Rollover risk and the maturity transformation function of banks

Teodora Paligorova*

Bank of Canada

E-mail: tpaligorova@bankofcanada.ca

João A. C. Santos*

Federal Reserve Bank of New York

and

Nova School of Business and Economics

E-mail: joao.santos@ny.frb.org

November 18, 2013

JEL classification: G21

Key words: wholesale funding, loan maturity

*We thank Vitaly Bord and Phoebe White for outstanding research assistance. The views stated herein are those of the authors and are not necessarily the views of the Bank of Canada, the Federal Reserve Bank of New York or the Federal Reserve System.

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Abstract

This paper shows that banks that rely heavily on short-term funding cut down on maturity transformation in an attempt to decrease their exposure to rollover risk. Banks shorten the maturity of their portfolio of loans by cutting both the maturity of newly issued loans as well as the maturity extensions they grant in renegotiations. We find that the loan yield curve becomes steeper with banks' increasing use of short-term funding. The loan maturity shortening is driven by banks and affects borrowers' financing choices—they turn to the bond market for long-term funding. Our finding that banks shorten loan maturities in response to their increased use of short-term funding points to a new source of systemic risk: the synchronization of bank rollover risk with borrower refinancing risk.

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1 Introduction

When banks rely on insured demandable deposits they are able to perform a maturity transformation function without exposing themselves to liquidity risk. Over the past several years banks have branched out into nondeposit (uninsured) funding such as short-term wholesale funding, which has given them the opportunity to meet their funding needs at better terms, but it has also exposed them to rollover risk.[1] In this paper, we investigate whether banks take into account the rollover risk arising from reliance on short-term wholesale funding by shortening the maturity of their loans. Ascertaining the answer to this question is important: 'self insurance' by shortening of loan maturities will reduce banks' exposure to liquidity risk but it will also hinder banks' maturity transformation function with potential negative implications for the availability and cost of long-term bank loans.

Any attempt to identify a potential link between the maturity of banks' funding sources and the maturity of their lending business, referred to as the *bank funding hypothesis*, has to consider other explanations for the maturity of loans. For example, banks that rely on short-term funding may shorten the maturity of their loans in order to strengthen monitoring of borrowers (*monitoring hypothesis*). There are several ways banks can increase their ability to monitor borrowers, including holding a senior claim (Berglof and Thadden (1994)), demanding collateral Rajan and Winton (1995), adding covenants to the loan agreement (Gorton and Kahn (2000)), and shortening the maturity of the loan (Diamond (1993)).

Banks may also adjust their loan maturity policies in response to a change in borrowers' funding preferences (*bond financing hypothesis*). For example, firms plagued with moral hazard problems can access the bond market if they are able to first take out a loan that elicits bank monitoring (Holmstrom and Tirole (1997)).[2] Accordingly, if firms opt for using more bond financing, they may first take out a short-term bank loan in order to capitalize on bank monitoring and access the bond market at better terms, thereby explaining the decline in the

[1] Banks' increasing use of short-term funding could be the result of several factors including their incentive to capitalize on favorable repo markets or to attract funding from non-deposit investors, or the outcome of a maturity race *a la* Brunnermeier and Oehmke (2012).

[2] Datta et al. (1998) show that firms that have outstanding bank loans at the time of their bond issues are able to raise bond financing at better terms.

maturity of bank loans.[3]

In our investigation of the maturity of corporate loans over the last two decades, we consider these and other potential explanations for loan maturities, including borrowers' incentives to synchronize the maturities of their assets and debt obligations. Our findings provide strong evidence in support of the bank funding hypothesis: to decrease exposure to rollever risk, banks shorten the maturity of loans in response to their increased reliance on short-term funding. We find that as banks increase their use of repo funding and wholesale funding—our two proxies for short-term funding—they reduce the average effective maturity of their portfolio of loans that is the average time to maturity of new and existing loans in the bank's portfolio of loans. Our results show that banks shorten the effective maturity of their portfolio of loans both by extending loans with shorter maturities and by extending the maturity of their outstanding loans by less when loans are renegotiated.

We also find that the shortening of loan maturities by banks that rely extensively on short-term funding is prevalent among term loans and does not affect credit lines. This finding supports the bank funding hypothesis and it is contrary to the monitoring hypothesis. Only shortening of term loan maturities is effective at reducing liquidity risk arising from banks' increased use of short-term funding. In the case of credit lines, however, banks only provide a commitment to extend future funding and shortening of maturities would not provide protection against liquidity risk and would be costly to banks.[4] This finding is also contrary to the monitoring hypothesis in which we would expect a decline in the maturities of both term loans and credit lines since they can force the borrower to renew their contracts more often. We uncover additional results that do not support the monitoring hypothesis. For instance, borrowers that need monitoring the most do not experience the strongest decline in loan maturities compared to borrowers that need less monitoring.

[3]Similarly if it becomes less expensive to access the bond market, as Gande et al. (1999) argue it happened following the gradual repeal of the Glass-Steagall Act which started in the late 1980s, borrowers may opt for substituting bank debt with bond financing. Since bond financing is predominantly long-term, this substitution would lead to a relative decline in both long-term bank loans and the maturity of outstanding bank debt.

[4]Bord and Santos (2013) show that banks charge higher undrawn fees when they extend credit lines with longer maturities. The undrawn fee, which includes both a commitment fee and an annual fee, is the price the borrower pays the credit line provider for the liquidity risk it incurs by guaranteeing the borrower access to funding at its discretion over the life of the credit line and up to the total commitment amount.

In addition, we find that the loan yield curve becomes steeper and short-term loans originated by banks that rely on wholesale funding become relatively cheaper than those originated by banks that rely less on wholesale funding. This finding adds support to the bank funding hypothesis and it runs counter to the bond financing hypothesis. According to the bank funding hypothesis, the shortening of loan maturities should go together with a relative decrease in the cost of short-term loans by banks that rely extensively on short-term funding aiming to make these loans more appealing to borrowers. In contrast, according to the bond-financing hypothesis, if borrowers' preferences for bond financing increase and if they choose to (strategically) take short-term loans prior to bond issuance to capitalize on bank monitoring, then the increased demand for short-term loans should be accompanied by an increase in loans rates.[5] We find other results that question our conjecture that high demand for bonds explains the decline in the maturity of bank loans. For instance, we find that firms that first take out short-term loans are more likely to issue bonds shortly after the bank loan and not vice versa. In addition, we find that those bonds issued after taking out a bank loan are of relatively longer maturity than term loans issued by high wholesale banks consistent with firms' attempt to compensate for short-term loans.

Our findings have several important implications. They indicate that banks opted to manage the liquidity risk arising from their reliance on short-term wholesale funding by shortening the maturity of their assets, in particular their corporate loans, with implications for the cost of bank lending. Specifically, we observe that the cost of long-term loans increases as banks rely more on short term funding. Our results also help to explain the downward trend in the average maturity of outstanding bank loans over the last two decades documented by Mian and Santos (2011).[6] Our findings also provide evidence of a new source of refinancing risk for corporations and more generally a new source of financial fragility. By forcing borrowers to come back to banks more often through shorter loans, banks can potentially monitor borrowers

[5] If borrowers' appetite for more bond financing derives instead from a decline in the cost of access to the bond market, to the extent that bank loans and bond financing are substitutes, this would lead firms to substitute long-term bank loans with bond financing as in the bank-finding hypothesis. However, if the bank-funding hypothesis is at play, the relative cost of short-term loans will be smaller and hence the cost of bank and bond long-term debt higher. See Section 5.2 for details.

[6] While average maturity is close to four years in 1988, it declines to just over two and a half years in 2010.

better while at the same time exposing the latter to refinancing risk. By relying on short-term wholesale funding and thus exposing themselves to refinancing risk, banks that lend short-term loans could automatically expose their borrowers to higher refinancing risk. The combination of banks' refinancing risk with borrowers' refinancing risk has the potential to reinforce each other and contribute to a financial crisis. Lastly, our findings suggest that regulatory initiatives aiming to align the maturity of bank assets more closely with the maturity of liabilities in order to reduce exposure to liquidity risk may have an adverse effect by virtue of banks' decision to move away from the long-term lending business.[7]

Our paper is most closely related to the literature on corporate debt maturity. This literature, including Barclay and Smith (1995), Stohs and Mauer (1996), Guedes and Opler (1996), Johnson (2003), Berger et al. (2005), and Custódio et al. (2012), primarily focuses on the cross-sectional relationships between firm characteristics and firm's choice of corporate debt maturity, and pays little attention to the firm's choice of maturity on each debt issue or the role that credit suppliers play in firms' debt maturity. Custódio et al. (2012) study the maturity of new bond issues and syndicated loans, but they too do not consider the role of banks in the maturity of firms' loan choices, a key aspect of our investigation.

In this regard, our paper is related to a recent literature which has identified a set of bank-specific factors that affect their loan policies. This literature has linked the spreads and the size of the loan to various bank-specific drivers, including capital standards (Hubbard et al. (2002) and Santos and Winton (2011)); lending standards (Paligorova and Santos (2012)), bank losses (Santos (2011)), liquidity shocks Ivashina and Scharfstein (2010), and with banks' use of bond financing (Hale and Santos (2010)). In contrast, we are interested in the effect of banks' increasing use of short-term wholesale funding may have on the maturity of the loans they extend to corporations.

The remainder of our paper is organized as follows. We discuss the data, empirical strategy and sample characteristics in section 2. In section 3, we report results of the effect of

[7]The Basel Committee has proposed the implementation of net stable funding ratio that requires a minimum amount of funding expected to be stable over one year time horizon based on liquidity risk factors assigned to assets and off-balance sheet liquidity exposures.

wholesale funding on loan maturity. In section 4, we investigate the bank-monitoring hypothesis. In section 5, we consider the hypothesis that the decline in loan maturity is the result of a change in borrowers' preferences for bond financing. Section 6 concludes the paper.

2 Data, methodology, and sample characterization

2.1 Data

The data for this project come from several sources, including the Shared National Credit (SNC) program run by the Federal Deposit Insurance Corporation, the Federal Reserve Board, and the Office of the Comptroller of the Currency, the Loan Pricing Corporation's Dealscan database (LPC), Compustat, the Center for Research on Securities Prices (CRSP), Merrill Lynch's bond yield indices, the Federal Reserve's Bank Call Reports, and the fixed investment securities database (FISD).

The SNC program has gathered at least since 1988, at the end of each year, confidential information on all credits–new as well as credits originated in previous years–that exceed $20 million and are held by three or more federally supervised institutions. For each credit, the program reports the identity of the borrower, the type of the credit (e.g. term loan, credit line), its purpose (e.g. working capital, mergers and acquisitions), origination amount, origination date, maturity date, rating, and information about the syndicate, including the portion of the credit that each syndicate member retains in its balance sheet. Combining the information on banks' credit holdings with information on the maturity left in each credit at the end of the year, we compute for each lead arranger the effective maturity of the bank's portfolio of loans.[8] Further, since the program provides for the possibility of linking loans over time, we use this information to identify loans that are renegotiated to extend their maturity and compute their maturity extension.

The SNC data is ideal to investigate the year end maturity left in a bank's portfolio of large loans. That data also provides a unique opportunity to investigate the maturity

[8] The confidential data were processed solely within the Federal Reserve for the analysis presented in this paper.

extension of credits that are renegotiated. However, since the data include credits above $20 million which are held by at least three supervisory institutions, it does not consider smaller credits. Another limitation of the SNC data is that it does not contain information on loan credit spreads.

For these reasons, we rely on the LPC's Dealscan database of business loans to investigate loan maturities and spreads at the time of the loan origination. Like SNC, LPC is dominated by syndicated loans, and contains information on individual loans, including its purpose and type; information about the borrower, including its sector of activity, and its legal status (private or public firm); and finally, information on the lending syndicate, including the identity and role of the banks in the loan syndicate.[9] In contrast to SNC, LPC information on banks' loan shares is missing for a very large portion of the loans in the database. In addition, LPC only has information at the time of the loan origination.

We use Compustat to obtain information on borrowers' balance sheets. Even though LPC contains loans from both privately held firms and publicly listed firms, given that Compustat is dominated by publicly held firms, we have to exclude loans to privately held firms from our sample.

We rely on the CRSP database to link companies and subsidiaries that are part of the same firm and to link companies over time that went through mergers, acquisitions or name changes.[10] We then use these links to merge the LPC and Compustat databases to find out the financial condition of the firm at the time it borrowed from banks. We also use CRSP to gather data on firms' stock prices.

We use Merrill Lynch's yield indexes on new long-term industrial bonds to control for changes in the risk premium in the credit markets. We consider the indexes on yields of triple-A and triple-B rated bonds because these go further back in time than the indexes on the investment-grade and below-grade bonds.

We rely on the Reports of Condition and Income compiled by the Federal Deposit

[9]See Bord and Santos (2012) for a detailed comparison between the SNC and LPC databases over the last two decades.

[10]We adopted a conservative criterion and dropped companies that could not be reasonably linked.

Insurance Corporation, the Comptroller of the Currency, and the Federal Reserve System to obtain bank data, including the portion of funding raised in wholesale markets, capital-to-asset ratio, size, profitability and risk, for the lead bank(s) in each loan syndicate. Wherever possible, we get these data at the bank holding company level using Y9C reports. When these reports are not available, we rely on Call Reports, which have data at the bank level.

Finally, we use information on firms' bond issuance from FISD to investigate whether firms react to the shortening of loan maturity by issuing more often in the bond market. We also use this data source to investigate if firms attempt to compensate for the shortening of bank debt by issuing bonds of longer maturity.

2.2 Methodology

Our methodology has three parts. Part one investigates whether banks adjust the maturity of their corporate loans in response to the increased use of short-term funding. Part two explores whether the decline in loan maturity could be the result of other hypotheses, including a change in banks' monitoring preferences or in borrowers' funding preferences. Part three, investigates firms' bond financing in an attempt to find whether banks' shortening of lending has any effect on firms' financial policies. We describe next the tests we conduct in the three parts of our methodology.

2.2.1 Bank funding hypothesis

Banks can convert short-term deposits into long-term loans without being exposed to creditors' withdrawal of funds because of deposit insurance. However, when banks rely on uninsured short-term funding such as wholesale funding they may not be able to originate long-term loans but they may self insure against liquidity risk by matching short maturities of financing and loans. In a theoretical model, Winton (2003) shows that institutions faced with liquidity needs will first use their most liquid assets as a source of financing.

Banks' short-term funding and loan maturity

We consider three tests of the bank-funding hypothesis. To determine if there is a link between banks' use of short-term funding and loan maturity, our first test builds on the following regression model:

$$L\,MATURITY_{l,f,b,t} = c + \alpha WHOLESALE_{l,f,b,t-1} + \beta X_{b,t-1} + \gamma Y_{f,t-1} + \lambda Z_{l,t} + \zeta M_t + \epsilon_{b,t} \qquad (1)$$

$L\,MATURITY_{l,f,b,t}$ is the natural log of the maturity of loan l that bank b extends to firm f during year t. $WHOLESALE_{b,t-1}$ is our key variable of interest. Following Goetz and Gozzi (2010), we measure $WHOLESALE$ as the ratio of the sum of federal funds purchased and securities sold under repurchase agreements, commercial paper, brokered deposits, and other borrowed money to total assets.[11] We also consider the ratio of the federal funds purchased and securities sold under agreements to repurchases to total assets ($REPO\ FF$) as an alternative proxy for the maturity of banks' liabilities. This proxy will likely capture the part of the wholesale funding that has the shortest maturity.[12]

Based on model (1) the coefficient α tells us whether banks shorten the maturity of loans when they increase their use of wholesale funding. We also control for the sets of bank-, borrower- and loan-specific factors, $X_{b,t-1}$, $Y_{f,t-1}$, and $Z_{l,t-1}$, respectively, which are discussed next. Our set of bank controls includes $L\,ASSETS\,BK$, the log of bank's total assets, to control for bank size, and $CAPITAL\,BK$, the bank's equity to total assets ratio, to account for the bank's capital ratio. It also includes $LIQUIDITY\ BK$, the bank's holdings of cash and marketable securities as a fraction of total assets, to control for liquidity. Lastly, our set of bank controls includes $CHARGEOFFS\,BK$ and $ROA\,BK$, the bank's chargeoffs and return on assets, respectively, to control for the bank's performance.

We complement this set of bank controls with a set of borrower-specific controls. Since

[11] We use information from Schedule HC FR Y-9C. Detailed definitions are available at: `http://www.federalreserve.gov/reportforms/forms/FR_Y-9C20110630_i.pdf`

[12] Due to the lack of data, we cannot use separately the federal funds purchased and the securities sold under agreements to repurchases throughout the entire sample period. See Section 3.6 for more details.

banks in general are less willing to extend long-term loans to riskier firms, our firm-specific controls attempt to capture different aspects of firm risk. To that end, we control for the borrower's leverage, $LEVERAGE$, its profit margin, $PROFMARGIN$, and for its size as captured by the log of its sales in hundreds of millions dollars, $L\,SALES$. Larger firms are typically better established and better diversified across customers, suppliers, and regions. Similarly, firms with a higher profit margin have a higher cushion to service their debt and are less risky as well. Firms with high leverage on the other hand have a higher risk of default. As leverage increases so does liquidity risk, hence firms with high leverage are expected to use more long-term debt, all else equal.

We also control for the firm's tangibles, $TANGIBLES$, and for its growth opportunities as measured by its market-to-book ration, $MKTOBOOK$, as firms with fewer tangible assets and those with more growth opportunities are more likely to have incentives (opportunities) to take on more risk. Firms with high growth opportunities may use short-term debt to limit agency issues related to underinvestment problem. Lastly, we include dummy variables to control for the firm's sector of activity, as determined by the single-digit SIC industry groups. A given industry may face additional risk factors that are not captured by firm controls, so the dummy variable allows us to capture such risk at a very broad level.

We further include a set of loan-specific controls. This set includes $L\,AMOUNT$, the log of the loan amount to control for the size of the loan, and dummy variables to account for the purpose of the loan. To that end, we distinguish loans taken out for working capital purposes, $WORK\,CAPITAL$, for mergers and acquisitions, $M\&A$, for recapitalizations, $RECAPITALIZATION$, for corporate purposes, $CORP\,PURPOSES$, and to backup a commercial paper program, $CPBKUP$. We control for the share of the loan retained by the lead arranger, $BKSHARE$, since this drives the bank's monitoring incentives.[13] Lastly, our

[13] A challenge to control for the effect of the retained share of the lead bank occurs as this variable is missing for a large percentage of the loans in Dealscan. To alleviate this problem, we complement the information on the lead bank's share in Dealscan with information from another proprietary data source on syndicated loans available to us (the Shared National Credit program). This procedure reduces the number of observations for which we do not have data on the lead banks' retained share, but it does not eliminate the problem entirely. To deal with the missing data, we apply the so-called "dummy variable adjustment" approach: we plug in an arbitrary value for the cases of missing retained shares and then include in the regression a dummy variable coded one if data in the original variable was missing and zero otherwise, and the interaction term between the

set of loan-specific controls includes the dummy variable, $TERM\ LOAN$,. This distinction is important because in the case of term loans the bank provides the borrower with funds for the duration of the loan while in the case of credit lines it only offers a commitment to lend to the borrower. As we will discuss further below, we will build on this distinction to isolate the role of banks' funding choices on their loan maturity policies from other alternative explanations.

We complement these three sets of bank controls with a set of time dummies. M_t account for macroeconomic factors that may also play a role in loan maturities; we include the slope of the yield curve and the bonds spread We cluster the errors at the bank level. Finally, to reduce concerns that our results are driven by time invariant heterogeneity at the bank level, we estimate all our models of loan maturity with bank-fixed effects.

Banks' short-term funding and the maturity of loan extension

Our first test of the bank-funding hypothesis focuses on the maturity of loans at their origination. To be precise, that test considers a sample that includes predominantly new loans but it also has some loans that were renegotiated for a variety of reasons, such as a change in covenants, interest rate, the amount or maturity date, among others.

If the maturity of banks' funding sources affects the maturity of loans, then funding is also likely to play a role in the length of the maturity extension at the time of renegotiation of their existing loans.

Our second test of the bank-funding hypothesis investigates that link. We modify model (1) and use a set of loans that are renegotiated for the purpose of extended maturity. In this case, the dependent variable of our analysis is $L\ MATURITY\ EXT_{l,f,b,t}$, the natural log of the maturity that bank b extends in renegotiation during year t to loan l of firm f. As in our previous model, the key variable of interest is $WHOLESALE$ and the other proxy we use for the maturity of the bank's liabilities, $REPO\ FF$. The estimates of these variables

dummy variable and the modified variable. We are aware that this technique may bias the estimates of the coefficients of retained shares. We also apply alternative methods of filling in for missing observations such as the subgroup mean share by bank-quarter and we obtain similar estimates. Moreover, retained share and the method of refilling the data do not seem to affect our main estimates of interest that is the effect of wholesale funding on loan maturity.

tell us whether banks that increase their use of wholesale funding or repo funding and thus shorten the maturity of their liabilities extend the maturity of their corporate loans at the time of renegotiation by a shorter period of time. As with the first test in our methodology, we attempt to identify this link controlling for the sets of bank-, borrower- and loan-specific factors, $X_{b,t-1}$, $Y_{f,t-1}$, and $Z_{l,t-1}$, respectively, which we discussed above, and include year dummies to control for macroeconomic factors.[14]

Do banks synchronize the maturities of their assets and liabilities?

The previous tests focus on the maturity at the loan level. If banks aim at reducing the liquidity risk arising from the shortening of their liabilities one could arguably claim that their goal should be to reduce the maturity of their portfolio of loans. Therefore, a loan reduction is expected not only for new loans but also for maturity extensions at the bank level.

To investigate this hypothesis, we begin by computing the number of years left up to loan maturity which gives us the "effective maturity" of the loan at time t. Next, we average these values for all loans in the banks' books to determine the average effective maturity of the bank's portfolio of loans as of time t. Using this information we then estimate the following model of the maturity of the bank's portfolio of loans:

$$L\,MATURITY\ LEFT_{b,t} = c + \alpha\, WHOLESALE_{b,t-1} + \beta X_{b,t-1} + \zeta M_t + \epsilon_{b,t} \tag{2}$$

$L\,MATURITY\,LEFT_{b,t}$ is the natural log of the average effective maturity in the bank's portfolio of loans computed at the end of year t. As in the previous analyzes, $WHOLESALE_{b,t-1}$ is our key variable of interest. As in the previous specifications we rely on two proxies: WHOLESALEy and REPO FFy defined at the yearly level. These measures tell us whether banks that fund their activities with relatively more wholesale funding, and thus with relatively more short-term liabilities, choose to operate with a shorter maturity portfolio of loans. We investi-

[14]There are two differences in the set of loan controls we use in this part of our analysis. They derive from the fact that we rely on data from the SNC program while in the first part of our analysis we rely on data from Dealscan. We drop $CORP\,PURPOSES$, which is available only in Dealscan, and add $CAPITAL\,EXP$ which is available only in the SNC dataset.

gate this link controlling for the set of bank-specific controls, $X_{b,t-1}$, that we discussed above, a set of year dummies, and M_t, to account for macroeconomic factors that may also play a role in loan maturities. As in our previous analyzes, to reduce concerns that our results are driven by uncontrolled bank heterogeneity we include bank-fixed effects.

2.2.2 Bank monitoring hypothesis

Banks can shorten the maturity of their loans not because they want to reduce the liquidity risk arising from their added use of short-term funding but because they want to strengthen the monitoring of their borrowers. We consider two tests to disentangle these two hypotheses. The first one builds on the type of contract the bank has with the borrower, namely whether it is a term loan or a credit line. The idea of this test is the following. If banks shorten loan maturities because they want to increase monitoring of borrowers, then we should find both shortening of the maturity of their term loans and of their credit lines since both will force borrowers to come back for renewals more often within a shorter period of time.

In contrast, if the shortening of loan maturity is driven by the bank's objective to reduce liquidity risk, then we should expect the result to be stronger for term loans than for credit lines. The reason being that in the case of term loans the bank provides the borrower with funds for the duration of the loan while in the case of credit lines it only offers a commitment to lend. To ascertain the importance of these hypotheses, we extend our model of loan maturity as well as our model of the extension of loan maturity and include the interaction between $WHOLESALE_{b,t-1}$ and the dummy variable $TERM\ LOAN$.

Our second test to distinguish the bank funding hypothesis from the monitoring hypothesis builds on the following idea. Under the bank funding hypothesis there is no apparent reason for banks to target a decline in loan maturities when they lend to any given group of borrowers. In contrast, under the monitoring hypothesis we should expect the decline in loan maturities to be present for loans in which the banks have high monitoring incentives through a large retained share be the lead bank. Equally plausible, banks with high retained share may have incentives to keep the sensitivity of wholesale funding and loan maturity low (not using maturity as a monitoring device) because borrowers' performance is improved and no additional monitoring is needed. Hence, if the sensitivity between loan maturity and wholesale funding differs for different retained share of the lead bank, it may be that bank monitoring is driving the result. To that end, we start by investigating the extent to which banks with high monitoring incentives, as determined by the share of the loan they retain, originate loans with shorter maturiites. Next, we investigate whether this link is stronger among banks that rely more extensively on wholesale funding.

2.2.3 Bond financing hypothesis

Another hypothesis that can explain a change in loan maturities is related to a change in borrowers' preferences for funding sources. It is possible that borrowers choose to take (strategically) short-term loans and then capitalize on bank monitoring to access the bond market under better terms. It is also possible that borrowers have preferences for bond financing because of lower costs, and in turn choose to substitute bank borrowing with another type of long-term financing such as bond financing. Yet, another possibility is that borrowers access the bond market in an attempt to compensate for the shortening of the maturity of their loans.

A key distinction between these alternatives is that while borrowers' access to the bond market induced by a change in the maturity of bank lending is supply driven, under the bond financing hypothesis the access is demand driven. This difference is critical for us to disentangle the relative importance of these hypotheses. Note that while under the bank funding hypothesis we would expect an increase in interest rates of long-term loans (relative to short-term loans) to induce borrowers to take short-term loans, under the bond hypothesis we would expect a negative relationship between bond and loans spreads.

To disentangle the bank-funding hypothesis from the bond hypothesis, we investigate the slope of the yield curve and its relationship to wholesale funding, and the relationship between bond and loan spreads. In addition, we examine whether the probability of bond issuance is higher after term loan origination, and whether banks' reliance on wholesale funding is positively associated with the likelihood of bond issuance after a term loan issuance. Lastly, we examine the relationship between bond maturity and loan maturity, and wholesale funding.

2.2.4 Other explanations for the maturity of bank loans

Firms may demand short-term loans because they use assets with shorter life span (Hart and Moore (1994)). It may be the case that banks that rely on short term funding respond to firms' demand for short-term loans. Although this story is not mutually exclusive with the bank-funding hypothesis according to which banks shorten the maturity of loans in a response to their own use of short-term funding to minimize the associated costs with exposure to liquidity risk, we propose several tests that try to distinguish between both hypotheses. We examine the relationship between maturities of loans and bank wholesale funding for firms that are expected to demand long-term loans because they have longer duration of their assets and for firms that are expected to demand short-term loans because of shorter duration of their assets. If the negative relationship between wholesale funding and loan maturities is stronger for the set of firms that are not expected to demand short-term loans compared to the set of firms that are expected to demand short-term loans, then we can conclude that firms' incentives to match their assets and liabilities cannot explain our result.

2.3 Sample characterization

Table 1 presents the characteristics of our sample. There are 17,702 loans in our sample that were taken out by 2,683 publicly listed non-financial corporations between 1990 and 2010 from 159 banks. As it is common in corporate samples, many variables are positively skewed, with mean values greater than median values. For example, the median firm has log of sales equal to 2.0 and has a leverage ratio equal to 32 percent and a market-to-book value of 1.4, whereas the mean firm has log sales of 2.2 and has a leverage ratio of 35 percent and a market-to-book value equal to 1.7. Several other variables, including the fraction of tangible assets, stock return and stock volatility are also positively skewed.

Turning our attention to the loan controls, we find that the loan amount is positively skewed, with a median of $195 million and a mean of $539 million. The same is true for the loan spread with a median of 200 basis points over LIBOR and a mean of 216 basis points over LIBOR. The mean and the median maturity is four years. Roughly a third of the loans (32 percent) are for corporate purposes. With regards to the type of contract, 28 percent of loans are term loans. On average the lead arranger holds 45 percent of the loan.

Next, we consider the set of bank controls we use in our study. We measure these controls at the holding company level, and not at the bank level, to capture any potential effects that may arise from ownership transfers between entities of the same holding company. For the ease of exposition, though, we continue to refer to these as bank controls. Banks are significantly larger with median of the log of bank assets 19.2 and mean of 19.0. The average bank has an equity-to-assets ratio of about 8 percent, and uses about 16 percent or 34 percent of wholesale funding, depending on whether we include in the definition of wholesale funding brokered deposits or uninsured deposits, respectively.

Figure 1 shows the kernel densities of the ratio of loan maturity over the mean maturity in a year. If the ratio takes values greater than one, the loan maturity is longer than the average maturity in that particular year. For values lower than one, the loans are viewed as shorter term loans. We split the sample into high (WHOLESALE>median WHOLESALE) and low wholesale funding (WHOLESALE<median WHOLESALE) banks. Having the distribution of high wholesale funding banks shifted to the left, these banks tend to originate more loans with shorter maturities. In contrast, the low wholesale funding banks tend to have a substantial portion of long-term loans, defined as loans with maturity higher than the mean loan maturity.

In Figure 2 we show the kernel densities of the ratio of the maturity extensions of each loan over the mean maturity extension for each year. If the ratio takes values greater than one, the loan maturity extensions is longer than the average maturity extension in that particular year. For values lower than one, the extensions are viewed as shorter extension. We split the sample into high (WHOLESALE>median WHOLESALE) and low wholesale funding (WHOLESALE<median WHOLESALE) banks. Based on the overlap of both distributions, we see that high wholesale funding banks provide a larger number of short term extensions compared to the low wholesale funding banks. As for the longer extensions—extension ratios with values higher than one—we note that both distributions overlap to a large extent. As we can see from Figures 1 and 2, banks' use of wholesale funding does appear to play a role in bank lending policies. Banks that use more wholesale funding on average appear to extend loans

with shorter maturities and to grant shorter maturity extensions at the time of renegotiations.

3 Banks' use of short-term funding and loan maturity

In this section, we report results of whether shorter maturity of bank liabilities as proxied by the use of wholesale funding affects negatively the maturity of loans. Then, we focus on the length of maturity extensions of renegotiated loans. We also investigate whether banks align the effective maturity of their portfolio of loans, that is the average time to maturity of new and existing loans in banks' portfolio of loans, with the maturity of their liabilities. We consider two cross-sections tests of whether certain banks are more likely to discount loan maturities as they rely on short-term funding. Finally, we isolate periods of drastic exogenous increase in REPO FF and explore its impact on loan maturities.

3.1 Shortening of maturities of new loans

Table 2 reports results from specifications that estimate the effect of bank wholesale funding on loan maturities. In columns (1) through (3), we focus on our first proxy for the maturity of banks' liabilities, $WHOLESALE$, and in columns (4) through (6) we focus on our second proxy, $REPO\ FF$.

In columns (1) and (4), we report regression models that take into account the effects of our proxies for the maturity of banks' liabilities, without separately accounting for the effects of term loans and credit lines. We leave out from those models all loan controls to reduce concerns about endogeneity arising from the simultaneous determination of maturity and other loan characteristics. The coefficients of interest in these models are those on the wholesale funding $WHOLESALE$ in column (1) and $REPO\ FF$ in column (4). Both coefficients are not statistically significant, implying that on average loan maturity does not depend on the maturity of banks' liabilities.[15]

[15] In unreported specifications, we consider alternative definitions of wholesale funding that allow for scaling to total funding as opposed to total assets. We define total funding to be the sum of deposits, federal funds purchased and securities sold under agreements to repurchase, commercial paper, subordinated notes and debentures, and other liabilities. This measure accounts for the fraction of short-term funding in total funding. The results and main conclusions remain unchanged.

Under the bank-funding hypothesis we would expect banks that increasingly rely on short-term funding to shorten the maturity of their term loans, but not necessarily the maturity of their credit lines. If banks synchronize asset and liability sides of their balance sheets to reduce the liquidity risk inherent in short-term funding, it is more likely that they do so with their term loans because they need to set aside the total amount for the loan unlike for credit lines which require only banks' commitment to provide financing. In contrast, under the monitoring hypothesis we would expect that link to be present in term loans as well as in credit lines because both of them force the borrower to come back to the bank more often, therefore, strengthening bank monitoring.

To differentiate the effect of banks' use of short-term funding on the maturity of their term loans and credit lines, we expand our model and include the interaction of the dummy variable $TERM\ LOAN$ with our proxies for banks' use of short-term funding. The results of this exercise are reported in columns (2) and (5).

In column (2), the negative coefficient on the interaction term between term loans and wholesale funding ($WHOLESALE \times TERM\ LOAN$,) is -0.321, implying that as wholesale funding increases by 1%, loan maturities shorten by 38% more for term loans than for credit lines. In fact, wholesale funding does not affect loan maturities for credit lines in any meaningful way. In columns (3) and (6), we further expand the set of controls to account for loan controls. In column (3) the total effect of wholesale funding on loan maturities is -0.343 that is the sum of the estimates on $WHOLESALE \times TERM\ LOAN$ and $WHOLESALE$. One standard deviation increase in $WHOLESALE$ leads to 3.3% decrease in term loan maturities (0.343×0.096). As for credit lines, the estimate on $WHOLESALE$ is statistically insignificant, implying that wholesale funding does not affect the maturity of credit lines. The same conclusions are preserved when we account for the set of loan controls (3). Turning our attention to columns (5) and (6), which report the results for banks' use of repo funding, $REPO\ FF$, we see that the estimates on the interaction terms, $REPO\ FF \times TERM\ LOAN$, are -0.262 and -0.378 respectively, yielding similar conclusion as before.

Looking at the coefficient estimates on banks controls, we find that more liquid banks originate loans with shorter maturities. The estimates on the remaining bank controls are not significant. Large firms as proxied by $LSALES$ have loans with shorter maturity possibly because they are better diversified and can afford to raise cheaper short-term funding on a frequent rollover base. Firms with higher levels of leverage ($LEVERAGE$) are associated with loans with longer maturity potentially trying to decrease their exposure to liquidity risk. More profitable firms, being less constraint in terms of liquidity, have loans with shorter maturity. Similarly to Barclay and Smith (1995) we document that debt maturity structure is inversely related to a firm's growth opportunities ($MKTOBOOK$). Loans originated for working capital, M&A, corporate purpose and CP backup have shorter maturity compared to the respective reference group. Larger loans have longer term maturity; so do loans originated for the purpose of recapitalization. We include the retained share of the lead arranger in the regression ($BKSHARE$) and for the non-missing observations we uncover that large retained share is associated with shorter loans.

The results reported in Table 2 assume that $WHOLESALE$ and $REPO\ FF$ alone affect loan maturity differently for term loans and credit lines. However, it may be the case that all other characteristics affect loan maturity differently for term loans and credit lines. To address this concern, we estimate specifications that allow for the complete interaction of the term loan variable ($TERM\ LOAN$) with all other controls. For brevity, in Table 3 we report only the coefficients on $WHOLESALE$ and $REPO\ FF$ and their interactions with the term loan variable. As in the previous table, the left-hand columns report the results for $WHOLESALE$ while the right-hand columns report the results for $REPOFF$. Columns (1) and (3) omit loan controls and columns (2) and (4) account for these controls. Lastly, as before we estimate all of these models with bank fixed effects.

A quick look at Table 3 shows that the results across all four specifications indicate that banks shorten the maturity of their term loans as they rely more on short-term funding. Note that both $WHOLESALE \times TERM\ LOAN$ and $REPOFF \times TERM\ LOAN$ are negative and highly statistically significant in columns (1)-(2) and (3)-(4), respectively. In terms of their magnitudes, they are larger than the estimates in the respective specifications in Table 2. For example, in column (1) the estimate on the interaction term is -0.509, suggesting that one standard deviation increase in wholesale funding is associated with 5% decrease in maturity

(0.509×0.096).

3.2 Shortening of maturity extensions at renegotiations

Most of the loans in the Dealscan database are new loans. However, once borrowers take out a loan, many of them go back to their bank before their loan reaches its maturity date to renegotiate it for various reasons, including extending the maturity of the loan. These renegotiations are valuable because they help us test the validity of some of our hypotheses. For instance, if the shortening of banks' liabilities is the driver of their decision to shorten the maturities of loans, then we would expect banks to do the same for the maturity extensions obtained in renegotiations. Complementing the analysis of maturity at origination with maturity extensions is valuable because it allows us to draw a broader picture of the behaviour of banks in regards to decisions on loan maturities. However, investigating maturity extensions that occur in renegotiations based on the Dealscan database is problematic. It is challenging and time consuming to identify these extensions in Dealscan, and more importantly, because Dealscan is focused on loans at origination, the way it gathers information will often classify renegotiations as new loans.

For these reasons, we rely on information from the SNC database in this section. This database fits our purpose because, in contrast to Dealscan, it gathers information on facilities not only at the time of their origination but also until they reach their full maturity. This makes it easy to identify renegotiations that lead to a change in the maturity date and to measure the length of maturity extensions that occur in these renegotiations. We build on this information to investigate whether banks' increasing use of short-term funding also affects the length of the maturity extensions they are willing to grant their borrowers in renegotiations.

The results of our investigation of the maturity extensions in renegotiations are reported in Tables 4 and 5. Table 4 reports specifications similar to those in Table 2 with the difference that the dependent variable is the log of the maturity extension. The left-hand panel (columns 1-3) focuses on our first proxy for banks' use of short-term funding, $WHOLESALE$, while the right-hand panel (columns 4-6) focuses on our second proxy, $REPOFF$. As before, we estimate the new results with bank-fixed effects. In columns (1) and (4), we consider a specification that does not distinguish between credit lines and term loans. As we can see from these two columns, the estimate on either of the two proxies we consider for wholesale funding is insignificant.

Following the approach we adopted in the previous section, in the remaining columns of the table we distinguish the effects of wholesale funding on maturity for term loans and credit lines. In columns (2) and (5), we omit loan controls and in columns (3) and (6) we add these controls to our model. Considering the sum of the estimates of $WHOLESALE$ and $WHOLESALE \times TERM\ LOAN$, in column (2), we note that as banks increase their use of wholesale funding there is a sizable cut in the length of the maturity extension in the case of term loans and no significant cut in the case of credit lines. This pattern persists when we add loan controls in model (3), and when we proxy for the maturity of bank liabilities by the usage of repo funding, $REPOFF$, (models 5 and 6).

Based on column (3), the signs of bank, firm, and loan controls suggest the following: loan extensions are shorter for more capitalized banks and longer for more profitable banks. Extensions for loans for working capital are longer than for other reasons, which is also valid for M&A loans and $CPBKUP$. The retained share, which is not missing for the sample of loan extensions, does not seem to play any significant role in the length of loan extensions. Longer maturity left ($MATURITY\ LEFT$) of the original loan is associated with shorter extensions.

Following the approach we used in the previous section, in Table 5 we report the full interaction specifications in which all controls are interacted with the term loan variable. The results confirm our previous findings: as banks use more wholesale funding, they shorten the maturity extensions they offer borrowers at the time they renegotiate their term loans.

The parallel evidence we unveiled between our investigation of the maturity at the time of the loan origination and our investigation of maturity extensions at the time of a loan renegotiation showing that as banks use more short-term funding they tend to shorten the maturities of their term loans but not those of their credit lines add important support to the bank-funding hypothesis. The effects of wholesale funding on the maturity of term loans and credit lines also casts doubt on the bank-monitoring hypothesis (see Section 4).

3.3 Shortening of the effective maturity of loan portfolios

So far we have documented that as banks increase their use of short-term funding, they shorten both the maturities of new term loans and the maturity of loan extensions they grant in renegotiations. We have argued that these findings support the bank funding hypothesis that banks shorten the maturity of their lending business trying to reduce the costs associated with exposure to liquidity risk due to strong reliance on short-term liabilities. But, if that is the case, then one would expect this to happen not only at the loan level, as we documented so far, but also at the loan portfolio level. To that end, we investigate the effective maturity of the bank loan portfolios, defined yearly as the average time to maturity of new and existing loans for the whole portfolio. Looking at the effective maturity of the loan portfolio is beneficial as it allows us to shed light at the hypothesis that banks attempt to align the maturities of their assets and liabilities. The results of this investigation are reported in Table 6. Using the SNC data, all models include a set of bank controls for assets, liquidity, capital, net chargeoffs and return on assets. All regressions are estimated with bank fixed effects.

Columns (1)-(3) report the results using our first proxy for banks' use of short-term funding, $WHOLESALE$, and columns (4)-(6) report the results for our second proxy, $REPOFF$. The estimate on wholesale funding in column (1) is -0.387, suggesting that one standard deviation increase in $WHOLESALE$ is associated with 3.7% reduction in the maturity of the entire loan portfolio. Based on columns (2), the discount of wholesale funding on effective maturity is pertinent to the portfolio of term loans only, which is consistent with our earlier findings. The estimate on wholesale funding for the portfolios of credit lines in column (3) is of much smaller magnitude. In column (4), the estimate on $REPO\,FF$ is -0.527, suggesting that $REPO\ FF$, our proxy for banks' funding liabilities with the shortest maturity, leads to the strongest decrease in effective maturity. In column (4), the estimate on $REPO\,FF$ suggests that maturity of term loans is decreasing when banks rely on repo funding. This is not the case for credit lines (column 5). We conclude that when banks take into account the maturities of new loans and the maturities left of previous loans, they shorten the maturity of the loan portfolio with greater reliance on wholesale funding. Finding evidence at the portfolio level provides additional support for banks' alignment of the maturities of their assets and liabilities.

3.4 Do short-term loans become less expensive as banks use more short-term funds?

We have implicitly assumed so far that the decline in loan maturities is supply driven. However, it is conceivable that such an effect is instead demand driven. For example, a change in borrowers' funding preferences towards bond financing could potentially lead to a decline in loan maturities. We look closely at the bond financing hypothesis in Section 5.2. For now, we want to get a sense of whether our findings about loan maturity and wholesale funding are likely bank driven by investigating banks' loan pricing policies.

If the effect of shorter loan maturity is coming from banks' balance sheet adjustments, we expect to find a corresponding impact on loan spreads. Specifically, if high wholesale funding banks tend to shorten the maturity of term loans, a unit increase in the maturity of term loans together with a unit increase in wholesale funding should lead to higher loan spreads. Hence, banks that rely on wholesale funding are expected to offer relatively cheaper short-term loans compared to banks that rely less on wholesale funding. Finding a decrease in both the maturity of loans and their spreads seems to be consistent with a change in banks' lending policies rather than with a change in the demand for short-term loans by borrowers.

To address this possibility in Table 7, we estimate loan spread regressions. To capture the differential impact of the maturity of banks' funding sources on loan spreads for loans with different maturities, we include the interaction between our proxies for the maturity of bank liabilities, $WHOLESALE$ and $REPO\,FF$, and the maturity of loans. This interaction captures the incremental effect of wholesale funding (repo funding) for a one-percent increase in loan maturities. We estimate this effect controlling for a set of firm-, bank-, and loan specific factors similar to previous studies of loan spreads (i.e., Santos and Winton (2008) and Santos (2011)).[16] Following our previous analysis, we estimate our loan-spread model with bank-fixed effects.

[16]Leaving out the set of loan controls to alleviate concerns about the endogeneity of some of these variables does not affect our findings in any meaningful way.

Columns (1) through (3) report the results when we consider our first proxy $WHOLESALE$, and columns (4) through (6) report the results when we consider our second proxy, $REPOFF$. Columns (1) and (4) report the results for the entire sample, while the remaining columns report the results separately for term loans and credit lines. Looking at column (1) we see that the coefficients on $WHOLESALE$ and the interaction term $WHOLESALE \times LMATURITY$ are both significant. Since the former is negative and the latter is positive, this indicates that the relationship between loan spreads and wholesale funding becomes weaker as loan maturity increases. Based on column (1), as banks increase their use of wholesale funding and thus shorten the maturity of their liabilities, they cut the interest rates they charge on their corporate loans, but by less on loans with longer maturities. In other words, as banks increase their use of wholesale funding, they cut loan spreads in a way that makes short-term borrowing relatively cheaper and consequently more appealing to borrowers. Stated differently, the loan yield curve becomes steeper when banks rely on on short-term funding. Looking at columns (3) and (4), which report the results for term loans and credit lines, respectively, we see that the coefficient on the interaction term $WHOLESALE \times LMATURITY$ is 0.303 in the former models and 0.113 in the latter model suggesting that the decline in the relative spread of short-term credit is stronger for term loans. A quick look at the remaining columns of Table 7 indicate that these conclusions continue to hold when we use our second proxy $REPO\ FF$.

Finding that banks that use more short-term funding offer relatively less expensive short-term borrowing together with the evidence that this effect is present for term loans adds important support to a bank-driven decline in the maturity of loans. These results are important because they add critical support to the bank-funding hypothesis and at the same time cast doubt that the shortening of the maturity is driven by demand theories (see Section 5).

3.5 Does banks' exposure to liquidity risk affect loan maturities?

The main hypothesis in our paper is that banks tend to decrease the maturity of their loans when they rely more on short-term funding in an effort to ameliorate the potential effect of a sudden stop of funding. In this section, we provide additional supporting evidence for this hypothesis by comparing loan maturity policies of banks that rely more on insured deposits to banks that rely less on insured deposit. The latter will be cushioned from wholesale funding withdrawals and hence less motivated to match the maturity of their assets and liabilities. Banks that rely on insured deposits will be less willing to decrease the maturity of their loans if short-term funding is the preferred source of funding.

In Table 8 we estimate loan maturity regressions similar to those in Table 2 separately for banks that rely more on insured deposits ($H\ INSURED$) and banks that rely less on insured deposits ($L\ INSURED$).[17] Looking at columns (1) and (2), we find that banks that rely less on insured deposits exhibit twice as large negative sensitivity of loan maturity to wholesale funding relative to banks that rely more on insured deposits (column 2). We get a similar result when we use $REPO\ FF$ as a proxy for the bank's short-term bank funding in columns (3) and (4). This test provides additional evidence on the channel through which banks that rely more on short-term funding decrease their loan maturities. Namely, banks that have access to more stable funding sources such as insured deposits are less inclined to decrease the maturity of their loans.

In Table 9 we report the result from a similar test, using net chargeoffs insttead. Our hypothesis is that rollover risk is more pronounced for banks with high chargeoffs because creditors will be more likely to withdraw funding when the bank has high levels of uncollectible loans. In columns (1) and (3), we focus on banks with low chargeoff levels (L CHAR) defined as chargeoff levels lower than the sample median, and in columns (2) and (4) we look at the high chargeoff banks defined as banks with chargeoff levels higher than the sample median. Starting with our wholesale funding measure, WHOLESALE, in columns (1) and (2), the estimate of the interaction term between term loans and wholesale funding is twice as small as the one for the high chargeoff banks. Similar evidence is uncovered when looking at the REPO FF measure in columns (3) and (4).

Overall, our cross-sectional tests at the bank level confirm that certain banks are more concerned with rollover risk. Namely, banks that rely more on stable insured funding are less

[17] We classify banks with high ($H\ INSURED$) and low ($L\ INSURED$) insured deposits if the ratio of bank insured deposits over total assets is respectively higher or lower than the sample median.

likely to experience the effect of funds and hence they do not try to match the maturity of liabilities and loans compared to banks that have less access to insured funds. In a similar spirit, banks that have high net chargeoffs are more likely not to have their funding rolled over and therefore they self insure more by reducing the maturities of their loans.

3.6 (Exogenous) Jump in Repo Funding

To provide convincing evidence that banks' reliance on short-term funding causes a decrease in loan maturities, one needs to examine a setting in which banks experience a 'shock' to the maturity of their liabilities that is unrelated either to change in bank assets or liabilities. Using such 'shock' allows one to provide causal evidence of the effect of the maturity of bank liabilities on the maturity of their lending. However, detecting such an event that makes banks exogenously more dependent on short-term funding is nontrivial.

We start by inspecting the time-series patterns of our proxies for the maturity of banks' liabilities, $WHOLESALE$ and $REPO\,FF$. We focus on the latter measure because it is more narrowly defined (it dependents to a large extent on the repo market) which makes it easier to identify pronounced times series patterns. Figure 3 depicts the quarterly mean of $REPO\,FF$, the ratio of federal funds purchased and repo sold to assets, used in our previous regressions. Looking at Figure 3, we can observe two periods in which $REPOFF$ is unambiguously trending up for several consecutive quarters. From 1992Q2 to 1995Q1, $REPO\,FF$ grew 22%; similar increase is documented from 1998Q3 to 2000Q3. The question then arises as to whether there is some specific reason for these patterns. Looking separately at Repo Sold and Federal Funds Purchased, the two components of $REPO\,FF$, we note that Repo sold is increasing over time, but that is not the case for federal funds purchased. Unfortunately, we do not have information about these two series separately over the period 1997Q1 to 2001Q4. However, based on the pattern on $REPO\,FF$ that is the sum of these two series, we can induce that the increase in $REPO\,FF$ from 1998Q3 to 2000Q3 is probably driven by an increase in Repo Sold and not by Fed funds purchased as it exhibits a decrease from 1998Q3 to 2000Q3. Hence, our investigation is focused on the reasons for observing such an increase in repo sold in the period 1998Q3 to 2000Q3.

The repo market underwent through a major reform in 1998. GCF (General Collateral Finance) Repo was introduced to reduce transaction costs and enhance liquidity in the repo market.[18] This innovation in the market for repurchase agreements provides several advantages to dealers over conventional general collateral repos. In particular, GCF Repo provides for netting in settlement, accommodates settlement later in the day and thus allows collateral to be easily substituted. These features reduce transaction costs, enhance liquidity and facilitate the efficient use of collateral. The benefits of GCF repo have plausibly contributed to the rapid growth in settlement volume from $11.3 billion in 2000 to $101.3 billion in 2002 when GCF repo was considered to account for 54% of the inter-dealer transaction on Treasury collateral (Fleming and Garbade (2003)).

Although we do not have direct evidence why individual banks increase their reliance on $REPO\ FF$, our conjecture is that at least part of this increase is due to the introduction of GCF Repo. For this reason, we assume that the period 1998Q3 to 2000Q3 is a period of an exogenous increase in repo funding.[19]

In Table 10, we examine whether the relationship between loan maturity and the maturity of the bank' liabilities, as proxied by $REPO\ FF$, differs in the period of exogenous increase in Repo compared to the rest. JUMP varies by banks and it takes one if $REPO\ FF$ increase from 1998Q3 to 2000Q3 and zero otherwise. Our hypothesis is that banks with positive growth in $REPO\ FF$ exhibit stronger sensitivity of loan maturity to $REPO\ FF$ in an attempt to attenuate the potential effect of a decrease in funding.

In column (1), based on the negative sign of the triple interaction term between $WHOLESALE$, $JUMP$, and $TERM\ LOAN$ we conclude that in periods of arguably exogeneous decrease in the maturity of banks' funding induced by a positive shock in $REPO\ FF$, loan maturity is more sensitive to the maturity of the bank's liabilities when compared to other periods in which the possible decline in the maturity of the bank's liabilities is not exogeneous. The same conclusion holds when we proxy for the maturity of banks' funding by $REPO\ FF$

[18]See Fleming and Garbade (2003) for detailed description of GCF Repo.

[19]Because we do not find similar explanation for the increase of repo in the period 1992Q2 to 1995Q1, we omit this period from the analysis that is possibly driven by some general time trends in the economy.

in column (2).

4 Could banks' monitoring incentives explain loan maturity shortening?

In Holmstrom and Tirole (1997)'s model banks bear all of the monitoring costs, however, they share only a part of the benefits, therefore, facing moral hazard in terms of exerting lower monitoring effort. Being exposed to this kind of moral hazard, lead arrangers in loan syndicates are expected to retain a larger share of the loan in order to signal their willingness to monitor borrowers' performance (e.g., Sufi (2007)). In the context of bank funding and loan maturities, it may be the case that banks that rely on short-term funding use the maturity of loans as an instrument to monitor by forcing borrowers to revisit them more often in search for new loans or maturity extensions.

As we noted above, the fact that we find shortening of maturity on term loans, but not on the maturity of credit lines, raises questions about the bank monitoring hypothesis. Under this hypothesis, we would not expect this difference because banks could increase their monitoring opportunities by shortening the maturity of either term loans or credit lines since both would force borrowers to come back more often. To further test these hypothesis we examine whether the relationship between banks' funding and maturity varies for different levels of bank monitoring incentives. If banks use the maturity of their loans as a monitoring device, then we would expect the estimate on $WHOLESALE \times TERMLOAN$ to be (negative) larger for banks with higher monitoring incentives relative to those with weaker monitoring incentives. Alternatively, banks with higher retained share may not use maturity shortening; on the opposite, they may extend loan maturity because these banks choose to originate loans to more creditworthy borrowers. Overall, monitoring by lead arrangers through loan maturity may be associated with either shortening or extending of maturity. Hence, the most convincing evidence that our results are not driven by monitoring is to find no relationship between the retained share, and the sensitivity of loan maturity to our proxies of the maturity of banks' liabilities.

Our test builds on the share of the loan retained by the lead bank. When banks retain a larger share of the loans, they have stronger monitoring incentives because they have more skin in the game. If high wholesale banks use the maturity of their loans as a monitoring device, then we would expect the estimate on $WHOLESALE \times TERM\ LOAN$ to be larger for banks with more skin in the game when compared to banks with less skin in the game. To test this hypothesis, we split our sample into loans with large versus those with small retained shares by the lead bank and estimate our loan maturity model. To further reduce concerns that our results may be driven by the set of loans for which we are not able to get information on the retained share, we also estimate our model for this set of loans.

Table 11 reports the results of this test. As before columns (1)-(3) report the results for $WHOLESALE$ while columns (4)-(6) report the results for $REPO\ FF$. Looking at the estimates of the interaction terms of $WHOLESALE \times TERM\ LOAN$ in columns (1) and (2), we observe that banks that retain relatively small share shorten the maturity of loans in a similar way as banks with large share. Similar evidence is confirmed in columns (4) and (5) where we use $REPO\ FF$. These results are not consistent with the monitoring hypothesis as banks' retained share does not seem to matter for the relationship of loan maturity and the maturity of the bank's liabilities. Note that the missing information about the retained share does not appear to drive our results—based on columns (3) and (6) both estimates on $WHOLESALE \times TERM\ LOAN$ and $REPO\ FF \times TERM\ LOAN$ are insignificant.

In sum, our results do not seem to support the idea that banks' monitoring incentives explain the evidence we uncovered between their increasing use of short-term funding and the shortening of the maturity on the term loans they extended their borrowers. The reason is that we do not find this link to be stronger among banks with stronger monitoring incentives, as proxied by their skin in the game.

5 Could loan maturity shortening be driven by borrowers' demand?

The evidence we unveiled shows that as banks increase their use of short-term funding they also increase the relative interest rates on long-term loans implying that our finding on loan maturity shortening is indeed bank driven and not demand driven. To further reduce concerns that our finding derives from a change in borrowers' preferences, in this section we report the results of two tests we developed. The first test builds on the idea that firms cater to the duration of their assets when they decide on the maturity of their borrowing. The second test, in turn, considers the possibility of our results deriving from a change in borrowers' preferences for bond financing.

5.1 Do firms cater to the duration of their assets?

Firms may have incentives to match the maturities of their assets and debt obligations. In Hart and Moore (1994)'s model of debt maturity a borrower cannot commit to repay debt and she can walk away from her debt obligations at any time. Although the lender can seize the assets in the event of the borrower's default, accumulated skill and knowledge cannot be acquired by the creditor. Debt maturity can help resolve this problem because as assets become longer lived, they provide the creditor with security to wait longer before being repaid. The lender's threat to seize assets is more credible when assets are longer lived. According to this model assets with longer (shorter) life are likely to be financed by longer (shorter) term debt.

If firms match the maturities of their assets and liabilities, as Stohs and Mauer (1996) document, one may wonder whether our finding of maturity shortening is driven by firms' adjustments to their balance sheet. If the maturity of banks' liabilities and short-term loans are correlated through an omitted factor that captures firms' appetite for "short-termism," then our results could be explained by firms' demand for short-term loans as opposed to banks' supply of short-term loans. Banks similar to firms may also have incentives to match the duration of assets and liabilities for reasons similar to these for firms. As a result, a non-random sorting between banks that demand short-term assets (to match their short-term funding) and firms that demand short-term loans (to match the duration of their assets) may be present in the data. If so, we would expect the decrease in loan maturities to be more pronounced for firms that need short-term loans and for banks that rely more on short-term funding, and therefore, want to originate short-term loans to match their short-term liabilities.

To investigate this conjecture, we examine whether the discount on loan maturity driven by banks with higher $WHOLESALE$ or higher $REPO\,FF$ varies with the level of borrowers' asset duration. Asset duration is related to depreciation costs at the industry level.[20] A higher depreciation rates require substantial investments to keep the stocks at a constant level. Industries with high depreciation rates include software, communication equipment, computers, petroleum and natural gas exploration. Higher depreciation rate in a certain industry implies shorter duration of assets. For assets with certain depreciation ($depr$) and for constant productivity ($prgrowth$),[21] the asset duration at the industry level is calculated as $\frac{1+prgrowth}{depr+prgrowth}$. Assuming that firms with shorter duration of assets prefer short-term financing, we would expect a larger decrease in their loan maturities compared to firms with longer asset duration.

We split our sample of borrowers into three groups depending on the distribution of industry asset duration which is unlikely to be affected by a single firm choice of asset duration. The first group includes firms in the first tercile of the asset duration distribution (short duration), the second and the third groups include firms in the second and third terciles respectively. In Table 12 we report the same set of loan maturity regressions as in Table 3 separately for the three classes of asset duration. Columns (1)-(4) and (5)-(8) report results for $WHOLESALE$ and $REPO\,FF$, respectively. Starting with columns (1) to (4), the estimates on the interaction terms between wholesale funding and term loans are negative and significant for all three groups of asset duration classes. However, the sensitivity between loan maturity and our proxies for the maturity of the bank's liabilities is the largest for firms with long asset

[20] Data comes from the Bureau of Economic Analysis (BEA) fixed asset tables. The information can be retrieved from http://www.bea.gov/, Table 3.4ES Current-Cost Depreciation of Private Fixed Assets by Industry. The reported depreciation costs for each industry are based on data on service lives and sales of vintage assets.

[21] The choice of the value of productivity growth does not affect the value of duration. We calculate duration based on 0.03 productivity.

duration that are supposed to issue long-term financing to match assets and liabilities.

Finding much smaller discount on loan maturity for short and medium duration assets (columns 1 and 2) than for long duration asset (column 3) is contrary to the expectation that banks with the shortest maturity funding, as proxied by their use of wholesale funding, $WHOLESALE$, may respond to a firm's demand for short-term loans. On the opposite, firms that are expected to demand longer term loans because of long asset duration experience the strongest maturity cut. Similar results are documented in columns (5) to (8) when using $REPO\,FF$. These findings suggest that firms that prefer long-term loans *ex ante* yet receive shorter maturity loans compared to firms that prefer shorter term loans, implying that our results are not driven by firms' demand for short-term loan.

In columns (4) and (8) we include fixed effects for each bank and asset duration class pair. In this case the identification comes from comparing loan maturities within the same bank and the same asset duration class. The negative significant coefficients on the interaction terms between term loan and $WHOLESALE$ or $REPO\,FF$ confirm that after accounting for potential sorting between banks and firms with particular asset duration, the positive relationship between the maturity of the bank's liabilities and loan maturity remains.

5.2 Is loan maturity shortening related to bond financing?

As noted above, the decline in loan maturity could also be the result of a change in borrowers' funding preferences for bond financing. According to the bond-financing hypothesis, borrowers strategically take short-term loans from banks that rely extensively on short-term funding with the purpose to access the bond market afterwards. Therefore, a firm may first take a short-term loan, capitalize on bank monitoring and access the bond market at better terms. If this is the case, one should observe a surge in short-term loans and a decline in the demand for long-term loans as borrowers switch to the bond market. An alternative implication is that firms may not be strategic in terms of sequencing their access first to the bank and then to the bond market, but rather they may respond to banks shortening of maturities by reaching for long-term bonds.

In terms of pricing implications, because the increase in short-term loans is demand driven in the first case, one would expect a relative increase in the spread of short-term versus long-term loans if bank rely more on short term funding. However, if firms go to the bond market in order to compensate for the shorter bank loans, a relative change in loan rates is not expected. Based on our previous analysis of loan spreads in Section 3.4, we observe that short-term loans become relatively cheaper than long-term loans when banks increase their use of short-term funding, which is somewhat at odds with the explanation that firms' demand for short-term loans have increased. Equally plausible story is that bond financing has become relatively cheaper over time and has made borrowers substitute the long-term bank funding with bond financing. If this explanation drives our results, we should observe a negative relationship between bond and loan spreads, holding all else equal.

In order to trace the interaction between term loans and bond financing, we isolate firm-quarter windows before and after the issuance of a term-loan.[22]. Using pre-/post-loan framework allows us to more cleanly identify the impact of each term loan on the terms of subsequent bonds. In Table 13, column (1), we report estimates of the probability of bond issuance on the lagged sales, leverage, tangibility, market-to-book ratios, profit margin and log of the spread between the triple-B and tripe-A index yields. Looking at column (1) the estimate on the $AFTER\ TL$ variable, which takes the value of one for the period after the term loan and zero for the period before the term loan, has a positive and significant sign indicating that it is more likely a firm to issue a bond after receiving a term loan compared to the pre-loan period. This result is consistent with firms' behaviour to reach for bonds, presumably with longer maturity.

Assuming that the shortening of banks' liabilities is the channel through which banks shorten loan maturities, we include $WHOLESALE$ into the bond issuance models reported in columns (2) to (4).[23] We expect term loans granted by banks that rely more on wholesale funding to be more likely followed by a bond issuance than term loans that are originated by lower wholesale banks. The positive sign on the interaction term between $AFTER\ TL$ and

[22]We focus only on term loans as they are a closer substitute to bonds relative to credit lines

[23]For the purpose of this analysis, we modify $WHOLESALE$ in the following way: all observations post term loan take the value of the average $WHOLESALE$ per firm quarter; $WHOLESALE$ is set to zero in the quarter before the term loan origination.

$WHOLESALE$ confirms that more wholesale funding (i.e., shorter loans) is associated with higher likelihood of bond issuance.

In column (3) we directly address whether the maturity of term loans and bonds are related. We estimate a model in which the dependent variable is the ratio of the average bond maturity for all issues in the period after the term loan origination over the maturity of the term loan.[24] The positive coefficient on $WHOLESALE$ implies that as wholesale funding increases the ratio of bond to term loan maturities increases as well, which is consistent with the explanation that firms try to reach for long term bonds after they have originated term loans with shorter maturity than desired.

In column (4) we focus on the bond spreads. These spreads provide us with yet another possibility to test the bond financing hypothesis. If bond financing becomes relatively more attractive when compared to term loans issuance in the bond market, then we would expect a negative relationship between term loan spreads and bond spreads. In specification (4), we observe that the sign of the estimate on $LAISD_q$ is positive, implying that loan spreads' increase is associated with an increase in bond spreads. A similar conclusion can be derived from the positive sign of $WHOLESALE_q$ suggesting that high wholesale funding banks issue relatively more expensive long-term loans which is reflected into higher bond spreads. In columns (5) to (7) we estimate the same specification as in columns (2) to (4) using $REPOFFq$ measure of wholesale funding. The results yield the same message as in columns (2) to (4).

Summing up, our tests of the bond financing hypothesis show the following: first, firms are more likely to issue bonds after term loan issuance compared to periods before term loan issuance; second, firms that take out loans from banks that rely extensively on short-term funding are more likely to issue bonds after term loan origination than before term loan issuance; third, the ratio of bond maturity to term loan maturity is larger for firms that take loans from banks that rely more on short-term funding; forth, the cost of bonds issued after the term loans is not cheaper than the cost of term loans indicating that firms are unlikely to access the bond market because of cheaper bond financing. Altogether, these findings are

[24]For windows with more than one bond issue, the bond maturity is averaged. If there are no bond issues, the bond maturity is set to zero and hence the ratio of bond to term loan maturities is zero.

consistent with the hypothesis that banks' shortening of loan maturities make borrowers search for long-term bonds rather than with the alternative hypothesis that an improvement in the access conditions in the bond market makes borrowers substitute bank funding with bond financing.

6 Final remarks

Banks have increasingly relied on repo funding and more generally on wholesale funding to finance their activities in the past decade. Thus far the focus of researchers and policy makers has been on the implications of bank funding sources for the stability of financial system. Little is known, however, about the effect of these funding sources on the maturity of bank assets. Yet, several banking theories suggest that the short-term nature of these funding sources is likely to affect banks' lending policies. In this paper, we focus on the effect they may have on loan maturity.

Our results show that banks that rely more on short-term funding tend to reduce the maturity of their loans. This result is present in the maturity of new loans, in the length of time the bank is willing to extend the maturity of existing loans during renegotiations, and in the maturity of banks' portfolio of corporate loans. Our investigation suggests these findings are mostly supply driven. Consistent with the supply story, we find that loans with shorter maturities become relatively cheaper as banks rely more on short-term funding. Further, we find that firms that operate in industries with shorter duration assets (i.e., need more short-term debt) also experience a cut in the maturity of their term loans. This finding confirms that the effect of loan maturity shortening is plausibly attributed to banks instead of borrowers willingness to shorten maturities. In addition, we find that firms try to make up for the shorter maturity term loans by going to the bond market where they manage to access longer term bonds. This substitution of bank funding with bond financing is not driven by a potential decline in the cost of bond financing. We also uncover that banks that rely more on insured deposits or have lower net chargeoffs have smaller sensitivity of loan maturity to wholesale funding than the rest.

Our results show that banks respond to the increased reliance on short-term funding by lowering the maturity of their lending possibly to manage the rollover risk associated with their short-term funding. We find that the loan yield curve becomes steeper as wholesale funding increases, suggesting more expensive long-term loans. Our findings suggest that banks' increasing use of short-term funding gave rise to a new source of financial fragility. Forcing borrowers to come back to banks more often or within shorter periods of time has the effect of exposing borrowers to refinancing risk. Banks on the other hand relying on short-term wholesale funding also become exposed to refinancing risk. This synchronization of banks' refinancing risk with borrowers' refinancing risk has the potential to reinforce each other and lead to a financial crisis.

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Appendix 1: Definition of Variables

ASSET DURATION is Macaulay's duration of assets at the industry level. It is the ratio of one plus constant productivity growth rate over the sum of constant productivity growth rate and depreciation. The sources is the Bureau of Economic Analysis fixed asset table available at `http://www.bea.gov/National/nipaweb/nipawebLegacy/FAweb/AllFATables.asp`

BKSHARE is the loan retained share by the lead banks

BOND SPREAD is credit spreads over the Treasury with the same maturity as that of the bond

CAPITAL BK is the ratio of bank equity over risk-weighted assets

CHARGEOFFS BK is bank net charge off over risk weighted assets

CORP PURPOSE is one if a loan is originated for corporate purpose

CPBKUP is an indicator variable that takes one if the loan is used for commercial paper backup

DEBT MATUR is the ratio of firm long-term debt to total debt

INSURED is the ratio of deposits of less than $100,000 over total assets. For detailed description of the exact items, see `http://www.federalreserve.gov/reportforms/forms/F`

JUMP is a dummy variable that takes one if the growth of *REPO FF* is positive for the period 1998Q3 to 2000Q3 and zero otherwise

EX RET is the one year stock return over the market return

L ASSETS BK is the natural log of bank assets

L AMOUNT is the natural log of loan amount in hundreds of millions of dollars

LEVERAGE is total firm debt over total assets

LIQUIDITY BK is the ration of bank current assets over risk-weighted assets

$LAISD$ is the natural log of the all-in-drawn loan spread over LIBOR (in basis points) at origination

$LMATURITY$ is the natural log of one plus the maturity of the loan in years

$LMATURITY\ EXT$ is the log of the period of extension of renegotiated loans. This variable is used in Tables 4 and 5

$LMATURITY\ LEFT$ is the natural log of the effective maturity of the loan portfolio that is calculated as the average of the maturity left of existing and new loans. It is used in Table 6

$L\,SALES$ is the natural log of the firm's annual sales in hundred millions of US dollars

MAT_b/MAT_l is the natural log of one plus the ratio of the average bond maturity over the average loan maturity in four (or eight quarters) after a term loan is issued.

$M\&A$ is a dummy variable that takes one if the loans is originated for the purpose of merger and acquisitions

$MISSING\ SHARE$ is a dummy variable that takes one if the retained share is missing and zero otherwise

$MKTBOOK$ is the ratio of firm market to book value of the firm

$PR\ BOND$ is the probability of bond issuance four quarter before and four quarters after a term loan issuance with the same maturity as that of the bond

$PROF\ MARGIN$ is the firm ratio of net income over sales

$RECAPITALIZATION$ is an indicator variable that takes one if the loan is used for recapitalization

$CAPEXPENDITURES$ is an indicator variable that takes one if the loan is used for capital expenditures

$REPO\ FF$ is the ratio of quarterly fed funds purchased and securities sold under agreements to repurchase (repos) over assets

$ROA\ BK$ is the bank's net income before taxes over risk weighted assets

$SPREAD$ is the difference between the Moody's indexes on the yields of AAA- and BBB-rated bonds

$STOCK\ VOL$ is the one year stock return volatility using daily returns

$TANGIBLES$ is inventories plus plant, property, and equipment over total assets

$TERM\ LOAN$ is equal to one if a loan is a term loan

$WORKCAPITAL$ is one if the loan is for working capital

$WHOLESALE$ is the ratio of quarterly fed funds purchased and securities sold under agreements to repurchase (repos), brokered deposits, commercial paper, mortgage indebtedness and obligations under capitalized leases over assets

Figure 1: KERNEL DENSITIES OF THE RATIO OF LOAN MATURITY OVER MEAN MATURITY FOR HIGH AND LOW WHOLESALE FUNDING (HIGHER/LOWER THAN THE MEDIAN WHOLESALE)

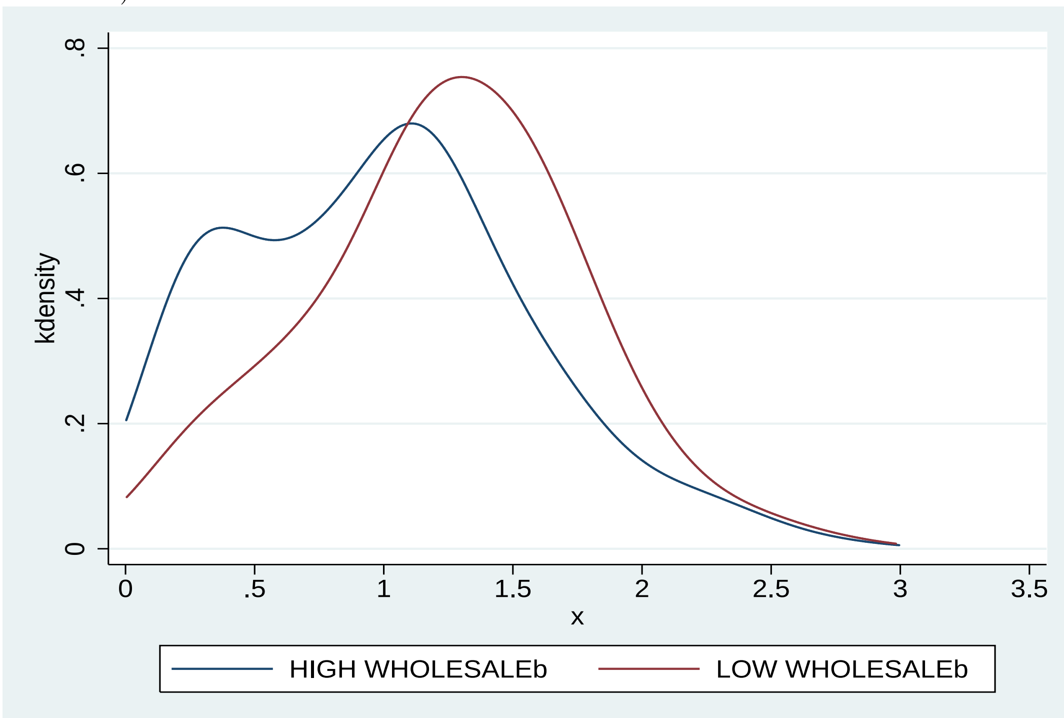


Figure 2: KERNEL DENSITIES OF THE RATIO OF EXTENSIONS OVER MEAN EXTENSIONS FOR HIGH AND LOW WHOLESALE FUNDING (HIGHER/LOWER THAN THE MEDIAN WHOLESALE)

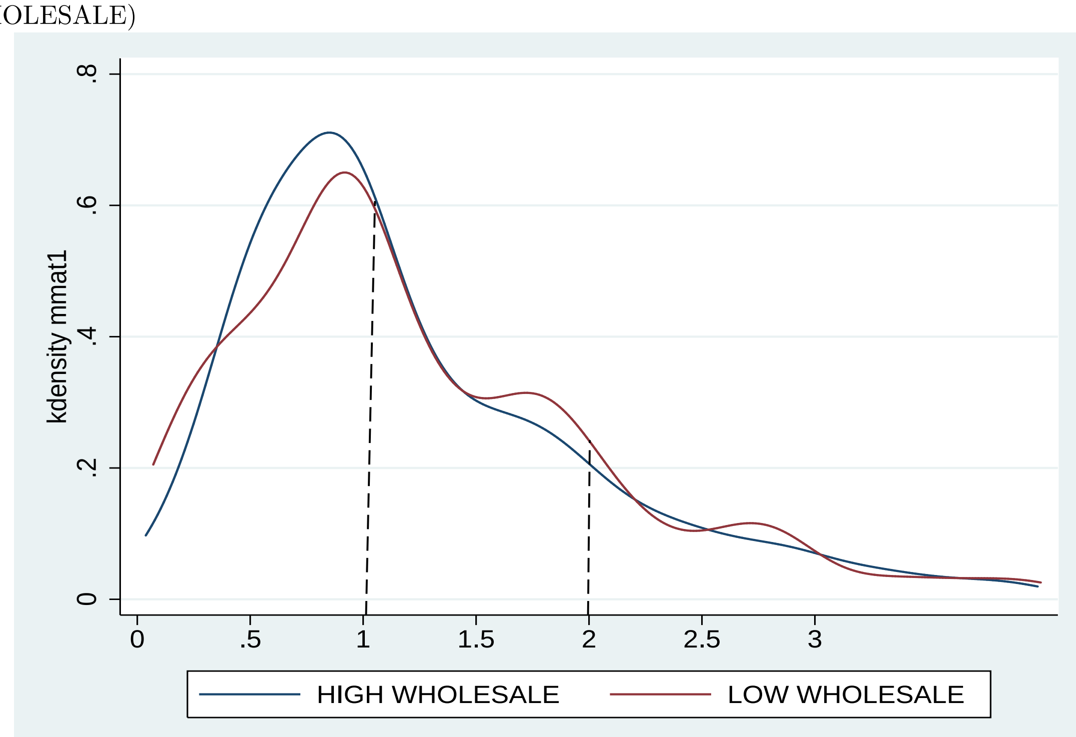
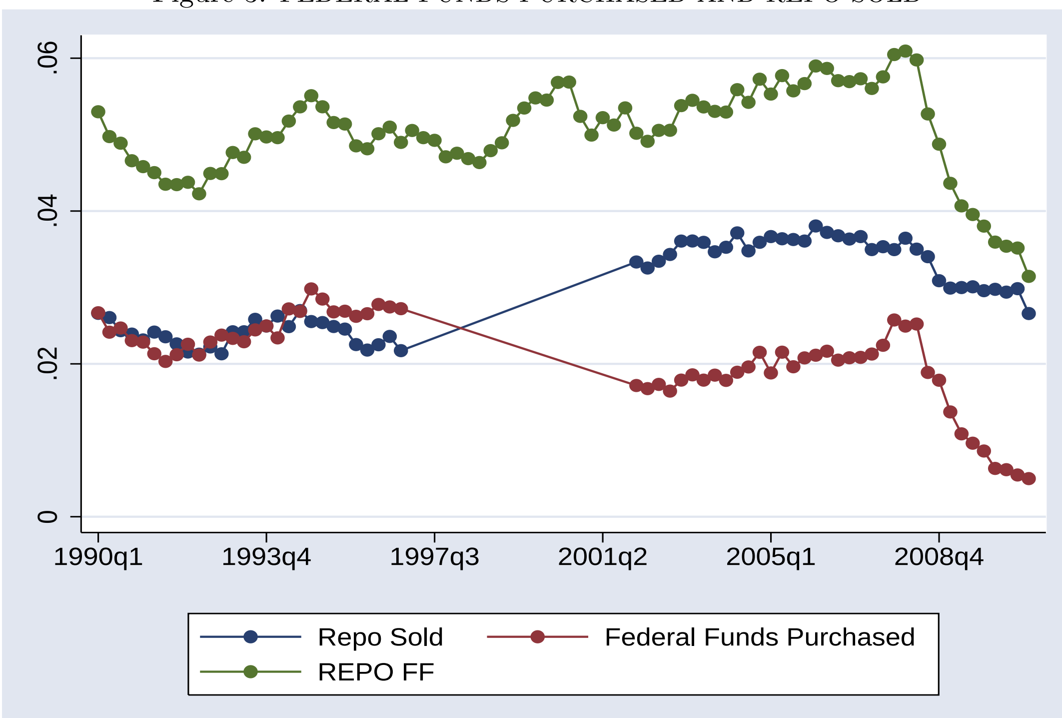


Figure 3: FEDERAL FUNDS PURCHASED AND REPO SOLD



Note: Repo Sold is the ratio of securities sold under agreement to repurchase over assets at the quarterly level. Federal Funds Purchased is the ratio of federal funds purchased over assets. REPO FF is the ratio of the sum of Repo Sold and Federal Funds Purchased over total assets. From 1997Q1 to 2001Q4, the series for Repo Sold and Federal Funds Purchased are not available separately.

Table 1: **DESCRIPTIVE STATISTICS**All variables are defined in Appendix 1.

	MEAN	ST.DEV	25th	MEDIAN	75th
			FIRM CONTROLS		
L SALES	2.242	1.556	0.959	2.012	3.297
LEVERAGE	0.350	0.249	0.173	0.321	0.481
TANGIBLES	0.709	0.367	0.433	0.693	0.959
MKTBOOK	1.714	0.987	1.118	1.401	1.926
PROF MARGIN	-0.014	0.264	-0.007	0.032	0.071
EX RET	0.001	0.001	-0.001	0.000	0.002
STOCK VOL	0.033	0.021	0.019	0.028	0.041
DEBT MATUR	6.157	2.921	4.098	4.609	8.693
BOND MATURITY	11.815	8.791	6.969	9.893	12.684
PR BOND	0.042	0.200	0.000	0.000	0.000
BOND SPREAD	2.675	2.233	0.722	2.398	4.155
MAT_b/MAT_l	0.201	0.490	0.000	0.000	0.951
			LOAN CONTROLS		
L AMOUNT (mil)	539.000	992.000	50.000	195.000	528.000
CORP PURPOSE	0.323	0.468	0.000	0.000	1.000
M&A	0.105	0.306	0.000	0.000	0.000
RECAPITALISATION	0.021	0.141	0.000	0.000	0.000
CPBKUP	0.051	0.22	0.000	0.000	0.000
WORK CAPITAL	0.158	0.364	0.000	0.000	0.000
TERM LOANS	0.276	0.448	0.000	0.000	1.000
LOAN MATURITY (YRS)	4.033	2.464	2.002	4.009	5.005
AISD	216.452	143.14	100	200	200
BKSHARE (%)	44.535	36.762	8.143	28.000	100
			BANK CONTROLS		
CHARGEOFFS BK	0.001	0.001	0.001	0.001	0.001
CAPITAL BK	0.075	0.015	0.065	0.076	0.085
L ASSETS BK	19.090	1.382	18.213	19.203	20.261
LIQUIDITY BK	0.056	0.024	0.001	0.001	0.001
ROA BK	0.001	0.001	0.001	0.001	0.002
WHOLESALE	0.240	0.096	0.175	0.228	0.296
REPO FF	0.102	0.060	0.046	0.102	0.141

Table 2: **MATURITY AND WHOLESALE FUNDING: LOAN LEVEL ANALYSIS** The dependent variable is the log of loan maturity at the loan level (LMATURITY). All variables are defined in Appendix 1. All specifications include quarter, year and bank fixed effects. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)	(5)	(6)
TERM LOAN		0.464***	0.510***		0.409***	0.438***
		(0.037)	(0.033)		(0.024)	(0.022)
WHOLESALE	0.016	0.089	0.098			
	(0.069)	(0.081)	(0.076)			
WHOLESALE×TERM LOAN		-0.321***	-0.440***			
		(0.108)	(0.108)			
REPO FF				0.054	0.099	0.067
				(0.095)	(0.109)	(0.101)
REPO FF×TERM LOAN					-0.262*	-0.378***
					(0.143)	(0.136)
L ASSETS BK	-0.001	-0.003	-0.002	-0.002	-0.003	-0.001
	(0.005)	(0.005)	(0.005)	(0.004)	(0.004)	(0.004)
LIQUIDITY BK	-0.208	-0.182	-0.212	-0.126	-0.091	-0.093
	(0.173)	(0.153)	(0.147)	(0.172)	(0.164)	(0.165)
CAPITAL BK	-0.734	-0.657	-0.581	-0.428	-0.447	-0.482
	(0.523)	(0.521)	(0.485)	(0.462)	(0.447)	(0.427)
CHARGEOFFS BK	-6.358	-2.067	-3.929	-8.743	-5.729	-8.221
	(5.530)	(5.604)	(5.863)	(6.913)	(7.646)	(7.961)
ROA BK	-2.299	-3.096	-1.889	-5.923	-5.930	-4.433
	(11.549)	(10.331)	(10.403)	(9.458)	(8.611)	(9.037)
LSALES	-0.099***	-0.083***	-0.145***	-0.095***	-0.082***	-0.144***
	(0.010)	(0.010)	(0.007)	(0.010)	(0.010)	(0.007)
LEVERAGE	0.350***	0.259***	0.140***	0.327***	0.259***	0.137***
	(0.048)	(0.038)	(0.036)	(0.048)	(0.037)	(0.035)
DEBT MATUR	0.290***	0.262***	0.174***	0.286***	0.266***	0.178***
	(0.022)	(0.022)	(0.019)	(0.021)	(0.022)	(0.019)
PROFMARGIN	-0.015***	-0.014***	-0.011***	-0.014***	-0.015***	-0.011***
	(0.003)	(0.003)	(0.004)	(0.003)	(0.003)	(0.004)
TANGIBLES	-0.069***	-0.048***	-0.018	-0.064***	-0.045***	-0.017
	(0.018)	(0.016)	(0.014)	(0.021)	(0.017)	(0.016)
MKTOBOOK	-0.032***	-0.025***	-0.023***	-0.032***	-0.026***	-0.023***
	(0.005)	(0.005)	(0.005)	(0.006)	(0.005)	(0.005)
EX RET	22.967***	23.116***	22.486***	22.357***	22.246***	21.897***
	(2.215)	(2.033)	(1.760)	(2.625)	(2.330)	(2.109)
STOCK VOL	-3.929***	-4.502***	-3.025***	-3.717***	-4.552***	-3.088***
	(0.622)	(0.530)	(0.384)	(0.597)	(0.523)	(0.379)
WORKCAPITAL			-0.028			-0.034*
			(0.018)			(0.017)
M&A			-0.079***			-0.078***
			(0.021)			(0.020)
RECAPITALIZATION			0.148***			0.140***
			(0.055)			(0.054)
CORP PURPOSE			-0.063***			-0.065***
			(0.015)			(0.014)
CPBKUP			-0.489***			-0.503***
			(0.034)			(0.032)
L AMOUNT			0.110***			0.108***
			(0.007)			(0.007)
MISSING SHARE×$BKSHARE$			0.003***			0.003***
			(0.000)			(0.000)
BKSHARE			-0.003***			-0.003***
			(0.000)			(0.000)
SLOPE YC	-0.016	-0.017	-0.002	-0.015	-0.015	-0.001
	(0.016)	(0.013)	(0.013)	(0.015)	(0.013)	(0.013)
SPREAD	0.103***	0.103***	0.089***	0.106***	0.103***	0.091***
	(0.016)	(0.016)	(0.015)	(0.014)	(0.014)	(0.015)
Observations	20,730	20,730	20,730	20,730	20,730	20,730
R^2	0.139	0.190	0.258	0.135	0.187	0.256

Table 3: **MATURITY AND WHOLESALE FUNDING: FULL INTERACTION**
The dependent variable is the log of loan maturity (LMATURITY). All specifications account for a complete interaction between each variable and the TERM LOAN variable (unreported). Each regression includes firm, bank, and macro controls. Each regression accounts for year, quarter and bank-fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)
WHOLESALE	0.130	0.124		
	(0.084)	(0.082)		
WHOLESALE×TERM LOAN	-0.509***	-0.535***		
	(0.185)	(0.158)		
REPO FF			0.135	0.097
			(0.105)	(0.092)
REPO FF×TERM LOAN			-0.458*	-0.547***
			(0.246)	(0.203)
Loan Controls	No	Yes	No	Yes
R^2	0.174	0.249	0.171	0.247
Observations	20,730	20,730	20,730	20,730

Table 4: **LOAN EXTENSIONS**

The dependent variable is log of the maturity of loan extensions (LMATURITY EXT). MATURITY LEFT is the number of years left till the loan matures prior to renegotiations. All other variables are reported in Appendix 1. Each regression accounts for year, quarter and bank-fixed effects. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)	(5)	(6)
TERM LOAN		0.122**	0.128***		0.081**	0.083**
		(0.049)	(0.049)		(0.038)	(0.038)
WHOLESALE	-0.082	-0.030	-0.020			
	(0.200)	(0.203)	(0.195)			
WHOLESALE×TERM LOAN		-0.606**	-0.662***			
		(0.239)	(0.240)			
REPO FF				-0.285	-0.240	-0.210
				(0.258)	(0.262)	(0.269)
REPO FF×TERM LOAN					-0.572**	-0.521**
					(0.243)	(0.251)
L ASSETS BK	0.001	0.001	0.003	0.006	0.006	0.008
	(0.032)	(0.031)	(0.032)	(0.032)	(0.032)	(0.032)
LIQUIDITY BK	0.025	0.026	0.038	0.023	0.024	0.036
	(0.206)	(0.208)	(0.199)	(0.195)	(0.197)	(0.191)
CAPITAL BK	-2.439**	-2.482**	-2.751**	-2.719**	-2.752**	-2.991**
	(1.169)	(1.169)	(1.168)	(1.180)	(1.178)	(1.174)
CHARGEOFFS BK	8.003	7.981	6.268	5.128	5.218	3.812
	(15.692)	(15.696)	(15.581)	(16.284)	(16.312)	(16.297)
ROA BK	10.308	10.247	11.077*	9.873	9.872	10.736*
	(6.982)	(6.995)	(6.665)	(6.586)	(6.588)	(6.310)
LSALES	0.004	0.005	0.006	0.004	0.005	0.006
	(0.004)	(0.004)	(0.005)	(0.004)	(0.004)	(0.005)
LEVERAGE	0.075*	0.073*	0.072*	0.074*	0.072*	0.071*
	(0.043)	(0.043)	(0.040)	(0.043)	(0.043)	(0.040)
DEBT MATUR	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**	-0.000**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
PROFMARGIN	0.029	0.028	0.040	0.027	0.027	0.040
	(0.060)	(0.060)	(0.061)	(0.059)	(0.060)	(0.061)
TANGIBLES	-0.027**	-0.027**	-0.023*	-0.027**	-0.026**	-0.023*
	(0.013)	(0.013)	(0.012)	(0.013)	(0.013)	(0.012)
MKTOBOOK	-0.006	-0.005	-0.004	-0.006	-0.006	-0.005
	(0.008)	(0.008)	(0.007)	(0.008)	(0.008)	(0.007)
WORKCAPITAL			0.040**			0.039**
			(0.018)			(0.018)
M&A			0.062***			0.063***
			(0.023)			(0.023)
RECAPITALIZATION			0.025			0.022
			(0.042)			(0.041)
CAPEXPENDITURE			-0.045			-0.044
			(0.053)			(0.053)
CPBKUP			0.055**			0.055**
			(0.024)			(0.024)
LAMOUNT			-0.009			-0.009
			(0.010)			(0.010)
MATURITY LEFT			-0.004**			-0.004**
			(0.002)			(0.002)
BKSHARE			-0.061			-0.060
			(0.050)			(0.050)
SLOPE YC	-0.077	-0.077	-0.078	-0.074	-0.075	0.126
	(0.050)	(0.050)	(0.050)	(0.051)	(0.051)	(0.114)
SPREAD	0.087	0.090	0.092	0.077	0.079	0.083
	(0.055)	(0.055)	(0.056)	(0.054)	(0.054)	(0.055)
Observations	5944	5944	5944	5944	5944	5944
R-squared	0.068	0.069	0.072	0.068	0.068	0.069

Table 5: **LOAN EXTENSIONS: FULL INTERACTION**
The dependent variable is the log of the maturity of loan extensions (LMATURITY EXT). Each regression includes firm, bank, and macro controls. Each regression accounts for year, quarter and bank-fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. ***denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)
WHOLESALE	0.000	0.010		
	(0.205)	(0.201)		
WHOLESALE×TERM LOAN	-0.789***	-0.763***		
	(0.249)	(0.255)		
REPO FF			-0.196	-0.174
			(0.270)	(0.280)
REPO FF×TERM LOAN			-0.620*	-0.625**
			(0.327)	(0.292)
Observations	5944	5944	5944	5944
Loan Controls	No	Yes	No	Yes
R^2	0.073	0.079	0.073	0.079

Table 6: **EFFECTIVE MATURITY AND WHOLESALE FUNDING: BANK-YEAR ANALYSIS**

The dependent variable is log of the effective maturity at the bank-year level (LMATURITY LEFT). TL includes the effective maturity of the term loan portfolio. CL includes the effective maturity of the credit lines portfolio. The bank controls are at the yearly level. All specifications include year and bank fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3) TL	(4) CL	(5) TL	(6) CL
WHOLESALEy	-0.366*		-0.580*	-0.258		
	(0.216)		(0.331)	(0.422)		
REPO FFy		-0.547*			-0.639**	-0.439
		(0.302)			(0.260)	(0.413)
LASSETSy BK	0.012	0.016	0.038	0.067	0.031	0.071
	(0.042)	(0.042)	(0.050)	(0.053)	(0.038)	(0.052)
LIQUIDITYy BK	-1.129*	-1.159*	-1.671*	-1.162*	-1.048*	-1.264*
	(0.618)	(0.630)	(0.985)	(0.690)	(0.535)	(0.672)
CAPITALy BK	1.043	1.150	0.565	2.020	0.119	1.945
	(0.969)	(0.985)	(1.585)	(1.496)	(0.852)	(1.489)
CHARGEOFFSy BK	21.006*	19.987*	13.118	5.764	16.306	4.157
	(11.757)	(11.661)	(17.143)	(15.202)	(10.348)	(15.146)
ROAy BK	-9.197*	-8.540	5.575	-9.624	-3.486	-9.116
	(5.508)	(5.336)	(6.844)	(7.228)	(4.303)	(7.408)
SLOPEy YC	-0.076***	-0.078***	-0.056	-0.093***	-0.055***	-0.097***
	(0.023)	(0.023)	(0.047)	(0.030)	(0.018)	(0.029)
SPREADy	0.201***	0.219***	0.197**	0.167***	0.219***	0.200***
	(0.050)	(0.054)	(0.081)	(0.031)	(0.054)	(0.040)
Observations	1,197	1,197	1,197	1,197	1,197	1,197
R^2	0.157	0.159	0.124	0.090	0.166	0.093

Table 7: **LOAN SPREADS**

The dependent variable is the log of all-in-drawn spread (LAISD). TL includes the sample of term loans; CL includes the sample of credit lines. Each regression includes year, quarter and bank fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	TL (3)	CL (4)	TL (5)	CL (6)
TERM LOAN	0.278***	0.273***				
	(0.026)	(0.026)				
WHOLESALE	-0.258**	-0.250**	-0.290	-0.193		
	(0.117)	(0.126)	(0.256)	(0.135)		
WHOLESALE×$LMATURITY$	0.207**		0.303*	0.113		
	(0.102)		(0.180)	(0.121)		
REPO FF					-0.789**	-0.119
					(0.338)	(0.163)
REPO FF×$LMATURITY$		0.182*			0.426*	0.124
		(0.097)			(0.220)	(0.124)
LMATURITY	-0.019	0.010	0.021	-0.018	0.041	0.008
	(0.035)	(0.023)	(0.065)	(0.039)	(0.044)	(0.024)
L ASSETS BK	-0.007	-0.003	-0.018***	-0.002	-0.002	-0.003
	(0.005)	(0.004)	(0.007)	(0.006)	(0.008)	(0.005)
LIQUIDITY BK	-0.185	-0.117	-0.122	-0.374	-0.108	-0.172
	(0.242)	(0.203)	(0.370)	(0.326)	(0.359)	(0.271)
CAPITAL BK	0.147	0.075	0.721	-0.006	-0.096	0.140
	(0.450)	(0.354)	(0.780)	(0.570)	(0.620)	(0.432)
CHARGEOFFS BK	9.250	8.946	37.070***	2.864	18.878	7.920
	(7.331)	(6.268)	(10.527)	(7.230)	(12.639)	(6.227)
ROA BK	-5.496	-0.122	-3.250	-8.253	1.210	-0.121
	(7.546)	(6.904)	(14.065)	(10.930)	(11.076)	(7.682)
LSALES	-0.161***	-0.162***	-0.082***	-0.161***	-0.088***	-0.161***
	(0.012)	(0.012)	(0.017)	(0.013)	(0.016)	(0.013)
LEVERAGE	0.594***	0.586***	0.322***	0.650***	0.330***	0.646***
	(0.042)	(0.044)	(0.053)	(0.054)	(0.049)	(0.052)
DEBT MATUR	0.115***	0.110***	0.056	0.117***	0.043	0.110***
	(0.030)	(0.030)	(0.041)	(0.025)	(0.040)	(0.027)
PROFMARGIN	-0.007**	-0.007**	-0.016***	-0.006**	-0.015***	-0.006**
	(0.003)	(0.003)	(0.004)	(0.003)	(0.004)	(0.003)
TANGIBLES	-0.112***	-0.114***	-0.015	-0.133***	-0.016	-0.138***
	(0.025)	(0.026)	(0.035)	(0.024)	(0.037)	(0.024)
MKTOBOOK	-0.119***	-0.120***	-0.073***	-0.129***	-0.075***	-0.127***
	(0.012)	(0.012)	(0.012)	(0.012)	(0.013)	(0.011)
EX RET	-18.403***	-17.450***	-9.554***	-21.785***	-7.064**	-20.067***
	(3.083)	(3.235)	(3.180)	(2.889)	(3.317)	(3.419)
STOCK VOL	10.815***	10.676***	7.704***	12.035***	7.282***	11.770***
	(1.009)	(1.019)	(0.844)	(1.005)	(0.898)	(1.100)
WORKCAPITAL	-0.128***	-0.126***	-0.123***	-0.129***	-0.112***	-0.122***
	(0.018)	(0.017)	(0.025)	(0.016)	(0.025)	(0.016)
M&A	0.121***	0.123***	0.007	0.162***	0.013	0.163***
	(0.019)	(0.018)	(0.018)	(0.020)	(0.017)	(0.016)
RECAPITALIZATION	0.119***	0.126***	0.136**	0.071	0.146***	0.092
	(0.039)	(0.040)	(0.055)	(0.066)	(0.052)	(0.062)
CORP PURPOSE	-0.161***	-0.159***	-0.136***	-0.160***	-0.127***	-0.153***
	(0.026)	(0.025)	(0.025)	(0.026)	(0.022)	(0.024)
CPBKUP	-0.614***	-0.619***	-0.108	-0.575***	-0.102	-0.563***
	(0.023)	(0.023)	(0.089)	(0.020)	(0.093)	(0.020)
LAMOUNT	-0.066***	-0.066***	-0.014	-0.101***	-0.013	-0.100***
	(0.007)	(0.006)	(0.009)	(0.009)	(0.009)	(0.009)
MISSING SHARE×$BKSHARE$	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
BKSHARE	0.002***	0.002***	0.002***	0.002***	0.002***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
SLOPE YC	0.069***	0.064***	0.054***	0.070***	0.074***	0.067***
	(0.010)	(0.010)	(0.010)	(0.011)	(0.0210)	(0.012)
BOND SPREAD	0.028	0.016	-0.014	0.032	0.023	0.012
	(0.084)	(0.077)	(0.162)	(0.059)	(0.138)	(0.067)
Observations	19,823	19,823	4,364	15,459	4,364	15,459
R^2	0.544	0.542	0.295	0.549	0.287	0.545

Table 8: **MATURITY AND WHOLESALE FUNDING FOR BANKS WITH HIGH/LOW INSURED DEPOSITS**

The dependent variable is the log of loan maturity (LMATURITY). L/H INSURED takes one if the ratio of insured deposits over assets is lower/higher than the sample median. Loan, firm, bank and macro controls are accounted for in each specification. Each regression includes year, quarter and bank fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)
	L INSURED	H INSURED	L INSURED	H INSURED
TERM LOAN	0.626***	0.518***	0.503***	0.444***
	(0.052)	(0.027)	(0.052)	(0.029)
WHOLESALE	0.403***	0.027		
	(0.141)	(0.062)		
WHOLESALE×TERM LOAN	-0.814***	-0.461***		
	(0.197)	(0.090)		
REPO FF			0.398*	0.066
			(0.227)	(0.194)
REPO FF×TERM LOAN			-0.709*	-0.434**
			(0.415)	(0.211)
Observations	7,347	7,399	7,477	8,188
R^2	0.259	0.293	0.255	0.295

Table 9: **MATURITY AND WHOLESALE FUNDING FOR BANKS WITH HIGN/LOW NET CHARGEOFFS**

The dependent variable is the log of loan maturity (LMATURITY). L/H CHARGEOFFS takes one if the ratio of insured deposits over assets is lower/higher than the sample median. Loan, firm, bank and macro controls are accounted for in each specification. Each regression includes year, quarter and bank fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)
	L CHAR	H CHAR	L CHAR	H CHAR
TERM LOAN	0.483***	0.574***	0.414***	0.487***
	(0.047)	(0.050)	(0.030)	(0.040)
WHOLESALE	0.122	0.088	-0.032	0.367
	(0.087)	(0.133)	(0.143)	(0.234)
WHOLESALE×TERM LOAN	-0.355**	-0.667***	-0.222*	-0.816*
	(0.145)	(0.194)	(0.124)	(0.433)
REPO FF				
REPO FF×TERM LOAN				
Observations	15,547	5,183	15,547	5,183
R^2	0.261	0.235	0.261	0.235

Table 10: **JUMP in REPO FF**

The dependent variable is the log of loan maturity. $JUMP$ is a dummy variable that takes one if a banks has a positive growth of REPO FF from 1998Q3 to 2000Q3. Loan, firm, bank and macro controls are accounted for in each specification. Each regression includes year, quarter and bank fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)
TERM LOAN	0.465***	0.421***
	(0.047)	(0.028)
WHOLESALE	0.035	-0.025
	(0.086)	(0.086)
WHOLESALE×TERM LOAN	-0.261*	
	(0.148)	
TERM LOAN×$JUMP$	0.120*	0.049
	(0.067)	(0.045)
WHOLESALEb×$JUMP$	0.172	
	(0.133)	
WHOLESALEb×$JUMP$×TERM LOAN	-0.489**	
	(0.228)	
REPO FF		
REPO FF×$TERMLOAN$		-0.228
		(0.159)
REPO FF×$JUMP$		0.246
		(0.177)
REPO FF×$JUMP$×TERM LOAN		-0.429*
		(0.247)
Observations	20,730	20,730
R-squared	0.258	0.257

Table 11: **TEST OF BANK MONITORING**

The dependent variable is the log of loan maturity (LMATURITY). SMALL/LARGE BKSHARE is lower/higher than the median share (25%) retained by the lead arranger. MISSING BKSHARE includes loans with missing information on retained shares. Loan, firm, bank and macro controls are accounted for in each specification. Each regression includes year, quarter and bank fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. ***denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1)	(2)	(3)	(4)	(5)	(6)
	SMALL BKSHARE	LARGE BKSHARE	MISSING BKSHARE	SMALL BKSHARE	LARGE BKSHARE	MISSING BKSHARE
TERM LOAN	0.458***	0.661***	0.424***	0.397***	0.608***	0.396***
	(0.058)	(0.050)	(0.038)	(0.054)	(0.045)	(0.027)
WHOLESALE	0.028	0.049	0.079			
	(0.116)	(0.132)	(0.119)			
WHOLESALE×TERM LOAN	-0.512***	-0.500***	-0.104			
	(0.141)	(0.174)	(0.132)			
REPO FF				0.060	-0.000	-0.020
				(0.255)	(0.238)	(0.175)
REPO FF×TERM LOAN				-0.708***	-0.618	-0.008
				(0.263)	(0.374)	(0.208)
Observations	5,823	4,417	10,490	6,187	4,825	9,718
R^2	0.325	0.197	0.249	0.325	0.191	0.251

Table 12: **MATURITY AND WHOLESALE FUNDING FOR FIRMS WITH DIFFERENT ASSET DURATION LEVELS**

The dependent variable is LMATURITY. Short, Median and Long stand for the first, the second and the third terciles of the distribution of asset duration (ASSET DURATION). Loan, firm, bank and macro controls are accounted for in each specification. Each regression includes year, quarter and bank fixed effects. All variables are defined in Appendix 1. Standard errors are clustered at the bank level. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	SHORT	MEDIUM	LONG	SHORT	MEDIUM	LONG
	(1)	(2)	(3)	(4)	(5)	(6)
TERM LOAN	0.551***	0.455***	0.573***	0.447***	0.417***	0.470***
	(0.048)	(0.042)	(0.059)	(0.034)	(0.028)	(0.038)
WHOLESALE	0.147	0.042	0.335***			
	(0.131)	(0.105)	(0.127)			
WHOLESALE×TERM LOAN	-0.329*	-0.363***	-0.719***			
	(0.189)	(0.129)	(0.208)			
REPO FF				-0.158	0.131	0.078
				(0.282)	(0.140)	(0.214)
REPO FF×TERM LOAN				0.232	-0.364**	-0.716**
				(0.226)	(0.180)	(0.355)
Observations	4,589	9,066	4,383	4,987	10,239	4,730
R^2	0.284	0.252	0.281	0.279	0.253	0.272

Table 13: **TESTS OF BOND FINANCING HYPOTHESES**

The sample includes four quarters before and after term loan issuance. The dependent variable in columns (1) to (3) is the probability of bond issuance. In columns (4) and (5) the dependent variable is Bond Spread defined as the log of one plus bond spread (over Treasuries). Bond spread is zero if no bond issuance occurs in a firm-quarter. In columns (6) and (7) $\frac{Mat_b}{Mat_l}$, is the log of one plus the ratio of the average bond maturity over the maturity of the term loan in the period after term loan issuance. AFTER TL is an indicator variable that takes one for the quarters after the issuance of a term loan, and zero for quarters before the issuance of a term loan. $WHOLESALEq$ takes the value of wholesale funding in the quarter of loan origination and over the entire period afterwards, and zero for the period before loan origination. $LAISDq$ is the log of quarterly averaged all-in-drawn spread; it is set to zero for the periods before term loan issuance. All other variables are defined in Appendix 1. Year and quarter fixed effects are included in all regressions. Columns (6) and (7) have firm fixed effects. *** denotes 1% significant level, ** denotes 5% significant level, and * denotes 10% significant level.

	(1) Pr Bond	(2) Pr Bond	(3) Pr Bond	(4) Bond Spread	(5) Bond Spread	(6) $\frac{Mat_b}{Mat_l}$	(7) $\frac{Mat_b}{Mat_l}$
AFTER TL	0.338***	0.245***	0.259***				
	(0.030)	(0.040)	(0.032)				
AFTER TL×WHOLESALEbq		0.614***					
		(0.172)					
AFTER TL×REPO FFq			2.486***				
			(0.268)				
LAISDq				0.062***	0.062***		
				(0.010)	(0.010)		
WHOLESALEbq				0.205***		0.203***	
				(0.051)		(0.064)	
REPO FFq					0.287***		0.316***
					(0.080)		(0.090)
LEVERAGE	0.473***	0.470***	0.496***	-0.048**	-0.047**	0.117***	0.117***
	(0.052)	(0.048)	(0.048)	(0.022)	(0.022)	(0.019)	(0.019)
DEBT MATUR	0.502***	0.501***	0.551***	-0.011	-0.011	0.060***	0.061***
	(0.065)	(0.070)	(0.071)	(0.016)	(0.016)	(0.019)	(0.019)
LSALES	0.257***	0.256***	0.258***	0.015**	0.015**	0.067***	0.067***
	(0.009)	(0.009)	(0.009)	(0.007)	(0.007)	(0.004)	(0.004)
PROF MARGIN	-0.199***	-0.198***	-0.193***	-0.004	-0.004	-0.055***	-0.055***
	(0.030)	(0.032)	(0.032)	(0.010)	(0.010)	(0.011)	(0.011)
TANGIBLES	0.082	0.088	0.072	0.056	0.054	0.018	0.018
	(0.061)	(0.062)	(0.063)	(0.041)	(0.041)	(0.022)	(0.022)
MKTBOOK	0.003	0.004	0.002	-0.003	-0.003	-0.008	-0.008
	(0.018)	(0.018)	(0.018)	(0.006)	(0.006)	(0.005)	(0.005)
SLOPE YC	0.015	0.021	0.007	-0.009	-0.009	0.034	0.033
	(0.051)	(0.051)	(0.051)	(0.012)	(0.012)	(0.021)	(0.021)
SPREAD	-0.110***	-0.110***	-0.110***	-0.018**	-0.018**	-0.017	-0.017
	(0.035)	(0.034)	(0.034)	(0.008)	(0.008)	(0.013)	(0.013)
Observations	26,890	26,864	26,411	15,447	15,447	6,327	6,329
R^2	0.145	0.146	0.152	0.015	0.015	0.118	0.118