we just report the marginal effects of interest from interacting key variables of the models separately for public and private firms. It can be seen that for all 4 credit access measures, violations results in substantial credit reduction for private firms. While a violation has a significant effect for public firms when we look at the share of loans facing a 10% or more cut, there is no statistically significant effect on public firms when we look at a larger limit cut of 25% or more. Recessions result in a larger impact of a violation on credit access for private firms. It is also clear that the impact of a violation is largest for partially secured loans both in terms of limit cuts and balance reductions for private firms. The results on collateral type differ somewhat across different credit access measures; when we look at the continuous measures of average limit cuts and balance reductions relative to assets that are more robust to small sample issues, it is clear that collateral that is redeployable offers better protection against credit rationing. It is also clear that loans to private firms that are externally rated are not impacted significantly by credit reductions after violations.

We have looked so far at credit access outcomes measured at the loan level. However, it is possible that either due to loan restructuring or loans maturing naturally, that a reduction of loan limit in one facility is offset with an increase in the limit of another facility. In order to better understand the impact of violations on the credit available to a firm, we aggregate all our loan-level variable to the firm level across

all the syndicated loans made to the firm within that year. To aggregate the covenant compliance variable and the rating, we look at the worst outcome across all the loans of the firm. For instance, if any loan remains non-compliant, the firm is treated as being non-compliant. Similarly, the firm rating is the rating of the worst rated loan in that year. We aggregate the continuous variable such as limits, balances and collateral value by summing across all the loans of the firm. We then implement our credit access measures at the firm level using the set of middle-market firms by first interacting the covenant violation indicator with public/private firm type and then also interacting it with firm-level collateralization or external rating availability, similar to the loan level regressions that underlie Table 10. We show the marginal effects from the set of firm level models in Table 11. These results confirm that covenant violations have large and statistically significant negative impact on credit limits and balances for private firms with similar magnitudes as shown from the loan level estimates in Table 10. For public firms, we see that violations result in some firms facing a small limit cut, but these cuts happen during more normal times rather than a recession and affect rated firms, suggesting that these firms could be switching financing. It is also clear the impact of a violation is largest on partially secured loans both in terms of limit cuts and balance reductions for private firms, and that the effect is larger during recessions. Overall, our results are similar at the loan level or firm level.

5. Robustness tests and other possible explanations

So far, we have shown that public firms are more likely to receive waivers and covenant amendments after violations and that as a result they suffer fewer and less severe restrictions on credit access. In this section, we explore alternative explanations and robustness of our results, including whether our results could be capturing unobserved quality differences across public and private firms, whether the results are robust to other ways of measuring risk, whether using additional fixed effects for industry and identity of lending bank affect results and some other tests.

5.1 *Alternative measures of risk - timing*

In the results presented so far that rely on annual data on syndicated loans, we have used bank loan ratings reported at year end as the primary control for credit quality differences across loans for two main reasons 1) these ratings are the most predictive factor for credit access outcomes for both violators and non-violations across public and private firms, and 2) given our annual data sample of reviewed loans, loan ratings from the end of previous year are not an adequate or timely measure of the risk of the loan at the time of the bank decision and thus could cause us to overstate the impact of covenants on credit access outcomes.

However, it is quite possible that for loans with violations, year-end ratings for violators are influenced to some extent by the covenant violation itself. If so, our empirical design could cause the marginal effect of the violation to be biased downwards, potentially affecting our relative results about the impact of violations on credit access across public and private firms in unpredictable ways. In this section, as a robustness check, we repeat our analysis using a different measure of credit quality, namely mid-year ratings at a firm level.

We use another regulatory dataset (“Expanded SNC data”)¹⁴ containing quarterly data on all syndicated loans on the books of 17 large banks, that became available starting in December, 2009. In this data, each reporting bank provides quarterly information on all the syndicated loans for which it is either an agent or participant, including the loan rating for each loan. We use the data reported as of the 2nd quarter or June-end of each year¹⁵ to create a firm-level credit quality measure, namely mid-year firm rating. To do this, we calculate the firm rating as the worst loan rating of all the loans made by the bank to the firm in the specific quarter, and then obtain the median value of the firm rating across all banks who report a loan to that firm in the quarter. We then match the firms in our sample of reviewed loans to this data. Note that since this data is only available since 2009, we miss out on observations from the recession, where loss of credit access was particularly severe. We also do not have loans agented by smaller banks.

We are able to obtain these mid-year ratings for 3,988 firm-year observations over 2009-2012, which accounts for most of the 4,760 firm year observations in our sample over this time period. For middle-market firms, we have mid-year ratings for 1,281 firm-year observations of which 1,149 firm year observations where we have data on all control variables. Using these observations, we test the robustness of our results to this alternate control for credit risk, while using all the other controls as before in a specification similar to the one underlying Table 11. We also repeat the analysis for this dataset using the year end rating as the credit quality control. We expect that the covenant violations will show up as having a greater impact on credit access when we use the mid-year rating as the control relative to when we use the year-end rating as the credit quality control, but our primary interest is in seeing if we still find that covenant violations impact credit access more for private firms, and that collateral remain key to preserving credit access. Results are shown in Table 12 in Panels A and B.

¹⁴ This dataset is also used by Aramonte, Lee and Stebunovs (2015) and Plosser and Santos (2015) who provide a more detailed description of the data. Note that we use the median rating and PD across all reporting banks to minimize the effects of variation across banks noted by the latter paper.

¹⁵ The data collection only started in 4th quarter of 2009, so we are forced to use data in 2009 from the 4th quarter, but for 2010, 2011 and 2012 we use data from 2nd quarter. If we exclude 2009 which is still a stressed year, we are left with only benign years in the sample, and too few observations.

It can be seen that the main results that violations impact credit access more for private firms, especially when the extent of collateral is low, is unchanged. The new things to note are the following. Using the mid-year rating as the control, we can now model the impact of violations on the share of firm exiting the SNC market in distress. The distress measure is based on year-end ratings, and hence we could not study this outcome using year-end ratings as the credit quality control. We see that violations result in a 5 percentage points increase relative to non-violators in the share of middle-market private firms exiting the SNC market in distress; there is no similar effect on public firms. Using mid-year measures of credit quality, we see some evidence using the share of firms with a 10% or more limit cut as the dependent variable that public firms credit access is affected by violations when they are partially secured; however, only rated public firms are affected suggesting that to some extent it may be a voluntary decision of firms to switch financing in response to tighter lending standards. Similarly, there is evidence that unsecured loans of public firms suffer a limit cut and balance reduction after violations. These results become less significant statistically when we use the year-end rating as the control. But in both panels A and B, middle market private firms are seen to suffer more severe credit access consequences, relative to middle market public firms. Finally, since the sample period for which mid-year rating is available is after the worst of the recession, externally rated firms are seen to suffer bigger credit cuts than unrated firms. We believe that this is indicative of firms switching to alternate financing such as the bond market, rather than suggesting that agency rated firms lose more credit access relative to unrated firms.

5.2 *Alternative measures of risk - Granularity of credit quality control*

Unlike papers in the literature on public firms, we do not have firm financials beyond size and leverage, and thus use bank ratings as the primary measure of risk. One could argue that these ratings are not sufficiently granular, and thus we have not controlled well enough for risk differences across firms. In this section we control for risk using an alternative measure of risk, namely firm probability of default estimates.

We obtain firm PDs from the Expanded SNC data as well, again using the 2nd quarter or June-end reports of each year (2009 from the 4th quarter). Among the 17 reporting banks, banks that are subject to advanced approaches capital requirements and have entered parallel run as of a given quarter provide their estimate of probability of default for each of their borrowers. We obtain the median PD for each firm by taking the median value of PD across all banks providing this information for that firm. This enables us to obtain a more granular measure of firm credit risk. We are able to obtain mid-year PDs for 1,489 firm-year observations out of the total 2,315 firm year observations in our sample over the time period

2009-2012. Of these, 679 firm-year observations with PD information correspond to middle market firms; we use this data for our analysis.

In Panel C of Table 12, we compare the marginal effects of a violation on different middle-market firms, controlling for credit quality using the mid-year PD (results for comparison using year end firm rating are provided in Panel D). We see once again that the marginal impact of a violation on credit access is larger for middle market private firms, especially their loans are only partially secured. Other results are similar to those obtained using the mid year firm rating as the control shown in Panel A of Table 12 and discussed above. Thus, we note that our results are robust to using a more granular measure of credit risk.

5.3 *Controlling for selection*

In the main analysis, we have not considered the possibility that being or staying public is an endogenous choice. While there are many reasons that motivate firms to go public or stay private (see for e.g. Pagano and Roell (1998) or Boot, Gopalan and Thakor (2006)), it is possible that public firms are more productive or have more growth opportunities than private firms (Bharath and Dittmar (2010), and (Maksimovic, Phillip and Yang (2013))¹⁶. The treatment effect (effect of being public) could also vary across firms, and influence the choice to go public.

We believe that the issue of selection is less important in our sample relative to other public-private papers, since our sample focuses on firms that are riskier, and would be less likely to include the most profitable or productive public firms. Moreover, our interest is not on any decision or choice made by the firm, rather on how the bank reacts to the firm's violation taking into account its choice to be public or private. We also have access to the bank internal rating which likely captures soft information and other factors that may not show up in firm financials such as management quality, etc. Thus, we do not believe that our results are driven by the choice of firms to go public, stay public or remain private; instead we believe that banks are reacting to the expanded access to financing that comes from being a public firm.

Nevertheless, to account for the possible selection effect, we take a multi-pronged approach: (1) controlling for selection using an instrumental variable approach either via bivariate probit approach that is similar to the Heckman selection model except that the dependent variable of interest is also binary or (2) controlling for selection using a switching regression approach similar to Maddala (1979 and 1986), that also allows for the importance of various factors such as collateral, relationships, etc. to be determined separately across public and private firms. In addition, the switching regression framework is useful to

¹⁶ Further, there is also literature suggesting that private firms have a higher return on assets or equity than public firms (Brav (2009)).

check if the treatment effect differs across public and private firms. . Finally, we also control for selection by implementing a propensity score-matching based on observable firm characteristics. For the biprobit and switching regression models, we use the median industry market to book ratio as an exogenous variable. It captures the attractiveness of being public at an industry level, and thus is related to the probability of a firm being public. It is however unlikely to directly affect the bank's waiver/amendment decision once we control for firm credit quality and public/private status, since we use the long run value of the industry market to book ratio over a period of 15+ years. Indeed we find that this variable has a strong effect on the probability that a firm is public. In unreported results, we test if it influences the waiver/amendment decision once we include all our controls, and find that it does not.

Table 13 shows the results of the bank decision model underlying hypothesis 2, controlling for selection. The second stage regression in Panel A models the likelihood of obtaining a waiver/amendment for loans with violations, using either a biprobit model which constrains coefficients on all control variables to be the same across public and private firms or a switching regression which allows the coefficients to vary across public and private firms. The first stage regression in Panel B which models the likelihood of being public, uses as independent variables firm size, age in the SNC market, existence of external rating, firm leverage as well as our industry level exclusion variable.

We are interested in the treatment effect i.e. how much does being public improve prospects of getting a waiver/amendment, controlling for other factors such as credit risk, firm size, collateral, relationships, other loan characteristics, external environment, etc. Looking at results in Table 13, the first stage model of public-private choice suggest that while firms in industries with higher market to book ratios are indeed more likely to choose to be public, firm size predicts the likelihood of being public most. When the predicted probability of being public is used in the second stage regression within the binary probit model or the switching regression model, the treatment effect of being public is 29 percentage points increase in the chance of obtaining a waiver/amendment in the binary probit model and 19 percentage points increase in the switching regression model, both of which are higher than in the standard logit model that does not control for selection in Table 7. We believe that the larger magnitude of the treatment effect is because now a greater number of large firms are now treated as being public whereas more small firms are treated as being private, thereby adding the size effect to the public-private effect seen earlier. The switching regression also suggests that while the treatment effect of being public is somewhat larger for firms that have chosen to be public, it is still fairly large for private firms. While we do not want to over-emphasize the magnitude of the treatment effect here relative to the model in Table 7 since we have relatively few predictors to explain the public-private decision, the IV model results do suggest that our main results are robust to selection.

We also implement a non-parametric propensity score matching (PSM) approach to evaluate the treatment effect within matched samples of public and private firms. Since public and private firms in our sample of reviewed loans with violations differ fairly substantially on many dimensions, a direct comparison of the likelihood of obtaining waiver/amendment across these two groups in a standard econometric model such as the ones used in the main results in Table 7 may not be able to separate these the impact of differences on the waiver/amendment decision from the public-private effect. be lead to erroneous conclusions. We use the PSM method to match our set of public firm loans with violations to private firms with violators based on their propensity scores of being public obtained from a logit regression based on their size, leverage, industry, internal loan rating, firm age in SNC, level of collateralization, loan type, etc. For observations with comparable propensity scores, we evaluate the treatment effect of being public on the likelihood of obtaining a waiver/amendment. Table 13, Panel C shows the results of the PSM approach. We are able to find a match for most of the public firm violators, and the treatment effect of being public on the waiver/amendment decision remains strong across all matched samples. Being public firms increases the likelihood of obtaining a waiver/amendment after a violation by at least 12 percentage points in the PSM results.

5.4 *Other robustness checks*

We also conduct further tests of robustness:

- By testing private public differences within alternate size bucketing of firms, such as by excluding firms below \$ 100 million from the analysis or considering a higher threshold of \$1.5 billion for middle market firms
- By including additional dummy variables at an industry level to ensure that our results are not affected by the industry composition differences across public and private firms.
- By including indicator variables to control for identity of agent bank and agent bank type to test whether differences in banks' response to violations drive the result.
- By testing alternate measures of transparency such as starting share of agent bank in the loan, which has been shown in previous literature to be related to the relative opacity of a firm, and by excluding the firms trading on over-the counter markets that we treat as private firms in the main analysis.

In all cases, our results are qualitatively similar.

In summary, we conclude that information asymmetry of firms that goes hand in hand with more limited access to external financing options does seem to directly influence bank decisions about

waivers/amendment and reducing loan amounts and that our results are unlikely to be driven by differences in size or riskiness of public and private firms or unobserved quality difference between public and private firms, or other factors such as firm industry, agent bank, etc.

6. Conclusion

We examined the impact of covenant violations on credit retention for public and private firms, drawing upon a novel supervisory dataset containing of syndicated loans over the period 2006-2012. Our findings provide robust evidence that banks are less willing to offer waivers/amendments after covenant violations to private firms, and as a result, these firms are more likely to lose credit access after violations. Larger private firms, externally rated private firms and those with established presence in the syndicated loan market fare better. Limit cuts and balance reductions are most severe for partially secured private firm loans, since private firms can overcome their disadvantage vis-à-vis public firms with sufficient overcollateralization. We find that recessions lead to more credit rationing for private firms on account of increased firm risk and likelihood of violations, tighter lending standards and reduced collateral values. Thus, we provide new insights on how covenant violations impact credit access for a broader set of borrowers, showing how borrowers' access to public markets affects bank renegotiation decisions and how banks use covenants and collateral jointly to monitor more opaque borrowers.

Our findings also point to potentially fruitful areas of future research. In this paper, we only look at credit access impact of violations, but equally relevant would be to evaluate how other consequences such as employment outcomes vary across public and private firms, and whether they also depend upon collateral. Further investigation of lender health, lender type and syndicate structure in relation to covenant renegotiation decisions would also complement our analysis in this paper.

Table 1. Variable definitions

Variable	Description
Covenant violation indicator	Set to 0 if borrower is compliant with all the loan covenants unconditionally without requiring any adjustment to terms or waiver, and 1 otherwise
Covenant violation, gets waiver/amendment	Set to 1 if borrower is only compliant with loan covenants as a result of receiving a waiver or amendment to covenant terms
Covenant violation, denied waiver/amendment	Set to 1 if borrower remains non-compliant with loan covenants at year-end
Public firm indicator	Set to 1 if firm is covered in Compustat, has non-missing value of assets and is traded on one of the main exchanges
Loan rating: Pass	The loan or credit is current and in good standing
Loan rating: Special Mention (SM)	The loan or credit is currently protected but is potentially weak
Loan rating: Classified	If any portion of the loan or credit is rated Sub Standard, Doubtful or Loss, where:
Loan rating: Sub Standard	The loan or credit is inadequately protected by current sound worth and paying capacity of the obligor or of the collateral pledged
Loan rating: Doubtful	The credit has all the weaknesses inherent in a substandard loan with the added factor that the weaknesses are pronounced to a point where collection or liquidation in full is highly improbable
Loan rating: Loss	The loan or credit is considered uncollectible and of such little value that its continuance as an active asset of the bank is not warranted
Firm rating: year-end	Equal to the worst loan rating over all loans by the agent bank to the firm in a given year
Firm rating: mid-year	Worst rating over all loans to a firm by a lending bank in the 2nd quarter of the year, and further obtaining the median firm rating across all banks lending to that firm in that quarter
Firm default probability (PD)	Median value of PD across all banks estimating a PD value for that firm in the 2nd quarter of the year
Leverage	Ratio of firm total debt to total assets based on SNC information, winsorized at 5% and 95% level
Payment default	Set to 1 if there is any missed payment of principal or interest
Limit cut indicator (yes/no)	Set to 1 if limit in year t+1 is reduced by at least 5% of its value in year t, includes instance where loan exits the general SNC data in year t+1, having had a classified rating in year t (full limit cut)
Limit cut as share of assets	Limit cut relative to firm assets: $(Limit(t)-Limit(t+1))/Assets(t)$, winsorized at 1% and 99% level, loan exit with a classified rating is treated as a 100% cut while loan withdrawal or exit with a performing rating is treated as a 0% cut. Average (median) value obtained across all loans in the segment.
Balance reduction as share of assets	Balance reduction relative to firm assets: $(Balance(t)-Balance(t+1))/Assets(t)$ for revolvers, winsorized at the 1% and 99% level, loan exit with a classified rating treated is as a 100% cut while loan withdrawal is treated as a 0% cut. Average (median) value across all revolving loans in the segment.
Firm exit	If firm exits general SNC data in year t+1 after being classified at end of current year t
Collateral value category: Unsecured	The facility is identified as unsecured in SNC
Collateral category: Partially Secured	The facility is considered secured and the loan limit to collateral value ratio (LTV) exceeds 70% (includes few cases of missing collateral value)
Collateral category: Well Secured	The facility is considered secured and LTV is less than or equal to 70%
Collateral type category	Redeployable if primary collateral type is real estate, inventory, accounts receivable, liquid assets or fixed assets and non-redeployable if the primary collateral type is business assets or other assets
New borrower	Relatively new to the SNC program: has been in the SNC data only for 0-2 years
Established borrower: no relationship	Not new to SNC, but has a relationship with the agent bank for less than two years
Established borrower: with relationship	Not new to SNC and has a relationship with the agent bank for at least 2 years
Agency rated	Set to 1 if firm is rated by Moody's or S&P using DRD database or Compustat respectively
Firm size: large corporate	Asset size above \$1000mn, asset size winsorized at 1% and 99% level across all firms in our sample
Firm size: middle market, medium	Asset size between \$250mn and \$1000mn where asset size is winsorized as above
Firm size: middle market, small	Asset size below \$250mn where asset size is winsorized as above
Downturn indicator	Set to 1 for 2007, 2008 and 0 otherwise
Large exposure indicator	Loan to assets ratio is above its median value across all loans to firms within the same size group
Loan utilization	Loan balance to limit ratio
Loan purpose	Stated use for loan proceeds, such as recapitalization, working capital, general purpose, M&A, etc.
Loan maturity	Years remaining until the maturity date, winsorized at 1% and 99% level
Loan type	The type of loan facility: Revolver, Term loan, Letter of credit, or Other
Market to book	Market capitalization to book equity from Compustat ($csho * prcc_f / ceq$), winsorized at 1% and 99%
Median Industry market to book ratio	Median value of market to book ratio for all firms in the industry (2 digit naics code) over the long run

Table 2. Summary statistics

The two panels show the distribution of firm and loan level characteristics for our sample of reviewed SNC loans (Column 2) relative to the entire SNC universe (Column 1) and the subset of loans with covenant violations in our sample (Column 3), all over the period 2006-2012. Note that data on PD in Panel A (B) and data on mid-year loan rating in Panel B (G) are only available since 2009 for a more restricted set of agent banks and obligors. Data on previous year end loan rating is missing when the observation corresponds to the first year of the loan. All variables are defined in Table 1.

Panel A. Firm level characteristics

Variable	All SNC loans		Our sample of reviewed loans		Loans with covenant violation in past year	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
	(1)		(2)		(3)	
A. Public and agency rating status						
All public	17,978	30%	4,229	31%	673	21%
Public, no agency rating	5,458	9%	990	7%	186	6%
Public, agency rated	12,520	21%	3,239	24%	487	15%
All private	41,678	70%	9,430	69%	2,519	79%
Private, no agency rating	35,806	60%	7,255	53%	2,094	66%
Private, agency rated	5,872	10%	2,175	16%	425	13%
Total	59,656		13,659		3,192	
B. Probability of default (PD) distribution						
Low (Below 1%, equivalent of investment grade)	16,781	56%	1,575	28%	184	20%
Medium - (Between 1% & 5%, non-investment grade)	8,717	29%	2,620	47%	387	42%
High- (above 5%, distressed)	4,442	15%	1,409	25%	352	38%
Total	29,940		5,604		923	
C. Years since firm first entered SNC						
New borrower: 0-2 years	23,646	40%	5,401	40%	1,338	42%
Established borrower: More than 2 years	36,010	60%	8,258	60%	1,854	58%
Total	59,656		13,659		3,192	
D. Industry						
Agriculture (Naics 11)	467	1%	179	1%	59	2%
Mining, oil and gas etc. (Naics 21)	2,749	5%	569	4%	107	3%
Utilities (Naics 22)	3,808	6%	541	4%	85	3%
Construction (Naics 23)	3,542	6%	834	6%	312	10%
Mfg. - food and textiles (Naics 31)	2,079	3%	469	3%	148	5%
Mfg. - petroleum, chemicals (Naics 32)	4,754	8%	1,319	10%	340	11%
Mfg. - metals, machines etc (Naics 33)	6,879	12%	1,675	12%	454	14%
Wholesale trade (Naics 42)	4,196	7%	902	7%	162	5%
Retail trade (Naics 44-45)	2,547	4%	569	4%	106	3%
Transportation (Naics 48-49)	2,086	3%	533	4%	137	4%
Information (Naics 51)	4,313	7%	1,398	10%	322	10%
Financials (Naics 52)	6,029	10%	1,042	8%	156	5%
Rental & leasing (Naics 53)	5,112	9%	969	7%	190	6%
Professional services (Naics 54)	1,912	3%	437	3%	75	2%
Management of cos. (Naics 55)	737	1%	137	1%	47	1%
Administrative services (Naics 56)	1,408	2%	411	3%	126	4%
Health care (Naics 62)	2,524	4%	578	4%	104	3%
Arts and Recreation (Naics 71)	1,355	2%	317	2%	87	3%
Accommodation/food (Naics 72)	1,892	3%	536	4%	131	4%
Other	1,267	2%	244	2%	44	1%
Total	59,656		13,659		3,192	

Table 2, Panel B. Loan level characteristics

Variable	All SNC loans		Our sample of reviewed loans		Loans with covenant violation in past year	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
	(1)		(2)		(3)	
E. Loan commitment size						
Big - above \$250 mn	18,815	32%	4,469	33%	628	20%
Middle - between \$50 mn and \$250mn	25,046	42%	5,890	43%	1,354	42%
Low - below \$ 50 mn	15,795	26%	3,300	24%	1,210	38%
Total	59,656		13,659		3,192	
F. Year-end ratings distribution						
Pass	50,598	85%	8,984	66%	1,163	36%
Special Mention loan	3,673	6%	2,434	18%	762	24%
Classified loans	5,385	9%	2,241	16%	1,267	40%
Total	59,656		13,659		3,192	
G. Mid-year ratings distribution						
Pass	29,788	82%	4,598	65%	578	41%
Special Mention loan	3,221	9%	1,518	22%	431	31%
Classified loans	3,223	9%	920	13%	391	28%
Total	36,232		7,036		1,400	
H. Previous year-end ratings distribution						
Pass	31,409	88%	5,915	80%	1,473	73%
Special Mention	2,017	6%	1,433	20%	541	27%
Substandard	2,435	7%	-	-	-	-
Total	35,861		7,348		2,014	
I. Loan type						
Revolver	32,010	54%	6,740	49%	1,461	46%
Term Loan - Non Institutional	16,985	28%	4,681	34%	1,154	36%
Term Loan - Institutional	2,257	4%	1,062	8%	255	8%
Letter of credit	1,942	3%	313	2%	60	2%
Other	4,876	8%	863	6%	262	8%
Construction loan	1,586	3%				
Total	59,656		13,659		3,192	
J. Loan purpose						
Working capital	20,552	34%	4,255	31%	1,042	33%
General corporate purposes	7,020	12%	1,879	14%	305	10%
Recapitalization	4,432	7%	1,552	11%	355	11%
Merger and acquisition related	5,873	10%	2,402	18%	544	17%
Backup	3,464	6%	363	3%	58	2%
Capital expenditure	2,949	5%	571	4%	125	4%
Real estate	6,171	10%	1,207	9%	428	13%
ABL	390	1%	107	1%	30	1%
Other	8,805	15%	1323	10%	305	10%
Total	59,656		13,659		3,192	

Table 3. Univariate statistics on the relation between a covenant compliance status and credit access outcomes

This table shows descriptive statistics for different credit access outcomes (from year to year t+1) measured at the loan or firm level for our full sample of reviewed loans as well as separately for non-violators and violators and further split within violators based on those receiving a waiver/amendment or not. Data used is our sample of reviewed loans over 2006-2012. Credit access loss is more severe when violators are denied waiver/amendment. All variables are defined in Table 1.

Impact of violation on credit access in the year after violation	Our sample (1)	Non-violators (2)	Violators		
			Violators (3)	with waiver/ amendment (4)	Remaining in violation (5)
A. Share of loans by change in loan limit from one year to next - all loans	13,659	10,467	3,192	2,050	1,142
Full limit cut (loan exit in distress)	8%	4%	20%	14%	31%
Partial limit cut	28%	27%	32%	30%	35%
Limit remains unchanged	28%	31%	18%	21%	12%
Limit increases	8%	8%	7%	6%	6%
Loan exits data with last rating performing (withdrawal)	29%	30%	24%	28%	16%
B. Level of reduction in loan limit to assets ratio - all loans	9,611	7,069	2,542	1,675	867
Loan limit to assets ratio at time of violation : Mean	24%	23%	26%	24%	32%
Mean cut in limit to assets ratio	2.7%	1.4%	6.4%	3.9%	11%
Loan limit to assets ratio at time of violation : Median	15%	14%	18%	16%	23%
Median cut in limit to assets ratio	0.0%	0.0%	0.0%	0.0%	3.0%
C. Level of reduction in loan balance to assets ratio - revolvers	4,676	3,516	1,160	794	366
Loan drawn balance to assets ratio at time of violation : Mean	11%	10%	15%	12%	21%
Mean cut in drawn balance to assets ratio	0.8%	0.0%	2.9%	1.4%	6.4%
Loan drawn balance to assets ratio at time of violation : Median	3%	2%	7%	5%	13%
Median cut in drawn balance to assets ratio	0.0%	0.0%	0.0%	0.0%	1.5%
D. Level of reduction in limit to assets ratio - all firms	5,381	3,920	1,461	917	544
Limit to assets ratio at time of violation : Mean	43%	42%	46%	43%	51%
Mean cut in limit to assets ratio	6.5%	4.3%	12.3%	8.5%	18.6%
Limit to assets ratio at time of violation : Median	39%	37%	43%	40%	48%
Median cut in limit to assets ratio	0.0%	0.0%	2.3%	0.5%	6.6%
E. Share of firms exiting the SNC market year after violation	7,390	5,658	1,732	1,058	674
Firm exits SNC in distress	4%	2%	12%	7%	19%
Firm remains in SNC but in distress	15%	10%	30%	24%	40%
Firm remains in SNC as performing or withdraws	81%	89%	58%	69%	41%

Table 4: Factors affecting the bank's waiver/amendment decision after a covenant violation

This table shows how each loan or firm characteristic influences the rate of covenant violations and the likelihood of getting waiver/amendment within our sample of reviewed loans over 2006-2012 for the full sample and separately for public and private firms. Within each segment, private firms are less likely to receive a waiver/amendment. All variables are defined in Table 1.

Characteristics	Full sample				Private		Public	
	Non-violators (1)	Violators (2)	Rate of violation (3)	Share denied waiver/amen (4)	Violators (5)	Share denied waiver/amen (6)	Violators (7)	Share denied waiver/amend (8)
All loans	10,467	3,192	23%	36%	2,519	41%	673	15%
Asset size								
Large corporate - above \$1000 mn	3,936	818	17%	17%	414	27%	404	7%
Middle market big - \$250- \$1000 mn	2,832	804	22%	33%	662	34%	142	25%
Middle market small - below \$ 250 mn	2,025	920	31%	50%	878	52%	42	19%
Current in payment	10,427	2,987	22%	32%	2,336	38%	651	13%
Payment default	40	205	84%	88%	183	91%	22	59%
Year-end loan rating								
Pass	7,821	1,163	13%	24%	875	29%	288	9%
Special Mention	1,672	762	31%	27%	594	31%	168	11%
Classified	974	1,267	57%	52%	1,050	57%	217	25%
Mid-year firm rating (available since 2009)								
Pass	4,020	578	13%	30%	430	36%	148	12%
Special Mention	1,087	431	28%	24%	355	26%	76	11%
Classified	529	391	43%	37%	333	41%	58	12%
Leverage less than 50%	3,080	933	23%	25%	642	33%	291	9%
Leverage 50% or more	3,795	1,554	29%	39%	1,273	45%	281	16%
Normal conditions	7,693	2,011	21%	31%	1,622	36%	389	11%
Downturn conditions (2007, 2008)	2,774	1,181	30%	44%	897	51%	284	20%
Agency rated	4,502	912	17%	20%	425	29%	487	13%
Not agency rated	5,965	2,280	28%	42%	2,094	44%	186	20%
Collateralization								
Well secured	4,824	1,592	25%	30%	1,255	35%	337	12%
Partially secured	3,113	1,112	26%	45%	928	50%	184	18%
Unsecured	709	124	15%	33%	59	56%	65	12%
Redeployable collateral type	5,596	1,763	32%	44%	853	47%	88	20%
More firm specific collateral	2,341	941	40%	32%	1,330	38%	433	13%
Firm age in SNC & bank relationship								
Established borrower: with relationship	4,663	1,463	24%	29%	1,036	36%	427	10%
Established borrower: no relationship	1,743	391	18%	36%	292	43%	99	14%
New borrower	4,063	1,338	25%	43%	1,191	45%	147	28%

Table 5. Factors affecting the impact of a covenant violation on various credit access outcomes separately for public and private firms

This set of tables shows how credit retention varies across firm and loan characteristics separately for the private firms and public firms in our sample, for violating and non-violating loans over 2006-2012. Each panel shows a different credit access outcome measure. The violation occurs sometime between year (t-1) and t and credit reduction is measured from year t to year (t+1). It can be seen that violations generally affect credit access more for private firms. All variable are defined in Table 1.

Panel A. Share of loans with a limit cut from year t to t+1 (limit cut is 1 when cut is at least 5% of limit in year t)

Characteristic	Private firms				Public firms			
	Violators		Non-violators		Violators		Non-violators	
	Obs.	Share	Obs.	Share	Obs.	Share	Obs.	Share
All loans	2,519	45%	6,911	21%	673	35%	3,556	18%
Asset size								
Large - above \$1000 mn	414	39%	1,775	20%	404	32%	2,161	20%
Medium - \$250- \$1000 mn	662	45%	1,534	21%	142	41%	494	17%
Small - below \$ 250 mn	878	53%	1,043	27%	42	52%	62	23%
Year end loan rating								
Pass	871	22%	5,045	16%	288	18%	2,776	15%
Special Mention	594	26%	1,163	18%	168	20%	509	16%
Classified	1,050	77%	703	61%	217	70%	251	60%
Mid-year rating (available since 2009)								
Pass	430	29%	2,514	17%	148	16%	1,539	14%
Special Mention	355	37%	748	24%	76	29%	339	19%
Classified	333	66%	389	42%	58	48%	140	50%
Leverage less than 50%	642	42%	1,602	19%	291	27%	1,478	17%
Leverage 50% or more	1,273	50%	2,624	23%	281	45%	1,171	22%
Normal conditions	1,622	40%	5,193	20%	389	26%	2,500	17%
Downturn conditions (2007, 2008)	897	55%	1,718	23%	284	46%	1,056	22%
Agency rated	425	40%	1,750	18%	487	35%	2,752	18%
Not agency rated	2,094	47%	5,161	27%	186	35%	804	17%
Collateralization level								
Well secured	1,255	44%	3,345	19%	337	31%	1,479	17%
Partially secured	928	50%	2,208	24%	184	46%	905	22%
Unsecured	59	53%	363	16%	65	31%	446	17%
Firm age in SNC & bank relationship								
Established borrower: with relationship	1,036	46%	2,514	23%	427	34%	2,149	19%
Established borrower: no relationship	292	42%	1,046	21%	99	44%	695	17%
New borrower	1,191	46%	3,351	19%	147	33%	712	17%

Table 5, Panel B. Level of limit cut from year t to year t+1 in relation to assets in year t

Characteristic	Private firms				Public firms			
	Violators		Non-violators		Violators		Non-violators	
	Obs.	Mean value (%)	Obs.	Mean value (%)	Obs.	Mean value (%)	Obs.	Mean value (%)
All loans	1,954	7.2%	4,352	1.8%	588	3.7%	2,717	0.1%
Asset size								
Large - above \$1000 mn	414	2.2%	1,775	0.1%	404	2.6%	2,161	0.1%
Medium - \$250- \$1000 mn	662	6.1%	1,534	1.7%	142	5.9%	494	1.4%
Small - below \$ 250 mn	878	10.3%	1,043	3.4%	42	6.1%	62	2.8%
Year-end loan rating								
Pass	629	1.1%	3,137	0.6%	251	0.9%	2,087	0.3%
Special Mention	487	1.8%	757	1.2%	143	1.5%	398	0.6%
Classified	838	14.8%	458	10.5%	194	8.8%	232	6.8%
Mid-year rating (available since 2009)								
Pass	239	2.3%	1,196	0.5%	103	0.4%	899	0.4%
Special Mention	268	5.0%	415	2.2%	67	3.7%	261	1.3%
Classified	246	13.9%	246	8.2%	53	6.6%	115	3.8%
Leverage less than 50%	642	4.2%	1,602	0.8%	291	1.8%	1,478	0.6%
Leverage 50% or more	1,273	8.6%	2,624	2.4%	281	5.7%	1,171	1.3%
Normal conditions	1,082	6.0%	2,699	1.6%	314	2.5%	1,685	0.7%
Downturn conditions (2007, 2008)	872	8.6%	1,653	2.1%	274	5.1%	1,032	1.2%
Agency rated	334	6.3%	1,050	1.2%	430	3.5%	2,105	0.1%
Not agency rated	1,620	7.4%	3,302	1.9%	158	4.2%	612	0.1%
Collateralization level								
Well secured	1,007	3.9%	2,312	1.0%	296	2.5%	1,148	0.7%
Partially secured	728	11.8%	1,460	3.0%	170	6.1%	761	1.6%
Unsecured	57	5.4%	252	1.1%	62	2.1%	432	0.6%
Firm age in SNC & bank relationship								
Established borrower: with relationship	868	6.0%	1,648	2.0%	386	3.8%	1,693	1.0%
Established borrower: no relationship	218	7.1%	620	1.3%	76	4.6%	512	0.8%
New borrower	868	8.3%	2,084	1.7%	126	2.7%	512	1.0%

Table 5, Panel C: Level of reduction in drawn balance on revolving loans from year t to t+1 in relation to assets at year t

Characteristic	Private firms				Public firms			
	Violators		Non-violators		Violators		Non-violators	
	Obs.	Mean value (%)	Obs.	Mean value (%)	Obs.	Mean value (%)	Obs.	Mean value (%)
All loans	842	3.5%	1,960	0.1%	318	1.6%	1,556	0.1%
Asset size								
Large - above \$1000 mn	188	1.2%	783	0.0%	218	1.1%	1,209	0.0%
Medium - \$250- \$1000 mn	304	3.0%	732	0.2%	73	3.1%	312	0.0%
Small - below \$ 250 mn	350	5.1%	445	0.0%	27	1.0%	335	-0.2%
Year-end loan rating								
Pass	297	-0.6%	1,508	-0.4%	142	0.3%	1,249	-0.2%
Special Mention	209	0.6%	291	0.3%	78	0.0%	200	0.0%
Classified	336	8.8%	161	5.1%	98	4.6%	107	1.8%
Mid-year rating (available since 2009)								
Pass	107	0.2%	565	-0.6%	59	-1.2%	555	0.1%
Special Mention	111	2.0%	179	-0.3%	40	2.1%	142	0.5%
Classified	74	5.9%	87	1.8%	27	3.1%	47	0.5%
Leverage less than 50%								
Leverage 50% or more	333	1.7%	868	-0.8%	176	0.9%	909	0.0%
Leverage 50% or more	493	4.8%	1,010	0.8%	130	2.6%	596	0.0%
Normal conditions								
Downturn conditions (2007, 2008)	436	1.8%	1,239	-0.2%	173	0.6%	996	0.0%
Downturn conditions (2007, 2008)	406	5.2%	721	0.6%	145	2.8%	560	0.1%
Agency rated								
Not agency rated	145	1.4%	457	0.1%	225	1.1%	1,153	0.2%
Not agency rated	697	3.9%	1,503	0.0%	93	2.6%	403	-0.1%
Collateralization level								
Well secured	443	1.1%	949	-0.2%	153	0.7%	612	0.0%
Partially secured	302	6.5%	687	0.5%	89	3.7%	391	0.0%
Unsecured	40	4.6%	172	0.5%	46	1.4%	330	0.3%
Firm age in SNC & bank relationship								
Established borrower: with relationship	410	3.4%	812	0.3%	212	1.6%	986	0.2%
Established borrower: no relationship	99	2.6%	318	0.3%	38	2.6%	288	0.0%
New borrower	343	3.8%	830	-0.3%	68	1.0%	282	-0.4%

Table 6. Impact of a covenant violation and the bank's waiver/amendment decision on credit retention

The table shows the marginal effects of various factors on credit access outcomes using our sample of reviewed loans over 2006-2012, from three models: a logistic regression estimating the likelihood of a limit cut for all loans and linear regressions estimating the level of limit cut for all loans and the level of balance cut for revolvers. The focus is on the impact of being denied a waiver/amendment in year t on loss of credit access from year t to t+1. Robust standard errors clustered at the firm level are shown below marginal effects. All variables are defined in Table 1.

Sample Regression Credit access outcome	All loans Logit Limit cut (yes/no)		All loans Linear regression Limit cut as share of assets		Revolving loans Linear regression Balance reduction as share of assets	
	Covenant violation indicator	0.046 *** 0.012		0.007 *** 0.003		0.003 0.003
Violation & waiver (relative to no violation)						
Violation, gets waiver/amendment		0.031 **		0.002		-0.001
		0.014		0.002		0.003
Violation, remains non-compliant		0.096 ***		0.021 ***		0.016 **
		0.021		0.006		0.007
Concurrent rating (relative to pass)						
Special mention	0.003	0.003	0.002	0.002	0.002	0.002
	0.016	0.016	0.002	0.001	0.003	0.003
Classified	0.429 ***	0.424 ***	0.094 ***	0.092 ***	0.047 ***	0.046 ***
	0.018	0.018	0.005	0.005	0.005	0.005
Delayed payment indicator	0.060	0.039	0.065 ***	0.058 ***	0.041 **	0.035
	0.037	0.037	0.015	0.015	0.021	0.021
Large exposure indicator	0.013	0.014	0.030 ***	0.030 ***	0.007 ***	0.007 ***
	0.009	0.009	0.002	0.002	0.003	0.003
Loan utilization	0.101 ***	0.097 ***	-0.009 ***	-0.010 ***	0.046 ***	0.044 ***
	0.017	0.017	0.003	0.003	0.003	0.003
Leverage	-0.033	-0.033	0.017 ***	0.017 ***	0.020 ***	0.020 ***
	0.023	0.023	0.004	0.004	0.005	0.005
Collateralization (relative to well secured)						
Unsecured	0.020	0.018	0.010 ***	0.009 ***	0.010 ***	0.010 ***
	0.021	0.021	0.003	0.003	0.003	0.003
Partially secured	0.022 **	0.021 **	0.014 ***	0.013 ***	0.008 **	0.007 **
	0.010	0.010	0.002	0.002	0.003	0.003
Asset size indicator (relative to large firms)						
Medium firms	0.000	0.000	0.012 ***	0.012 ***	-0.001	-0.001
	0.123	0.123	0.002	0.002	0.002	0.002
Small firms	0.053 ***	0.049 ***	0.032 ***	0.032 ***	-0.001	-0.001
	0.017	0.017	0.003	0.003	0.004	0.004
Firm SNC status (relative to long relationship)						
New borrower	-0.028 **	-0.031 ***	0.001	0.001	-0.003	-0.003
	0.011	0.011	0.002	0.002	0.003	0.003
Established: no relationship	-0.012	-0.014	-0.001	-0.001	0.001	0
	0.015	0.015	0.003	0.003	0.003	0.003
Loan maturity	-0.014 ***	-0.014 ***	-0.002 ***	-0.002 ***	-0.001	-0.001
	0.003	0.003	0.001	0	0.001	0.001
Downturn indicator	0.031 ***	0.028 ***	0.007 ***	0.006 ***	0.002	0.002
	0.010	0.010	0.002	0.002	0.003	0.003
Controls included, not shown	Loan purpose, loan type, collateral type			Loan purpose, collateral type		
R-squared	0.20	0.20	0.27	0.27	0.15	0.15
No of observations	8,464	8,464	8,464	8,464	4,074	4,074

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Table 7. Likelihood of obtaining a waiver/amendment after a violation

This table shows the marginal effects of several factors on the likelihood of getting a waiver/amendment for a violation, estimated via a logistic regression using loans with violations in our sample of reviewed loans over 2006-2012. The focus is the effect of being private on obtaining a waiver/amendment after a violation. The last 2 columns show effects separately for public and private firms. Robust standard errors clustered at the firm level are shown below marginal effects. All variables are defined in table 1.

Sample	All violators			Private firm	Public firm
	Minimal controls available for all	Adding firm size and leverage	Adding Collateral	violators	violators
Controls				All controls	All controls
Public firm indicator	0.217 ***	0.162 ***	0.143 ***		
	0.036	0.040	0.04		
External certification indicator				0.113 ***	-0.022
				0.04	0.049
Internal rating (relative to pass)					
Special mention	-0.013 ***	-0.045	-0.036	-0.035	-0.031
	0.028	0.029	0.030	0.038	0.035
Classified	-0.169 ***	-0.177 ***	-0.174 ***	-0.194 ***	-0.121 ***
	0.029	0.030	0.032	0.035	0.047
Delayed payment indicator	-0.347 ***	-0.324 ***	-0.311 ***	-0.382 ***	-0.002
	0.061	0.061	0.064	0.063	0.081
Large exposure indicator		0.035 *	0.056 ***	0.056 **	0.052 *
		0.018	0.021	0.026	0.028
Loan utilization	-0.134 ***	-0.160 ***	-0.148 ***	-0.158 ***	-0.124 **
	0.031	0.037	0.038	0.046	0.058
Leverage		-0.054	-0.065	-0.083	0.009
		0.049	0.051	0.065	0.062
Asset size indicator (relative to large firms)					
Medium firms		-0.092 ***	-0.117 ***	-0.091 **	-0.149 *
		0.033	0.034	0.043	0.058
Small firms		-0.164 ***	-0.178 ***	-0.172 ***	-0.051
		0.034	0.036	0.042	0.062
Collateralization (relative to well secured)					
Unsecured			-0.182 ***	-0.173 **	-0.149 **
			0.058	0.078	0.059
Partially secured			-0.062 **	-0.062 **	-0.051
			0.023	0.025	0.062
Firm SNC status (relative to long relationship)					
New borrower	-0.092 ***	-0.093 ***	-0.088 ***	-0.07 **	-0.174 **
	0.025	0.027	0.028	0.033	0.067
Established, no relationship	-0.056 **	-0.076 **	-0.067 *	-0.07	-0.027
	0.034	0.037	0.036	0.049	0.043
Loan time to maturity	0.010	0.017 **	0.019 **	0.02 *	0.007
	0.007	0.007	0.008	0.01	0.016
Downturn indicator	-0.064 **	-0.094 ***	-0.097 ***	-0.089 ***	-0.120 ***
	0.024	0.025	0.027	0.031	0.044
Controls included, not shown		Loan purpose, loan type, collateral type			
Pseudo-R squared	0.16	0.23	0.23	0.19	0.35
No of observations	3,192	2,487	2,274	1,757	508

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Table 8. Credit access consequences of a covenant violation on public and private firm loans

This table shows the marginal effects of several factors on credit retention from year t to t+1 using all three credit access outcome models we show in table 5. Data used is our sample of reviewed loans from 2006-2012. The focus is on variation in the impact of a violation on a given outcome across public and private firms, shown in columns 1, 3 and 5; columns 2, 4 and 6 further split the firms by size, large corporate and middle market. Robust standard errors clustered at the firm level are shown below marginal effects. All variables are defined in table 1.

Sample Regression Credit access outcome	All loans Logit		All loans Linear regression		Revolving loans	
	Limit cut (yes/no)		Limit cut as share of assets		Balance reduction as share of assets	
Covenant violation and public (relative to private, no violation)						
Public, no covenant violation	0.022		0.005 **		0.005	
	0.015		0.002		0.003	
Private, covenant violation	0.063 ***		0.013 ***		0.004	
	0.015		0.004		0.004	
Public, covenant violation	0.051 **		0.006		0.005	
	0.024		0.004		0.004	
Large firm indicator	-0.172		-0.020 ***		-0.001	
	0.012		0.002		0.002	
External rating indicator	-0.026 ***	-0.029 ***	0.001	0.000	0.003	0.003
	0.014	0.014	0.003	0.003	0.002	0.002
Covenant violation, firm size and public (relative to private, middle market, no violation)						
Private, large corporate, no violation		-0.008		-0.009 ***		0.004
		0.016		0.003		0.003
Public, middle market, no violation		-0.002		0.003		0.004
		0.022		0.004		0.005
Public, large corporate, no violation		0.017		-0.007 **		0.006 *
		0.019		0.003		0.003
Private, middle market, violation		0.078 ***		0.024 ***		0.011 *
		0.017		0.005		0.006
Private, large corporate, violation		0.004		-0.033 ***		-0.011 **
		0.026		0.005		0.005
Public, middle market, violation		0.068 *		0.014 *		0.014
		0.036		0.009		0.008
Public, large corporate, violation		0.032		-0.011 ***		0.003
		0.031		0.005		0.005
Collateralization (relative to well secured)						
Unsecured	0.015	0.015	0.008 ***	0.008 ***	0.010 ***	0.009 ***
	0.022	0.022	0.003	0.003	0.003	0.003
Partially secured	0.023 ***	0.023 ***	0.014 ***	0.014 ***	0.008 **	0.008 **
	0.011	0.011	0.002	0.002	0.003	0.003
Downturn indicator	0.031 ***	0.031 ***	0.007 ***	0.007 ***	0.003	0.002
	0.011	0.011	0.002	0.002	0.003	0.002
Controls included, not shown	Loan: purpose, type, maturity, collateral type; Firm: age, relationship and risk					
R-squared	0.21		0.27		0.15	
No of observations	8464		8464		4075	

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Table 9. Credit access consequences of violations on middle-market public and private firm loans

This table shows the marginal effects of several factors on credit access outcomes from year t to t+1 as in table 7 but restricting the data to middle market firms within our sample of reviewed loans over 2006-2012. In Column 2 we add an additional dependent variable, share of loans with a 25% or more limit cut to compare it to the share of loans with a 5% or more limit cut in Column 1. Our focus in each column is on the relative impact of a violation on credit access for public and private firms. Robust errors clustered at the firm level are shown below marginal effects. All variables are defined in table 1.

Sample Regression Credit access outcome	All loans Limit cut (yes/no)	All loans Logit limit cut ≥ 25% (yes/no)	All loans Linear regression Limit cut as share of assets	Revolving loans Balance cut as share of assets
Covenant violation and public (relative to private, no violation)				
Public, no covenant violation	0.022 0.024	0.028 0.021	0.012 ** 0.005	0.011 ** 0.005
Private, covenant violation	0.071 *** 0.018	0.032 ** 0.015	0.010 ** 0.005	0.001 0.006
Public, covenant violation	0.088 ** 0.040	0.029 0.029	0.011 0.009	0.01 0.009
Firm size (log assets)	-0.022 ** 0.01	0.000 0.008	-0.009 *** 0.003	0.003 0.004
External rating indicator	-0.085 *** 0.022	-0.034 ** 0.017	-0.006 0.005	-0.009 ** 0.004
Concurrent rating indicator (relative to pass)				
Special mention	0.007 0.018	0.004 0.011	0.004 0.003	0.003 0.005
Classified	0.441 *** 0.023	0.454 *** 0.023	0.128 *** 0.007	0.072 *** 0.008
Delayed payment indicator	0.056 0.034	0.069 *** 0.022	0.065 *** 0.018	0.028 0.023
Large exposure indicator	-0.016 0.015	-0.045 *** 0.012	0.033 *** 0.003	0.001 0.005
Loan utilization	0.125 *** 0.034	0.015 0.018	-0.010 * 0.006	0.064 *** 0.007
Leverage	-0.052 0.034	0.012 0.028	0.031 *** 0.008	0.044 *** 0.009
Collateralization (relative to well secured)				
Unsecured	-0.019 0.039	0.022 0.033	0.018 * 0.011	0.028 *** 0.010
Partially secured	0.034 ** 0.015	0.027 ** 0.011	0.024 *** 0.004	0.017 *** 0.005
Firm SNC status (relative to long relationship)				
New borrower	-0.031 ** 0.015	-0.002 0.012	0.005 0.004	0 0.005
Established, no relationship	0.011 0.024	-0.002 0.017	-0.002 0.005	0.000 0.006
Loan maturity	-0.008 * 0.005	-0.020 *** 0.004	-0.003 *** 0.001	-0.001 0.002
Downturn indicator	0.051 *** 0.015	0.024 ** 0.011	0.011 *** 0.004	0.004 0.004
Controls included, not shown	Loan purpose, loan type, collateral type			
R-squared	0.23	0.32	0.32	0.19
No of observations	4,399	4,399	4,399	2,055

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Table 10. Measuring the impact of a violation on loan level credit retention within key sub segments of loans for public and private firms

This table shows the marginal effects of key factors interacted with the violation and public-private firm type variable on credit access outcomes for middle market public and private firms, using the regression models similar to table 9. Data used is middle-market firms within our sample of reviewed loans over 2006-2012. We are interested in exploring how the impact of a covenant violation on credit access of a firm depends on economic conditions, collateral value and type as well as the external rating availability, separately for middle market public and middle market private firms. All variables are defined in Table 1.

Marginal impact of covenant violation in the year after violation on credit access	Share of loans with 5% or more limit reduction		Share of loans with 25% or more limit reduction		Amount of limit cut as share of assets		Amount of balance reduction as share of assets	
	All loans		All loans		All loans		Revolving loans	
	Private	Public	Private	Public	Private	Public	Private	Public
Violation impact	7.2% ***	6.4%	3.4% **	0.3%	1.1% **	0.0%	0.0%	0.0%
Violation impact by economic conditions								
Recession	8.8% ***	5.6%	3.9% *	-2.5%	1.5% **	0.7%	0.8%	-0.4%
Normal	6.2% ***	7.1%	3.2% *	2.3%	0.7%	-1.1%	-0.5%	0.2%
Violation impact by collateralization								
Unsecured	-0.4%	40.0% *	3.3%	30.0%	0.7%	4.9% ***	5.2%	3.8% **
Partially secured	5.6% **	3.8%	3.6% *	2.9%	3.5% ***	1.0%	2.4% **	2.4%
Well secured	8.4% ***	6.5%	3.3% *	3.0%	-0.4%	-1.0%	-1.8%	-2.2%
Violation impact by collateralization level and type								
Partially secured firm-specific collateral	0.5%	2.2%	2.5%	2.4%	4.5% ***	0.8%	3.4% **	1.3%
Partially secured, redeployable collateral	11.0% ***	8.2%	4.6%	3.9%	2.0% *	0.8%	1.2%	3.8% *
Well secured, firm-specific collateral	11.0% ***	5.6%	5.1% ***	-3.6%	-0.4%	-1.4%	-1.4% *	-2.7% **
Well secured, redeployable collateral	2.6%	10.2%	-0.9%	-0.5%	-0.6%	-0.4%	-2.9% ***	-1.1%
Violation impact by external rating availability								
Unrated	7.4% ***	3.3%	3.1% ***	-1.8%	1.2% **	-0.5%	0.5%	0.5%
Rated	5.9%	9.5%	4.5%	2.8%	0.2%	0.6%	-3.2% ***	-0.9%

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Table 11. Measuring the impact of a violation on firm level credit retention within key sub segments of firms for public and private firms

This table shows the marginal effects of key factors interacted with the violation and public-private firm type interaction for regression models of the type described in Table 9 except that the credit access and dependent variables are measured at the firm level by aggregating across loans. The data used is the set of middle market firms within our reviewed sample over 2006-2012, corresponding to 3,035 firm-year observations with 1,028 violators. This analysis is intended to test if loan-level results shown in Table 9 still hold, once we look at the total financing available to middle-market firms within our reviewed SNC sample. We also show how the impact of a covenant violation on credit access measured at the firm level depends on economic conditions, collateral value and type as well as the external rating availability for a firm. All variables defined in Table 1 are further aggregated across all loans in that year to a given middle market firm within our sample of reviewed loans to obtain corresponding firm level variables.

Marginal impact of covenant violation in the year after violation on firm level credit access	Share of firms with at least %10 limit cut		Share of firms with at least %25 limit cut		Limit cut as share of assets		Balance reduction as share of assets	
	Private	Public	Private	Public	Private	Public	Private	Public
Covenant violation impact	7.1% ***	8.9% *	3.7% ***	-0.6%	1.7% **	0.3%	1.9% **	0.6%
Covenant violation impact by economic conditions								
Recession	7.8% ***	4.6%	3.2%	-8.7%	2.1%	-2.8%	1.7%	-2.7%
Normal	6.6% ***	12.1% *	4.5% ***	8.6%	1.4%	2.3%	1.8% **	2.4%
Covenant violation impact by collateralization								
Unsecured	13.7%	28.7%	14.1%	28.0%	0.1%	1.1%	-1.9%	0.4%
Partially secured	6.3% **	9.2%	7.6% ***	6.9%	3.4% ***	1.3%	3.4% ***	2.5%
Well secured	7.2% ***	7.1%	0.7%	-5.0%	-0.1%	-1.0%	0.5%	-1.4%
Covenant violation impact by collateralization and economic conditions								
Recession - partially secured	8.0% *	-3.5%	8.2% **	-5.2%	3.8% **	-3.3%	2.4%	-2.4%
Recession - well secured	7.1%	6.7%	-2.6%	-16.2% *	0.2%	-2.9%	1.0%	-2.8%
Normal - partially secured	5.5% *	17.6% **	6.3% **	16.5% *	3.1% **	4.1%	3.9% ***	5.5%
Normal - well secured	7.3%	6.9%	2.0%	1.3%	-0.2%	0.0%	-0.2%	-0.7%
Covenant violation impact by external rating availability								
Unrated	7.8% ***	0.7%	3.9% **	-2.1%	1.6% **	-1.7%	1.7% **	-1.4%
Rated	0.5%	19.7% **	2.3%	6.1%	2.3%	2.9%	2.6%	3.3%

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Table 12. Robustness of results to alternative credit risk controls

This table contains results similar to Table 11 but uses a subsample of middle-market firms over 2009-2012 which contain data on 2 alternative measures of firm risk, namely, 1) mid-year firm ratings (Panel A:1,281 observations, 403 violators) a control variable that is unlikely to be influenced by the violation itself and 2) midyear probability of default PD (Panel C:730 observations,192 violators) which is a more granular risk control. For comparison, we provide results using the year-end firm rating as a control for the set of firms for which each of these alternative measures are available (Panel B and Panel D for mid-year and PD sets respectively). Note that by using these mid-year risk measures as controls we can now estimate a model with firm exit as the dependent variable, since the distressed exit definition is only based on the year-end risk measure and exit thereafter. All variables are defined in Table 1.

Marginal impact of covenant violation in the year after violation	Share of firms with at least %10 limit cut		Share of firms exiting the SNC market in distress		Limit cut as share of assets		Balance reduction as share of assets		
	Private	Public	Private	Public	Private	Public	Private	Public	
A. from model with mid-year ratings as control estimated on a sub-sample of firms over 2009-2012 having this data									
Covenant violation impact	11.1% ***	15.3% **	5.1% ***	0.7%	3.5% **	3.6%	4.3% ***	3.8%	
Covenant violation impact by collateralization									
Unsecured	1.5%	-	-	-	16.1%	4.9% ***	-17.8%	4.7% *	
Partially secured	11.8% ***	18.6% *	7.1% ***	-2.5%	6.4% ***	4.7%	7.7% ***	6.5% *	
Well secured	10.9% **	9.6%	2.7%	0.9%	0.8%	2.1%	1.2%	0.4%	
Covenant violation impact by external rating availability									
Unrated	9.8% ***	9.3%	4.4% ***	-7.3%	2.5% *	1.6%	3.4% **	0.1%	
Rated	19.1% **	26.3% *	9.5% *	6.5%	8.9% **	5.6%	9.2% **	10.5%	
B. from model with year-end ratings as control similar to Table 11 but estimated on the same sample subset above									
Covenant violation impact	6.2% **	8.8%			1.3%	0.9%	2.5% **	0.3%	
Covenant violation impact by collateralization									
Unsecured	4.6%	-			-15.2%	3.4% ***	-16.2%	3.4%	
Partially secured	6.3%	12.1%			3.9% ***	2.2%	5.4% ***	4.5%	
Well secured	6.5%	3.3%			-1.2%	-0.6%	-0.4%	-1.7%	
Covenant violation impact by external rating availability									
Unrated	6.0% *	4.1%			0.8%	-0.5%	2.0%	-1.4%	
Rated	7.7%	22.2% *			4.0%	4.4%	4.6%	9.3%	
C. from model with firm PD as control estimated on a sub-sample of firms with this information over 2009-2012									
Covenant violation impact	14.5% ***	20.3% **	6.1% ***	0.5%	4.9% **	4.5%	5.4% ***	3.9%	
Covenant violation impact by collateralization									
Unsecured									
Partially secured	18.8% ***	20.8% *	8.3% ***	-2.2%	10.3% ***	3.8%	10.4% ***	4.7%	
Well secured	11.2% *	19.0%	4.1%	6.8%	0.1%	5.6%	1.1%	3.2%	
Covenant violation impact by external rating availability									
Unrated	14.7% ***	13.1%	5.2% **	-4.7%	4.5% **	2.6%	4.8% **	0.7%	
Rated	13.4%	33.3% **	10.1% *	7.7%	5.6%	5.7%	6.4%	9.2%	
D. from model with year-end ratings as control as in Table 11 but estimated on the same sample subset as above									
Covenant violation impact	6.7% *	11.2%			1.3%	1.1%	2.5%	1.6%	
Covenant violation impact by collateralization									
Unsecured									
Partially secured	8.9%	10.4%			5.6% *	0.0%	6.4% **	1.9%	
Well secured	4.8%	11.4%			-2.2%	2.7%	0.6%	1.2%	
Covenant violation impact by external rating availability									
Unrated	7.4% *	6.5%			0.9%	0.4%	2.1%	0.8%	
Rated	4.8%	26.6% *			2.7%	2.3%	4.1%	6.8%	

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Table 13. Is the effect of being private on the waiver/amendment decision robust to use of sample selection techniques?

This table reports the variable coefficients using likelihood of obtaining a waiver/amendment as the dependent variable and three techniques designed to control for firms self-selecting to be public and data on loans with violations within our sample of reviewed loans from 2006-2012. The two instrumental variable techniques used are a switching regression and a biprobit regression, using the median industry market to book ratio over time as the exclusion variable. Panel A shows the second-stage IV results while Panel B shows the result of the first stage logit regression of public/private choice. Panel C shows the results from a separate propensity score matching regression for the waiver/amendment likelihood. All variables are defined in Table 1.

Panel A. Waiver/amendment decision controlling for firms self-selecting to be public or private

Coefficients from regression of waiver/amendment (yes or no)	Biprobit	Switching regression	
		Public firms	Private firms
Treatment effect (impact of being public on waiver/amendment)	27%	17%	19%
Public firm indicator	0.974 ***		
	0.248		
Internal rating indicator (relative to pass)			
Special mention	-0.130	-0.200	-0.134
	0.109	0.260	0.111
Classified	-0.646 ***	-0.870 ***	-0.620 ***
	0.010	0.257	0.105
Loan in payment default	-1.036 ***	-0.176	-1.084 ***
	0.194	0.579	0.207
Leverage	-0.219	-0.300	-0.153
	0.185	0.430	0.201
Collateralization indicator (relative to well secured)			
Unsecured	-0.560 **	-0.752 **	-0.575 **
	0.192	0.340	0.235
Partially secured	-0.224 ***	-0.113	-0.231 **
	0.079	0.340	0.081
Asset size indicator (relative to large firms)			
Medium firms	-0.304 **	-1.056 ***	-0.138
	0.149	0.304	0.159
Small firms	-0.447 ***	-0.595	-0.297 *
	0.162	0.553	0.168
Firm age and relationship (relative to long relationship)			
New borrower	-0.275 ***	-1.038 **	0.167
	0.101	0.280	0.102
Established borr., no long rel.	-0.333 ***	0.371	-0.315 **
	0.129	0.312	0.142
Time to maturity	0.062 ***	0.067	0.066 ***
	0.029	0.083	0.028
Downturn indicator	-0.358 ***	-0.816 ***	-0.287 ***
	0.092	0.247	0.098
Controls included, not shown	Loan type, loan purpose, collateral type		
Are equations correlated?	Yes*	No	Yes ***
No of observations	2,274	517	1,757

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Table 13, Panel B. Selection model of choice to be public

Logit regression of probability of being public	All firms appearing in switching regression
Asset size indicator (relative to large firms)	
Medium firms	-0.794 *** 0.171
Small firms	-0.830 *** 0.143
Age in SNC	0.037 *** 0.012
Externally rated indicator	1.090 *** 0.130
Large exposure indicator	0.019 0.070
Leverage	-0.928 *** 0.248
Median Industry market to book ratio (exclusion variable)	0.814 *** 0.220
No of observations	2,274

Table 13, Panel C. Propensity score matching - Treatment effect of being public obtaining waiver/amendment

Treatment effect of being public on waiver/amendment likelihood using propensity matching with different matching variables	Size bucket, Industry	Size bucket, Industry, internal rating	Size bucket, Industry, internal rating, leverage, firm age bucket	Size bucket, Industry, internal rating, leverage, firm age bucket, collateral bucket	Size bucket, Industry, internal rating, leverage, firm age bucket, collateral bucket, loan type
Treatment effect	17.4%***	18.8%***	17.2%***	12.4%***	13.1%***
Matched loan-year observations	2,525	2,492	2,385	2,228	2,210
Public firms	584	568	511	476	466
Private firms	1,941	1,924	1,874	1,752	1,744
Unmatched loan year observations	17	50	102	46	64
Public firms	4	20	61	41	51
Private firms	13	30	41	5	13

Significance level p is as follows: * p < 0.1, ** p < 0.05, and *** p < 0.01

Figure 1. Types of covenants in SNC across public and private firms.

This chart is based on data from a loan-level survey of SNC underwriting practices of banks conducted annually since 2010.

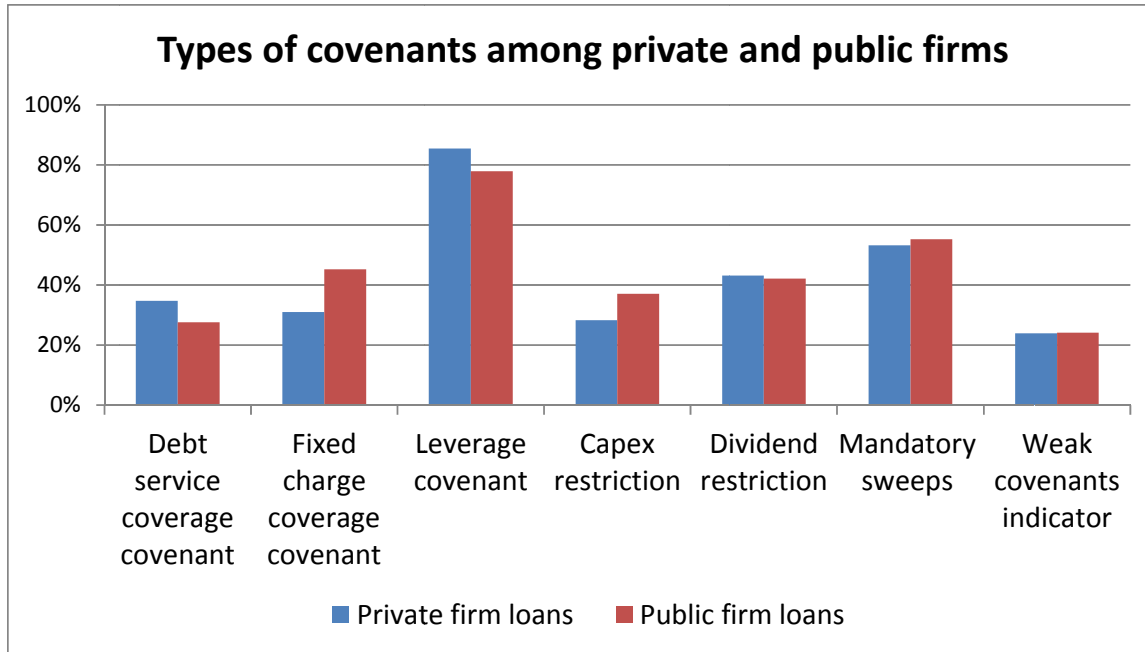


Figure 2. Asset size of firms in our sample of reviewed loans across public and private firms, overall and those with violations

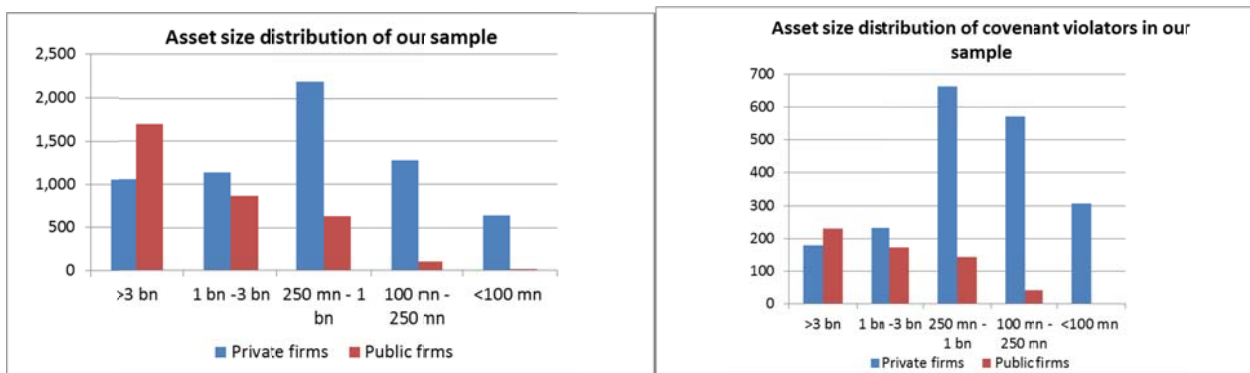


Figure 3. Credit quality of our sample relative to general SNC universe and the subset of loans with covenant violations over 2006-2012, using internal bank loan ratings

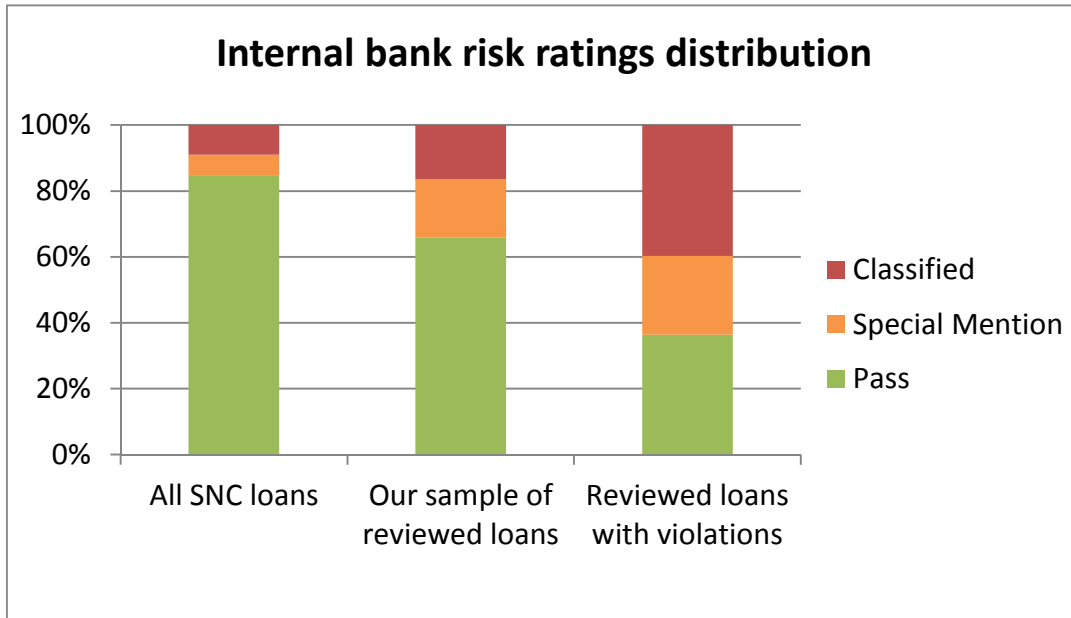


Figure 4. Credit quality of our sample relative to general SNC universe and the subset of loans with covenant violations over 2006-2012 based on agency ratings, where available

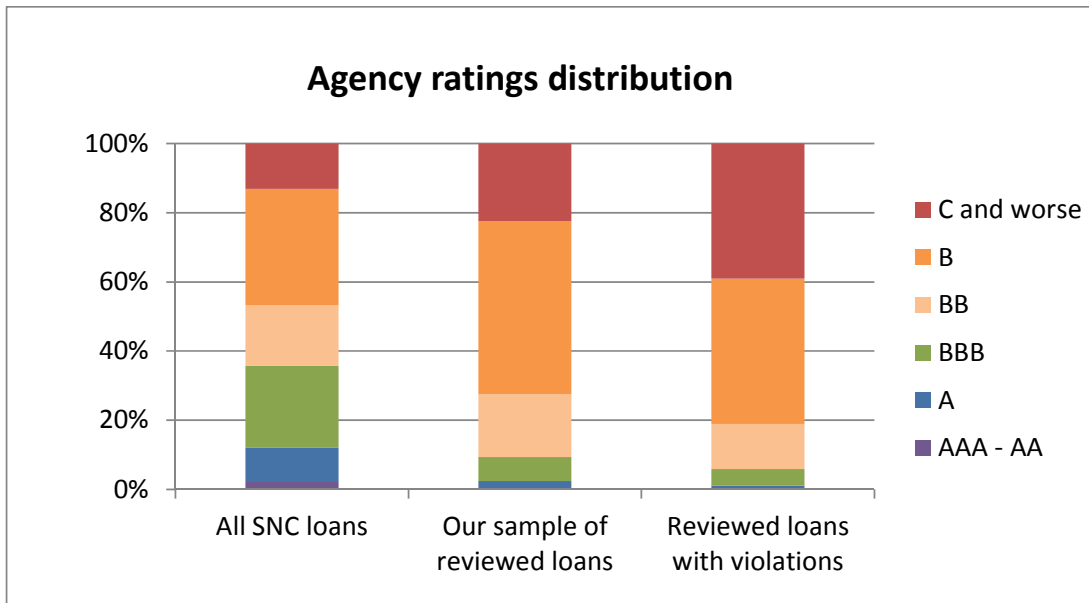


Figure 5. Credit access is affected more when bank does not forgive violation

The three charts show how different credit access outcomes at the loan level vary from one year to next across non-violating loans, loans with violation that are granted waiver/amendment and loans remaining in violation. All variable are defined in Table 1.

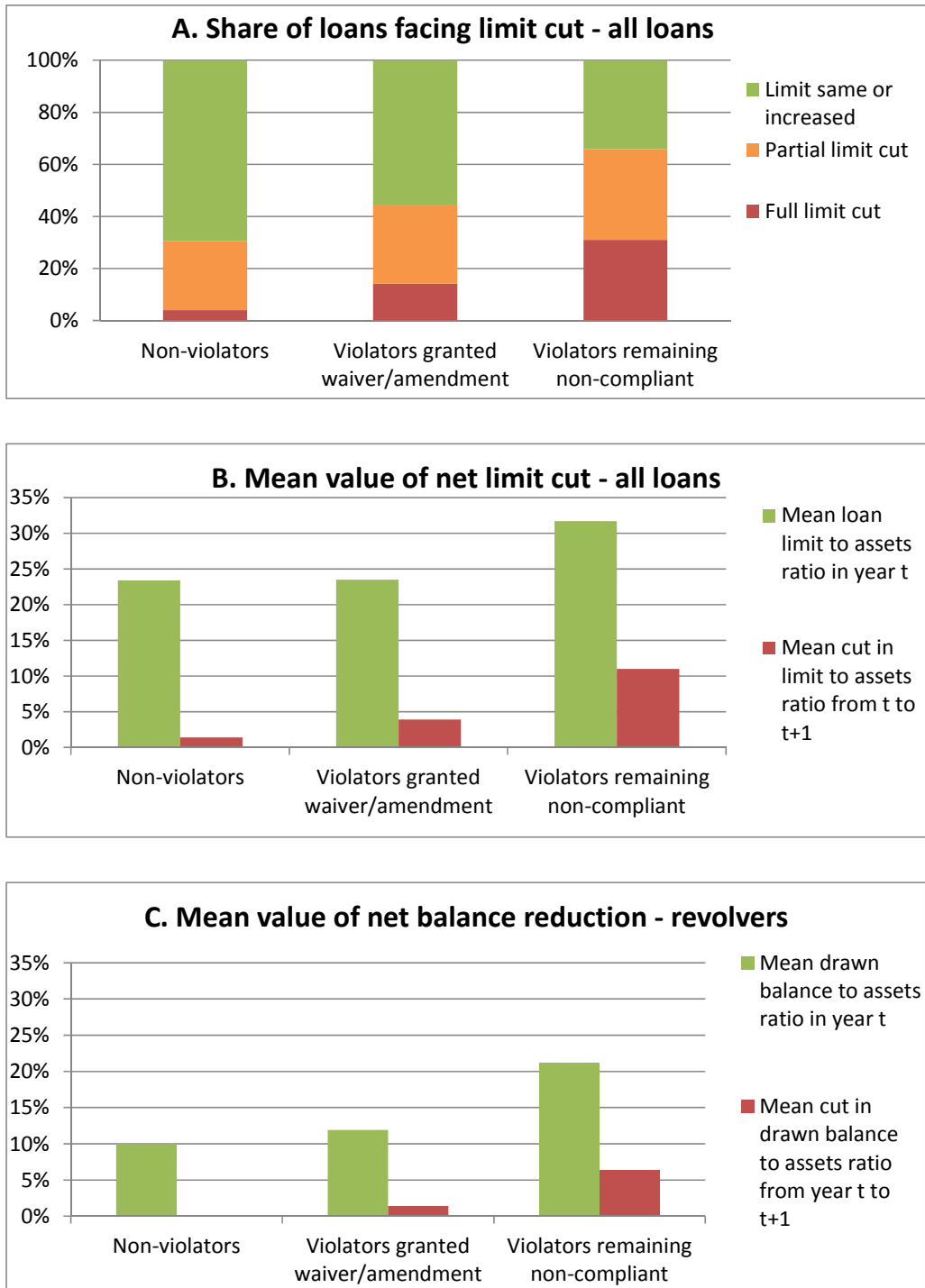


Figure 6. Banks are less likely to forgive violations by private firms

The two charts show the annual distribution of our reviewed loans sample over 2006-2012 for all loans and loans with violations, for private firms (A) and public firms (B). The secondary axis indicates the share of violators that do not receive waiver/amendment. Note that the number of public firm loans with violations is very small in 2011 and 2012, leading to more volatility in the denied renegotiation ratio. All variables are defined in Table 1.

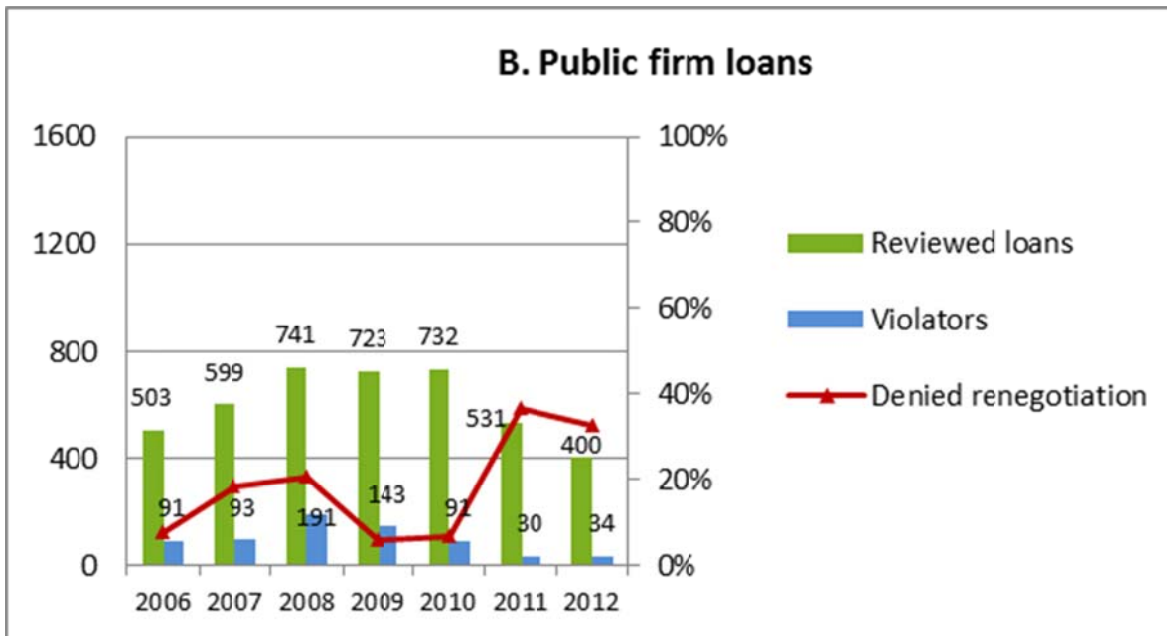
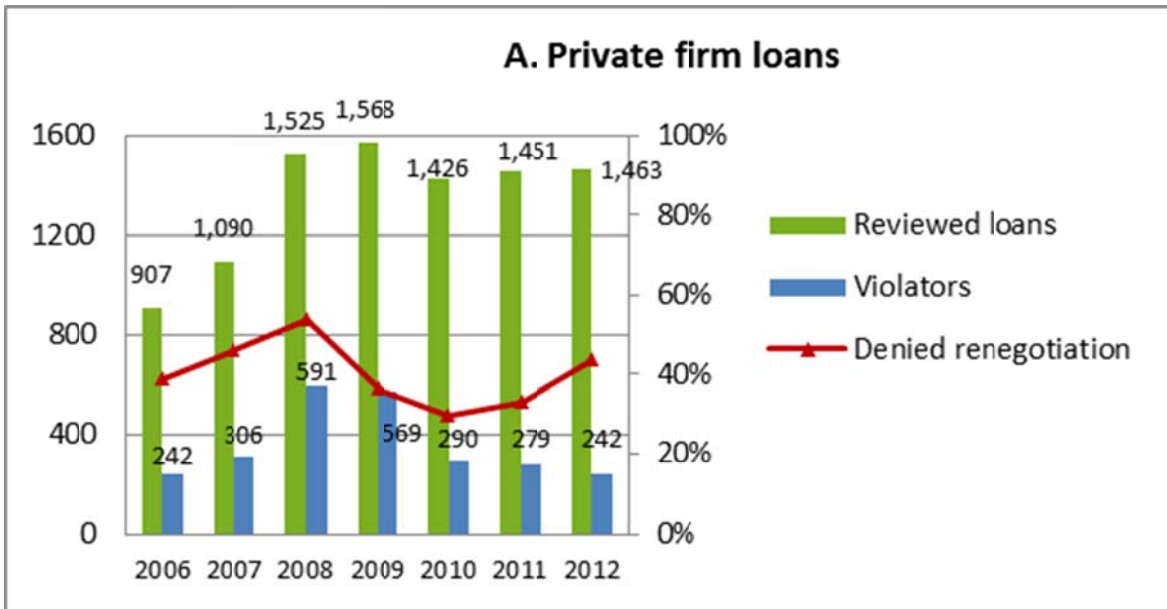
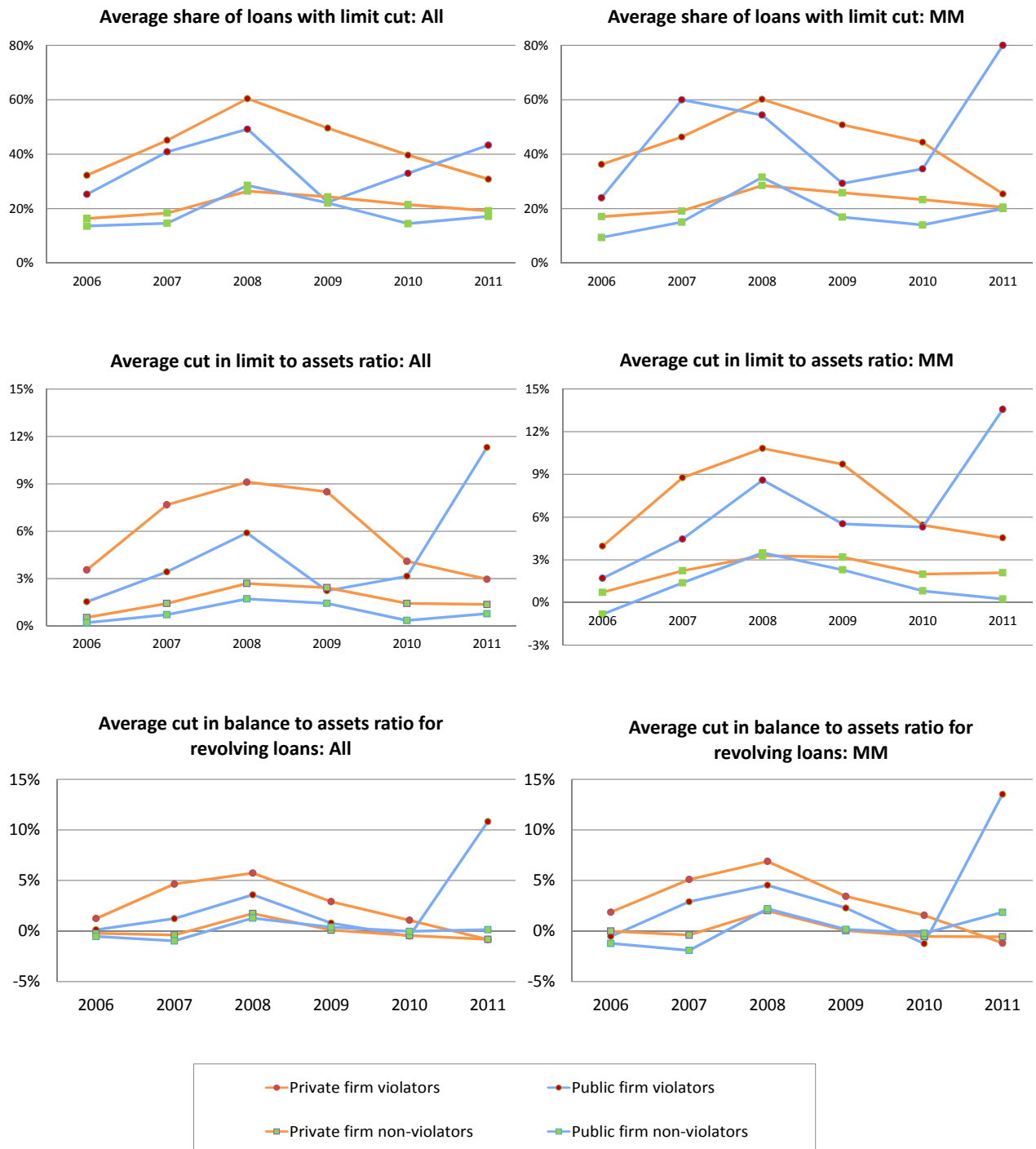


Figure 7. Covenant violations impact credit access more for private firms

The charts compare the impact of a violation on private firms and public firms using 3 different credit access measures based on the entire sample of reviewed loans over 2006-2012 (Column A) or restricting the sample only to middle market firms (Column B). All variables are defined in Table 1.

A. Full Sample

B. Middle Market



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