Bank Loans for Private and Public Firms in a Credit Crunch

by Jason Allen and Teodora Paligorova

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Acknowledgements

Abstract

Banks reliance on short-term funding has increased over time. While an effective source of financing in good times, the 2007 financial crisis has exposed the vulnerability of banks and ultimately firms to such a liability structure. The authors show that banks that relied most on wholesale funding were the ones to contract its lending the most during the crisis. Their results suggest that banks propagate liquidity shocks by reducing credit only to a certain type of borrower. Importantly, in the financial crisis banks passed the liquidity shock only to public firms. Furthermore, long-term relationships between firms and banks played an important role during the crisis. Public firms with weak banking relationships pre-crisis experienced a greater credit crunch than other public borrowers.

JEL classification: G01, G20
Bank classification: Financial institutions

Résumé

Le recours des banques au financement de court terme s'est accru au fil des ans. Bien que cette pratique soit efficace lorsque tout va bien, la crise financière de 2007 a mis au jour la vulnérabilité des banques et donc celle des entreprises à une telle structure de passif. Les auteurs montrent que les banques les plus tributaires du financement de gros sont celles qui ont le plus réduit leurs prêts durant la crise. D'après leur analyse, les banques contribuent à la propagation des chocs de liquidité en diminuant uniquement les crédits qu'elles accordent à un certain type d'emprunteur. Lors de la dernière crise financière en particulier, elles n'ont répercuté le choc de liquidité que sur les entreprises cotées en bourse. Les auteurs constatent que les relations à long terme que les firmes nouent avec les banques ont également beaucoup joué : les entreprises cotées qui, avant la crise, n'entretenaient pas de relations suivies de ce type ont davantage souffert du resserrement du crédit que les autres sociétés ouvertes.

Classification JEL : G01, G20
Classification de la Banque : Institutions financières

1 Introduction

The recent financial crisis has intensified the debate on bank lending behavior. Continued write-downs in 2008 by U.S. banks raised the question of whether impaired banks would be able to continue lending. A banking crisis may affect the real economy by reducing firms' credit and hence investment and consumption. While the theoretical literature suggests a framework where banks' financial conditions can affect the performance of their borrowers (e.g., Bernanke and Blinder (1988)), empirical studies face a challenge in tracing the channels through which shocks are transmitted. Separating out demand and supply effects is difficult because a common economic shock may drive the performance of both banks and firms. For example, a contraction of bank lending may be due to their unwillingness to lend, or to lower demand for credit. In this paper, we use matched bank-firm panel data to isolate what appears to be a shift in loan supply across banks and a shift in loan demand across firms. We investigate loan issuance of Canadian banks who faced an exogenous adverse shock in short-term wholesale funding markets. The results suggest that a one standard deviation increase in wholesale funding prior to the 2007-2009 crisis leads to a 11% reduction in firm credit during the crisis.

As a neighboring country and the largest U.S. trading partner, Canada entered the recession with critically important advantages (Ratnovski and Huang (2009)). Canadian financial institutions were in good health, corporate balance sheets were robust and household debt was not as large as in some other advanced countries. Furthermore, the Canadian banking system has historically been less reliant on wholesale funding than the American system, suggesting that it should have been less vulnerable to a liquidity shock in the short-term wholesale funding market. Notably, Canadian banks emerged as "world class lenders" post-crisis.[1]

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[1]The Financial Times (14 September, 2010) reports that "the five biggest banks—Royal Bank of Canada, Toronto-Dominion, Bank of Nova Scotia, Canadian Imperial Bank of Commerce and Bank of

Therefore, Canadian banks are a well-suited laboratory to analyze whether banks that relied more on wholesale funding prior to the crisis changed their lending behaviour during the crisis. If they curtailed lending during the crisis, it would not have been because of write-downs but because of a US-transmitted liquidity shock. We first analyze the dynamics of wholesale funding of Canadian banks pre- and post-crisis. Our hypothesis is that when the wholesale market dried up, banks that had initially relied most on wholesale funding curtail lending most aggressively during the crisis. This hypothesis is consistent with the bank lending view (Bernanke and Gertler (1995)). Banks cannot frictionlessly access alternative sources of funding in the short-run, therefore banks with greater exposure to wholesale sources had to cut lending more aggressively in the crisis.

From a firms' perspective if there is a credit crunch banks will choose, at the margin, to cut lending to more risky firms (Stiglitz and Weiss (1981)). Assuming that private firms are subject to greater asymmetric information problems than public firms, we should observe larger credit cuts to private firms than to public firms, holding all else equal (Gertler and Girlchrist (1994), Kashyap et al. (2002)). On the other hand, having access to alternative financing sources, public firms may switch to alternative financing during a crisis (Hale and Santos (2010)). Thus, one may observe lower loan amounts in public firms due to cost-efficient switching from banks to other sources of credit. While the aggregate impact on credit in this case may remain unchanged as firms substitute one source of financing with another, the decrease in bank loans at the firm level can be viewed as supply-driven. Private firms, on the other hand, have limited access to bond markets and thus must bear the liquidity shock. To address these issues, we exploit the sensitivity of loan issuance to wholesale funding separately for publicly traded and

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Montreal—have survived the crisis in better shape than most of their US and European counterparts. None required any direct injection of capital from taxpayers, and all maintained their dividends. Royal and TD are among a handful of banks around the world that still carry a Moodys triple A credit rating. Their capital buffers remain well above regulatory thresholds, with tier one capital ratios ranging from 11.7 per cent at Scotiabanks to 14.2 per cent at CIBC."

private firms.

Banking relationships are yet another factor that may affect the availability of credit in times of crisis. Banks create value by screening and monitoring borrowers, which decreases information asymmetry between a borrower and a lender. As a result borrowers obtain a larger loan amount compared to borrowers that did not have such relationships (e.g., Berger and Udell (1995), Bharath et al. (2011)). Long-term banking relationships can be particularly beneficial in times of crisis as they can facilitate the access to credit (Rajan and Petersen (1994)). On the other hand, if a single bank is hit by a severe liquidity shock, it may be beneficial to have diversified relationships across many banks.

In the case of syndicated loans, there is an asymmetric information problem known as "syndicate moral hazard." It arises between the lead arranger, who is responsible for monitoring the loan, and other participants. To attenuate moral hazard, the lead arranger has to retain a high share of a loan to borrowers requiring high level of monitoring (Sufi (2007)). This type of moral hazard, however, can be exacerbated in times of crisis and eventually it can lead to lower availability of credit. For example, since monitoring is costly a lead arranger may not be willing to retain a higher portion of a loan. In this case other participants would expect a higher rate to compensate for the lower level of monitoring, If not, the loan amount, and hence the need for monitoring, may decrease.

We rely on panel data from the Canadian syndicated loan market during the period 1990 to 2010:Q1. We also have complete bank balance sheet data and balance sheet characteristics for public borrowers. We observe that newly issued syndicated lending in Canada started to fall in 2007:Q2. On a quarterly basis, it decreased by 76% over the period 2007:Q4-2009:Q1, while business loans (less drawdowns) remained near their pre-crisis level. Observing that syndicated loans were heavily affected by the crisis, we consider them to be the appropriate avenue for examining the relationship between a funding shock and credit access.

We use the difference-in-difference methodology to examine whether banks with different exposure to the crisis change their lending policy during the crisis. To control for loan demand, we control for a large set of observable firm characteristics and firm fixed effects. We show that banks that were more exposed to wholesale funding before the crisis reduced their syndicated lending the most during the crisis. Our results are economically significant—an increase in wholesale funding from the 25th to the 75th percentile pre-crisis is associated with a 11% drop in loans. We find that the magnitude of credit supply reduction due to exposure to the wholesale funding market is present only in public firms. We also document that the lending cut is more pronounced for firms that invested relatively less during the crisis.

In addition, we find that bank-firm relationships play an important role during the crisis. Using a multivariate analysis, we first document that public firms maintain more multiple banking relationships than private firms. To the extent that multiple banking relationships is a proxy for weak relationships, we expect a negative correlation between this proxy and loan amount.

We find that public firms with multiple banking relationships pre-crisis did experience the largest cuts to credit during the crisis. Furthermore, this effect is more pronounced involving banks where syndicate moral hazard likely increased the most during the crisis, that is, in cases involving large public firms (requiring large loans with many participants) with banks exposed to the liquidity shock in the wholesale funding market.

Our results contribute to several strands of literature. First, this paper complements Ivashina and Scharfstein (2010), who find that U.S. banks with greater exposure to short-term credit cut syndicated lending more aggressively than banks that relied on insured deposits. Similar conclusions are offered by Gozzi and Goetz (2010) using U.S. bank-level data. By focusing on the Canadian syndicated market, we benefit from better identification of the transmission of the funding shock since it is exogenous. We also

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shed some light on the Canadian banking system, which was labeled the most resilient among developed economies, yet not well understood.

Our study is also related to recent work by Santos (2010) and Hale and Santos (2010), who examine the cost of syndicated loans during the crisis. The first study focuses on the role of bank losses during the crisis on the cost of loans, while the second study traces the link between a bank's reliance on the bond market and the cost of loans. More generally, our paper contributes to a broader literature that identifies the role of bank funding constraints on credit supply (e.g., Leary (2009)).

Finally, we contribute to the large literature on relationship lending. Berger and Udell (1995) and Rajan and Petersen (1994) posit that relationships are valuable for private firms because, for example, firms with strong banking relationships receive more credit in times of crisis. Using syndicated loan data for the U.S., Bharath et al. (2011) show that a borrower with a prior relationship is able to obtain larger loan amounts. Looking at the latest financial turmoil, De Mitri et al. (2010) show that Italian firms that were borrowing from more banks suffered on average a larger contraction in bank credit and a higher probability of experiencing a reduction in outstanding bank debt. Since the Canadian banking system is more concentrated, relationships are expected to play an important role.

The remainder of the paper is organized as follows. Section 2 presents data and sample selection. Section 3 presents methodology. Section 4 presents the results, and Section 5 focuses on firm-bank relationships. Section 6 concludes.

2 Data and Sample Selection

The data used in this study comes from several sources, including Loan Pricing Corporations's Dealscan (LPC), Compustat, and banking data compiled by the Bank of Canada

and the Office of the Superintendent of Financial Institutions (OSFI).[2]

We use the Dealscan data to identify Canadian firms that obtained syndicated loans from 1990 to the first quarter of 2010. Dealscan provides information on newly issued syndicated loans, their purpose and type, maturity, seniority, and the identity and role of the banks in the loan syndicate. The total number of facilities is 4,926 and the total number of deals is 3,413. Each deal may consist of several tranches (facilities) that differ in terms of maturity, pricing, and/or amount. Borrowers operate in different industries: the three largest sectors at the one-digit SIC level are mining and construction firms (23%), manufacturing (28%) and transportation (16%). of all firms.

Balance sheet information on public firms is provided by Compustat.[3] The balance sheet data are from the quarter prior to the facility active date. We do not have firm level information for private firms apart from their industry classification and credit ratings, both provided by DealScan. Since we are interested in comparing the impact of the crisis on public and private firms, we keep both types of firms in our sample and estimate regression models with and without firm controls. Typically studies only focus on public firms.

Finally, we merge bank-level data with Dealscan. To identify lead arrangers we rely on the procedure suggested in Sufi (2007).[4] We retrieve information for about thirty domestic banks, foreign banks subsidiaries, and foreign bank branches, all regulated by OSFI.[5] These lenders originate 72% of the total volume of syndicated loans granted to Canadian firms; the rest are originated by foreign institutions.

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[2]The aggregate version of the bank data is publicly available: Tables C1 and C2 from the Bank of Canada Banking and Financial Statistics. Disaggregated data are confidential.

[3]To merge DealScan and Compustat we use a link file graciously provided by Michael Roberts, as used in Chava and Roberts (2008).

[4]We use the custom report from the web version of LoanConnector to extract the names of lead arrangers from variables "Lenders-All Lenders" and "Lender-Lead Arranger". If the field is missing then we use "Lead Role" variable in the "Lenders-All Lenders" as a lead arranger.

[5]See www.osfi-bsif.gc.ca about the conditions under which OSFI regulates financial institutions in Canada.

2.1 Basic Facts about the Canadian Syndicated Loan Market

In this section we describe the Canadian syndicated lending market.[6] Figure 1 shows the total volume of newly issued syndicated loans, corporate bonds and commercial paper to Canadian borrowers from 2000 to November 2010. Similar to other credit markets, the syndicated market grew substantially over the past decade. The total amount of newly issued loans in 2000 was $82 billion and it grew to $192.4 billion in 2007, the peak of the credit boom. In 2007 the corporate bond market totalled $100.6 billion and the commercial paper market totalled $173.5 billion. The syndicated loans therefore comprised a substantial portion of the total credit in the economy. With the start of the crisis in 2007, syndicated lending dropped to $93.7 billion by 2009, which is comparable to the decrease in the commercial paper market. There was a similar drop in the bond market, although it did not occur as immediate as the syndicated loan market or the commercial paper market. Corporate bond issuance only fell in 2009.

There are several major types of syndicated loan facilities: revolving credit lines, term loans, letters of credit, and acquisitions of credit line.[7] In Canada, 72% of all syndicated loans are revolving credit lines, which is higher than in the U.S., where 50% of the loans are credit lines. Figure 2 shows that the total amount of originated credit lines was $37

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[6]The Canadian syndicated loan market (comprised of Canadian borrowers) is not as well understood as the U.S. one, which is examined in a large number of papers (e.g., Sufi (2007), Ivashina and Scharfstein (2010)). Syndicated loans are provided by a group of lenders. There are usually two groups of banks in the syndicate. Acting as arrangers, lead managers, or agents, senior syndicate members are appointed by the borrower to construct a deal. By sharing a loan across multiple banks, senior banks avoid excessive exposure to credit and market risk and related compliance. At the same time they earn fees and maintain relationships with borrowers. The fees associated with syndicated loans are upfront fees, the commitment fee, facility fee, administrative agent fee, letter of credit fee, and cancelation or prepayment fee. Junior banks do not earn fees, however, they benefit from increasing their origination capability and the opportunity to maintain a future relationship with borrowers. See Taylor and Sansone (2007) for details on loan syndication.

[7]Revolving credit lines allow borrowers to draw down, repay and re-borrow. This facility acts much like credit cards, except that borrowers are charged an annual commitment fee on unused amounts. A term loan is an installment loan which is drawn during a short commitment period and then is repaid. Acquisition lines are credits that may be drawn down for a given period to purchase specified assets or equipment in order to make acquisitions.

billion in 2003 and climbed to \$137 billion in 2007. There is a substantial heterogeneity in loan types across countries. For example, revolving credit lines comprise a much smaller portions of the UK and Australian markets, around 40% and 20%, respectively. The second largest category in Canada is term loans, worth 28% of total volumes.

In terms of reasons for borrowing, the two most popular categories in Canada are real ivestment loans (capital expenditures, working capital or general corporate purposes (58%)), followed by acquisitions (15%). Figure 2 shows that the total amount of real investment loans was \$27.3 billion in 2003 and peaked at \$130 billion in 2007. Similar to the U.S. syndicated loans are rarely used for leveraged buy-outs in Canada.

In Canada both public and private borrowers use syndicated loans—47% of all syndicated loans are originated by private firms. An interesting observation is that the total volume of originated loans by private firms is more stable over time than for public firms. For example, for the period 2000 to 2006 the amount of syndicated loans to public firms increased more than four times on a yearly basis, while for private firms it increased one and a half times (Figure 3). Then at the start of the crisis public firms experienced a much larger drop in syndicated lending than private firms.

As can be seen from Figure 4, new lending starts falling with the start of the crisis. By the first quarter of 2008, the dollar volume of lending was 36% lower than it was in the second quarter of 2007. This continued throughout 2009, so that the overall drop from 2007:Q2 to 2009:Q1 was 76%. Ivashina and Scharfstein (2010) report a similar pattern for syndicated lending in the U.S. Notably, the same pattern is observed for credit lines and real investment loans. The total amount of credit lines in Canada is 80% lower in 2009:Q1 compared to 2007:Q2, and 79% for real investment loans.

Table 1 presents summary statistics of the key variables used in our analysis. The loan statistics are at a facility level, the firm characteristics are at a firm-quarter level and the bank characteristics are at a bank-month level. The mean size of the loans in the

sample is $300 million and the median is $115 million. Expectedly, the typical Canadian loan facilities are slightly smaller than those reported by Sufi (2007) and Bharath et al. (2011) for the U.S. The mean loan maturity is 41 months. The mean spread is 223 basis points. The mean size of a syndicate is 5.23 lenders and the mean share of the lead arranger is 36%, both comparable with the summary statistics reported in Sufi (2007).

Using Compustat data, borrowing firms have on average $3,686 million in assets (median is $1,188 million). The means of the market-to-book ratio, tangibility, profitability, leverage, current ratio, all winsorized at the 1% and 99%, are respectively 1.26, 0.3, 0.28, 0.29 and 1.4. For U.S. borrowers, Bharath et al. (2011) report the means of the same variables to be 1.75, 0.34, 0.14, 0.25, 2.08. Overall, the structure of the Canadian syndicated loan market and the borrowers' characteristics are closely comparable to those in the U.S.

Over the entire sample period, the average fraction of banks' cash over assets is 6% per month, and the Tier 1 capital over assets is 9%. A proxy for the riskiness of lenders is the ratio of impaired business loans to total business loans. The mean ratio is 3%.[8] We use a broad definition for wholesale funding ratio that is deposits by deposit-taking institutions (fixed term and demand and notice deposits by deposit-taking institutions), banker acceptances and repo to total funding (wholesale funding and retail deposits). The average wholesale funding ratio is 41%.

In Table 2 we report the market shares of the top ten banks in the Canadian syndicated market. Although 190 banks participate in the syndicated market, the top ten banks comprise 82% of the market, and the top five largest Canadian banks comprise 62% of the market. During the crisis, the top Canadian banks' market share fell to 55%.

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[8]From an accounting point, when a loan or portfolio of loans becomes impaired as a result of a deterioration in credit quality and the lender no longer has reasonable assurance of timely collection of the full amount of principal and interest, the carrying amount of the loans should be reduced. This reduction should be recognized as a charge in the statement of income in the period in which impairment is identified.

Foreign banks registered in Canada comprised 4% of the market before the crisis and only 1% afterwards. The share of foreign financial institutions increases from 30% to 40% pre-post crisis.

In Table 3 we report summary statistics for private and public firms separately. The average loan size for public firms is $130 million larger than for private firms. The average number of deals per borrower is higher for the public firms. Also, public borrowers prefer loans with shorter maturity (almost 5 months shorter) and from larger syndicates than private borrowers. Public borrowers interact with 2.11 different lead arrangers on average, while private firms with 1.19.

2.2 Funding conditions in Canada

In mid-2008, the confidence between banks in the U.S. declined and this resulted in a breakdown in interbank markets as credit ratings declined and valuation losses increased. The collapse of Lehman Brothers in September 2008 exacerbated the loss of confidence and thus the shock spread from the interbank market to CDS market, the commercial paper market, the markets for covered bonds and bank bonds, and other long-term funding markets.

In Canada, the concern about the U.S. market began in the summer of 2007. Figure 5 shows the spread between CDOR and OIS rates. An increase in the spread is an indicator of banks unwillingness to lend to each other. We see that spreads start increasing in the summer of 2007 and more so in the fall of 2008. The growing risk caused declines in the volumes of commercial paper, bankers acceptances, repo and interbank lending markets. Figure 6 shows the quarterly percentage change in wholesale funding ratios of Canadian banks relative to 2007:Q4 levels. The decline is observable across all definitions of wholesale funding.[9]

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[9]If wholesale funding is defined as the sum of banker acceptances, repos, fixed term, and demand

3 Methodology

The methodology consists of two parts. First, we investigate whether loan size varies with banks' exposure to wholesale funding. Second, we examine the role of lending relationships.

3.1 Loan amounts and wholesale funding

To analyze whether loan activity declined during the crisis, and if so whether the decline was more pronounced for banks with a stronger reliance on wholesale funding, we estimate the following baseline regression:

$$
\begin{aligned}
Log(Loans)_{lbit} = {} & \alpha + \beta \mathrm{CRISIS}_t + \mu WHOLESALE_{bt-1} \times \mathrm{CRISIS}_t \\
& + \lambda WHOLESALE_{bt-1} + \sum_{j=1}^{J} \xi_j F_{j,i,t-1} + \sum_{s=1}^{S} \delta_s B_{s,b,t-1} \\
& + \sum_{p=1}^{L} \eta_p L_{p,l,t} + \nu_i + \lambda_b + \theta_t + \epsilon_{iblt},
\end{aligned}
\tag{1}
$$

where $Log(Loans)_{lbit}$ is the natural log of facility l, granted by bank b (lead arranger) to firm i at date t. $CRISIS$ is an indicator variable equal to 1 for the period 2007:Q4 to 2009:Q4, and zero otherwise.[10] $WHOLESALE_{bt-1}$ is the monthly ratio of wholesale funding to total funding. Wholesale funding includes fixed term, demand and notice deposits by deposit-taking institutions, acceptances, and obligations related to assets sold

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and notice deposits by deposit-taking institutions, the drop from the second quarter of 2007 to the forth quarter of 2009 is 13%; if repos and bank acceptances are excluded from the above definition, then the drop for the same period is 40%. Looking at the three year period from 2004:Q1 to 2007:Q2, wholesale funding had increased by 40%.

[10]We estimate equation (1) both at the facility and the deal levels. Some deals have more than one tranche. Tranches differ in terms of purpose, amount, maturity etc. Since we focus on loan amounts, it is important to account for loan characteristics precisely at the facility level as opposed to aggregating them at the deal level. The drawback, however, is that facilities at the deal level are not independent observations for deals with multiple tranches, which may result in lower standard errors. As a robustness check, we cluster the standard errors at the deal level.

under repurchase agreements (repo) as a ratio of total funding which includes wholesale funding, demand and fixed term deposits to individuals (retail funding). We fix the wholesale funding ratio during the crisis (2007:Q4 to 2009:Q4) to be equal to the mean of its pre-crisis values from 2007:Q1 to 2007:Q3.[11] In this way, we address the possibility that syndicated loans and wholesale funding may be affected by common unobserved factors during the crisis. Also, this modification allows us to examine the lending behaviour of banks with different pre-crisis exposures to wholesale funding. $F_{j,i,t-1}$ and $B_{s,b,t-1}$ are lagged values of firm and bank characteristics respectively; $L_{p,l,t}$ denotes loan characteristics such as type of loan, purpose, and syndicate size; ν_i, λ_b, and θ_t are fixed effects for firm, bank, and year, respectively.

The key coefficient of interest is μ, which estimates the extent to which banks that relied on wholesale funding changed their lending behaviour during the crisis, relative to the pre-crisis period. As liquidity in wholesale markets dried up, we expect that banks that relied on this type of financing to issue fewer loans. Therefore, we expect μ to be negative. If banks relied on alternative sources of financing, however, the coefficient should be insignificant.

Firms characteristics are retrieved at the quarterly frequency from Compustat. Our choice of control variables follows the existing literature (e.g., Santos (2010), Bharath et al. (2011)). *Log(firm assets)* is the log of the firm's assets in million of dollars. Larger firms are more diversified and consequently should be less risky. *Profitability* is the ratio of EBITDA divided by sales. More profitable firms can service their debt more securely than less profitable firms and thus they have more access to credit. *Leverage* is the book value of debt to total assets and serves as a proxy of default—greater leverage should lead to smaller loan amounts. *Tangibility*—inventories plus plant, property, and equip-

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[11]As a robustness check, we change the pre-crisis period to the year 2006 and the results remain unchanged.

ment over assets—is a proxy for collateral, which should be positively related to loan size. *M/B* is firm market value over its book value. It is a proxy of growth opportunities and the relationship to loans is expected to be negative. *Current ratio* is the ratio of current assets to current liabilities.

Loan size is likely to be affected by loan characteristics. We include the purpose of the loan and the type of the loan (credit line vs. term loan), loan maturity (in months) and the syndicate size.

We also include lead-bank characteristics. To control for lead-bank size, we use the log of monthly bank assets (*Log(bank assets)*). Large banks are expected to be better diversified, and/or have access to funding at better conditions and thus provide larger loans. Well-capitalized banks can better shield their lending from shocks as they have easier access to uninsured funding, consistent with the "bank lending channel" (e.g., Bernanke and Gertler (1995)). Also, it is possible that well-capitalized banks have extended loans to risky borrowers that are more exposed to economic downturns, suggesting a negative relationship between capital and lending. To capture the effect of bank liquidity on syndicate lending we include the ratio of cash to total assets *(Cash/Assets)*. We include firm- and bank-fixed effects to account for the role of unobservable time invariant factors that may affect loan amounts. We also include quarterly, monthly and yearly effects. Standard errors are clustered at the firm level.

3.2   The effect of credit line drawdowns

Before turning to the results, we highlight a number of issues that could raise some concerns about drawdowns on previous commitments. It is possible that during the financial crisis the reliance on wholesale funding captures exposures to general liquidity risk. In other words, it is not that banks in particular propagate their own fund-

ing constraint to the borrowers but rather they propagate the overall market dry-up. Following this reasoning, we would expect loan contractions, presumably due to a general liquidity shock, to be detected across all types of business loans, including non-syndicated commercial loans. We focus on business loans less drawdowns, as suggested by Ivashina and Scharfstein (2010), who argue that the observed increase in commercial and industrial loans in the U.S. during the crisis is due to an increase in drawdowns of existing loan commitments (credit lines). Figure 7 shows the quarterly change in syndicated loans and total business loans (less drawdowns) relative to 2007:Q4 in Canada. We observe that business loans (less drawdowns) remain almost unchanged. Syndicated loans, however, experienced a significant decrease during the crisis compared to business loans, suggesting that the decrease in business lending is somewhat specific to syndicated loans only.

The level of drawdowns on exiting credit lines may affect the issuance of new loans. Along with rising concerns about bank insolvency and liquidity in mid-2008, U.S. corporate borrowers increased drawdowns to ensure access to committed funds (Ivashina and Scharfstein (2010) and Gozzi and Goetz (2010)). We observe similar patterns for Canadian borrowers using data from 2007:Q3 to 2009:Q4. Hence, not only do wholesale funding cuts affect new issuance, but sudden drawdowns may also play a role. To the extent that drawdowns and wholesale funding are correlated, we face the risk of omitted variable bias. To evaluate the direction of the bias on the estimate of wholesale funding in equations (1) and (2), we plot the relationship between the wholesale funding ratio and the ratio of drawdowns to existing credit lines. Figure 8 shows that high wholesale funding is negatively correlated with drawdowns during the crisis. For example, one reason for observing a lower ratio of wholesale funding and a high ratio of drawdowns is that borrowers perceived banks whose wholesale funding dropped the most during the crisis to be riskier, which made them draw down previous commitments. Equally plausible,

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as suggested by Gatev and Strahan (2006), financial institutions maintain strong retail funding (i.e., low wholesale funding) as it allows them to fund future credit lines. In either case, the correlation between wholesale funding and drawdowns is negative. As the correlation between drawdowns and new issuance is negative, and the correlation between new drawdowns and wholesale funding is also negative any potential bias of the estimate on wholesale funding (μ in (eq. 1)) will take a positive sign. Hence, preventing us from detecting even a greater impact of the pre-crisis wholesale funding on loan reduction during the crisis.

4   Results

In this section we first present results on the effect of wholesale funding on syndicated lending. We then explore the role of bank-firm relationships in syndicated lending.

Table 4 presents results for regressions of loan facilities (tranches) on firm, bank and loan characteristics. We also include macro variables to capture the general deterioration in market conditions. The dependent variable in columns (1), (2) and (4) is the log of the tranche amount, and in columns (3) and (5) it is the ratio of the tranche size to quarterly firm assets. We report estimates for public and private firms separately. Columns (4) and (5) include additional characteristics that are available only for public firms. All specifications account for time, bank, and firm fixed effects.[12]

Our results are consistent with the hypotheses that banks that relied more on wholesale funding *before* the crisis decreased their lending to public firms relatively more during the crisis. In particular, in columns (1), (3), (4) and (5) the estimate on the interaction term $CRISIS \times WHOLESALE_{2007}$ is negative and significant. From column (1), we

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[12]Firm fixed effects control for unobservable time-invariant characteristics. For example banks might be lending in a systematic way to firms who experience a larger drop in credit demand in a credit crunch, i.e. the match between banks and firms is not random.

see that a one-standard-deviation increase in the wholesale funding ratio pre-crisis leads to an 11% drop in the average tranche post-crisis. The standard deviation of the ratio of wholesale funding is 14%, which is equivalent to the interquartile range from the 25th to the 75th percentiles. In other words, an increase in the wholesale funding ratio from the 25th to the 75th percentile before 2007:Q4 is associated with a 11% fall in syndicate loans during the crisis. In column (3) and (5), where the dependent variable is the ratio of facility amount to total assets, the impact of wholesale funding is also economically and statistically significant—a one standard deviation increase is associated with a 18% fall in the log ratio of syndicated loans to assets compared to the pre-crisis period.[13]

The results in column (2) suggest that banks with a high dependency on wholesale funding did not transmit the liquidity shock to private borrowers. To the extent that credit demand is driven by a common unobservable factor to both private and public firms, looking at the difference in the sensitivity of pre-crisis wholesale funding to loan issuance offsets the role of these factors.

The underlying assumption for the results in Table 4 is that changes in demand for loans during the crisis are not correlated with a bank's dependence on wholesale funding before the crisis. It is possible, however, that banks with higher dependence on wholesale funding systematically lend to firms that happen to experience a larger decrease in credit demand during the crisis, i.e., those firms match with banks non-randomly. If so, the estimate of the interaction term between the wholesale funding ratio and the crisis variable reflects reductions in loan demand that are more pronounced in

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[13]If we redefine wholesale funding as a dummy variable that takes on the value of one for values higher than the sample median and zero otherwise, we obtain similar results (unreported)—banks with higher than the median wholesale funding before the crisis decrease loans by 18%. Also, we specify wholesale funding in two additional ways by sequentially subtracting the values of bankers acceptances and repos. We also estimate a change regression where the pre- post-crisis change in loans for the same firm is regressed on the change in wholesale funding. The results indicate that a more severe drop in wholesale funding is associated with a greater fall drop in newly issued loans in the crisis period, holding all else equal. The drawback of this specification, however, is that not all firms take loans pre- and post-crisis.

firms borrowing from banks that relied on wholesale funding pre-crisis. To address this concern we include firm and bank fixed effects to control for unobservable time-invariant characteristics.

In addition to including fixed effects that capture unobservable time-invariant factors, differences in credit demand across banks can be affected by time-varying bank-specific factors. Relatively large banks with well diversified portfolios may have lent to riskier borrowers whose demand for credit is more vulnerable to a crisis. There is a large literature that focuses on the link between bank capital and risk aversion (e.g., Flannery (1989)). If well-capitalized banks choose *ex ante* a loan portfolio with higher return and risk, their borrowers would be, on average more exposed to economic downturns. Thus, banks with high capital may target more risky borrowers. On the other hand, high levels of capital increases banks' capacity to raise uninsured debt and therefore its ability to cope with a shock to wholesale funding (Ashcraft (2006)). In our specification, the estimate on capital is neither statistically nor economically significant. We also control for the ratio of cash over assets. Assuming that cash and loans are substitutes, we find that banks with more cash lend less.

The estimates of firm characteristics in all specifications take the expected signs. Typically, firms with high growth opportunities (high market-to-book ratio) have lower leverage ratios. One explanation is that these firms are likely to have good future prospects relative to the value of their assets in place. Although growth opportunities add to the firm's value they do not add to taxable income. In our specification the estimate on M/B is neither statistically nor economically significant. Firms with relatively high levels of tangible assets (the ratio of fixed assets over total assets) have more collateral and thus manage to take larger loans.[14]

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[14]In results not reported here we interact the firm variables with the crisis dummy variable to account for any potential differential impact of firm characteristics on lending before and during the crisis. The (available upon request) results show that the impact of firm characteristics on syndicate loans is similar

We account for financial market conditions with the yield spreads of triple-A corporate bonds.[15] The estimate on wholesale funding is significant when including macro and finance variables, suggesting that wholesale funding brings additional information such as bank-specific exposure to the crisis. Omitting macroeconomic and financial market factors biases the estimate slightly upwards. Assuming that the public firms in our sample can substitute bonds and syndicated loans, the estimate on the yield spread can be interpreted as the alternative cost of financing. On average, higher bond yields make bank loans more preferable, which is consistent with the positive estimate on the spread for the sample of public firms.

4.1 Do banks reduce credit supply more to some firms?

We study whether the effect of wholesale funding on loan availability differs across firms. For that purpose, in addition to bank, firm, and loan control variables, we introduce interaction terms related to various firm characteristics. In column (1) of Table 5, we formally examine whether the liquidity shock affects public and private firms differently. Indeed, the negative sign on the estimate of $CRISIS \times PUBLIC \times WHOLESALE_{2007}$ suggests that banks that relied on wholesale funding cut lending to public firms more than to private firms. Moreover, splitting the sample into public and private firms, as reported in Table 4, shows that private firms do not actually experience a reduction in lending due to banks' exposure to the shock.

In column (2) we observe that the credit supply contraction is stronger for those public firms that invested in production relatively less during the crisis. The question of whether a firm's choice of investment is driven by the lack of credit financing and/or

before and during the crisis.

[15]More specifically, this is an index of the seven year bond yields of Canadian corporations over the corresponding yields of Government of Canada bond. In unreported specifications, we consider bonds with different maturity and different rating class. The conclusions are preserved.

weak economic environment is beyond the scope of our paper. Rather, we observe that credit rationing is correlated with low levels of investment. In column (3), we estimate investment equations for the sample of all Canadian public firms reported in Compustat. We find that firms that have access to syndicated loans during the crisis have higher levels of investment compared to other public firms, suggesting that the firms that took syndicated loans did not lose their appetite for investment due to the negative economic conditions.

4.2   Robustness checks

4.2.1   Out-of-sample checks

If the negative relation between wholesale funding and loans is demand driven, we would expect to find a similar pattern after September 11, 2001 which is assumed to have been a demand shock to the economy (Duchin et al. (2010)). The results in the upper panel of Table 6 show a quite different pattern in 2001 than the recent financial crisis. We observe that high wholesale funding before 2001 is associated with less loan origination. This negative effect is subdued after 2001, which is exactly the opposite of the evidence during the recent crisis. Without shedding light on the reasons that explain the pattern in 2001, we note that the relationship between wholesale funding and lending is different for the 2001 demand shock and the most recent supply shock.[16]

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[16]It is possible that *during* the crisis credit demand was affected by unobserved changes in investment opportunities that are correlated with wholesale funding. Following Duchin et al. (2010), we address this issue by purging away the variation in firm characteristics during the crisis by fixing them at their pre-crisis levels (2007:Q1 to 2007:Q3). The assumption is that pre-crisis demand for credit is not positively correlated with unobservable changes in firm-specific demand shocks during the crisis. The results (unreported) imply that the estimate of wholesale funding is negative and similar in magnitude to the estimates in Table 4.

4.2.2 Wholesale funding and bank risk

The effects of the exposure to wholesale funding on lending may be consistent with the following argument. Banks with strong wholesale funding before the crisis may have been more risk taking, in a sense that they may have issued loans with lower credit quality. Finding a negative relationship between wholesale funding and lending may therefore be the result of revealed bad credit quality. If this hypothesis is true, however, we would expect wholesale funding in the crisis to be a 'proxy' for bank risk. To address this possibility, we include the fraction of impaired business loans to total business loans as a proxy for bank risk. If wholesale funding is a proxy for bank risk, we would expect its impact to be insignificant once we explicitly control for bank risk. The results, presented in the middle panel of Table 6 show that the drop in the sensitivity of wholesale funding to lending is preserved, however at a slightly lower magnitude.

4.2.3 Syndicate fixed effects

Unobserved syndicate-specific characteristics may be correlated with a bank's wholesale funding. It may be the case that banks manage to attract more wholesale funding because of their participation in 'high' quality syndicates. Also, banks within the syndicate may fund each other at better terms because of the existing syndicate relationships. Therefore, we include syndicate fixed effects to account for unobserved time-invariant factors related to the syndicate. Overall, the estimates on the interaction term between $CRISIS \times WHOLESALE_{2007}$ in columns (1) to (5) in Table 6 are similar to those in Table 4, suggesting that the inclusion of unobserved syndicate characteristics do not change our conclusions.

5 The Role of Relationships during the Crisis?

Rajan and Petersen (1994), Berger and Udell (1995), and Bharath et al. (2011), among others, suggest that lending relationships have an impact on various price and non-price loan terms. Long-term relationships between firms and banks allow banks to access proprietary information about the borrowers, which can reduce information asymmetries and hence be beneficial to firms by ensuring more access to capital at a lower cost and with less collateral. On the other hand, the cost of long term bank-firm relationships is that banks have access to private information which may lead to a hold-up problem and extraction of information rents, particularly for borrowers with limited access to alternative funding sources.

We start by estimating a probit model of whether a borrower has more than one prior banking relationships. We control for a set of firm characteristics and time effects and find that on average public firms are more likely to develop relationships with multiple banks. This is consistent with the argument of Berger and Udell (1995) that *single* banking relationships are more valuable to private firms as they allow lenders to collect information about the borrower over longer periods of time. Since lenders can refer to available public information about borrowers, relationship lending is less valuable for public firms, which is supported by the evidence of multiple banking relationships.

In syndicated loans, the lead arrangers monitoring effort is unobservable and thus creates a moral hazard problem among members of the syndicate (Holmstrom and Tirole (1997)). To minimize this problem, the lead arranger retains a large share of the loan. Banks that are more affected by the crisis may find it costly to commit to monitoring through retaining a larger portion of the loan. Indeed, we find that banks with high wholesale funding prior the crisis reduce their share by 3% during the crisis. Alternatively, we conjecture that banks can decrease the amount they lend and hence the value

of monitoring. We expect borrowers with whom banks have the weakest relationships to experience a larger cut to lending relative to the rest.

To examine the role of the bank-lending relationship in the context of syndicated loans, we augment equation (1) by interacting REL_MANY, that is a dummy variable for having more than one banking relationship in the past, with $CRISIS \times WHOLESALE_{2007}$. Table 7 reports the estimates of these regressions separately for public and private firms. For brevity, the coefficients of loan, firm, and bank controls are not reported but are similar to those reported in Table 4. In column (1), the negative sign on $WHOLESALE_{2007} \times REL\_MANY \times CRISIS$ suggests that greater exposure to the crisis through high wholesale funding is associated with greater cuts to lending for borrowers that had past relationships with multiple banks.

One reason for this could be that a lead arranger with high wholesale funding deteriorates the quality of the syndicate and therefore these syndicates cut new lending. We therefore control in column (3) for syndicate quality with syndicate fixed effects. The magnitude of $WHOLESALE_{2007} \times REL\_MANY \times CRISIS$ has significantly decreased, which suggests that once we account for the quality of syndicate lending, the impact of wholesale funding and multiple banking relationships of loan amounts is purged away. Hence, the effect of $WHOLESALE_{2007} \times REL\_MANY \times CRISIS$ can be explained with decreased quality of those syndicates in which one or more of the lead arrangers were heavily exposed to the crisis.

6   Concluding Remarks

As confidence between U.S. banks worsened due to downgrading and write-downs in mid 2008, the interbank market was severely impaired. Banks began to hoard liquidity for precautionary purposes. The collapse of Lehman Brothers in September 2008 further

deteriorated confidence among market participants. Thus, the shock spread to all markets such as commercial paper markets, repo and bond markets. Although, the liquidity shock did not originate in the Canadian financial system, it had secondary effects on its funding markets. In this paper, we examine how the liquidity shock affected bank lending activity in Canada using detailed information about banks, borrowers and loan characteristics. We find that public firms experienced a greater cut in lending and thus suffered the cost of the financial constraint of banks that relied on wholesale funding sources before the crisis. Also, we document that during the crisis banks that were most exposed to the crisis cut lending to public firms with multiple banking relationships.

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Figure 1: Bonds, Commercial Paper and Syndicated Loans (CAD million)
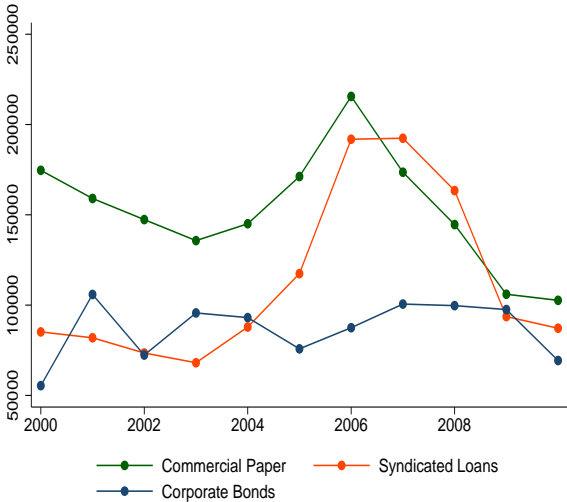
Corporate bonds and syndicated loans both include issuance by financial and non-financial firms. Commercial paper excludes issuance by provinces/municipalities, federal agencies, and the federal government. Source: Bank of Canada, DBRS and Dealscan.

Figure 2: Revolving Loans and Real Investment Loans (CAD million)
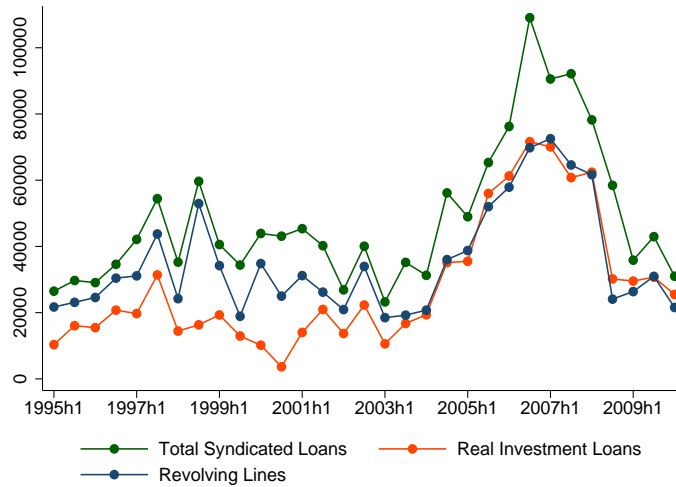
Revolving lines (bi-annual) include credit facilities with less and more than one year maturity. Real investment loans (bi-annual) are defined as those intended for general corporate purposes, capital expenditure, or working capital. Source: DealScan

Figure 3: Total Amount of Issued Syndicated Loans for Private and Public Firms (CAD million)
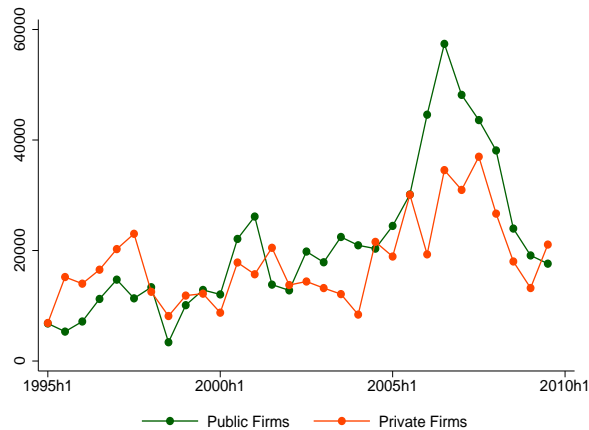
Total syndicated loans (bi-annual) by private and public Canadian firms. Source: DealScan.

Figure 4: Growth Rates of Syndicated Loans, Revolving Lines and Real Investment Loans (Indexed, 2007:Q2=0)
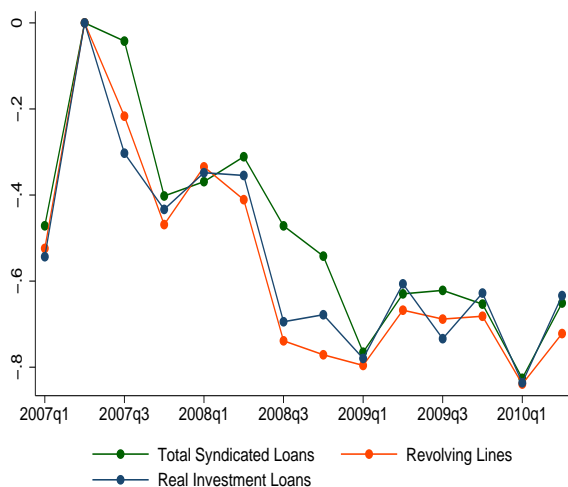
The graph shows the percentage change in lending for each quarter with respect to the second quarter of 2007. Source: DealScan

Figure 5: Spreads between CDOR and OIS

This graph shows the CDOR-OIS spreads (in percent) for one and three months contracts.

Figure 6: Relative Changes in Wholesale Funding Ratios
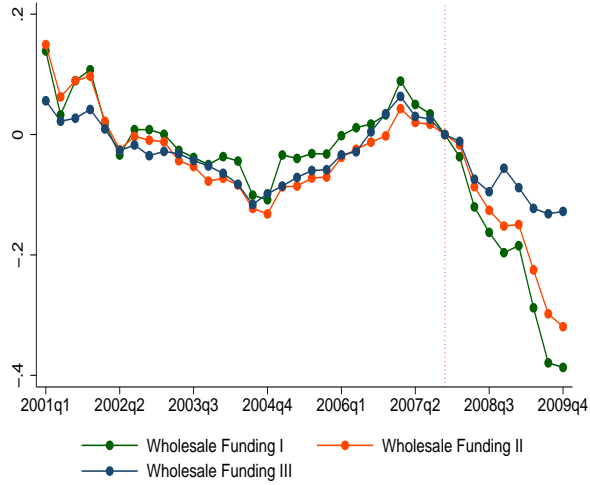
The graph shows the percentage change in the ratio of wholesale funding to total funding (wholesale and retail funding) for each quarter with respect to 2007:Q4 ($\Delta = WholesaleFunding/TotalFunding_t - WholesaleFunding/TotalFunding_{2007q4}$). *Wholesale Funding I* is the ratio of fixed term, demand and notice deposits by deposit-taking institutions over total funding. *Wholesale Funding II* is the ratio of fixed term, demand and notice deposits by deposit-taking institutions, and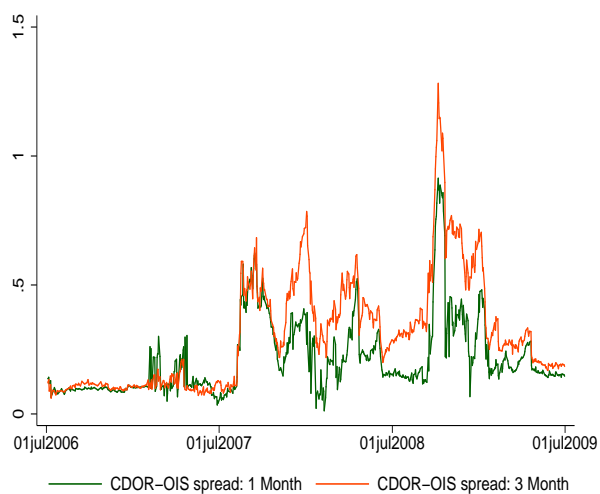 banker acceptances over total funding. *Wholesale Funding III* is the ratio of fixed term, and demand and notice deposits by deposit-taking institutions, banker acceptances and repo over total funding.

Figure 7: Relative Changes in Syndicated and Commercial Loans Surrounding the Crisis
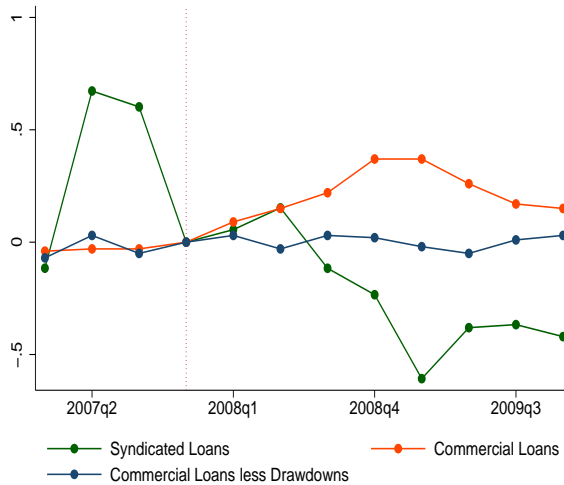
The graph shows the percentage change in the total amount of syndicated loans and commercial loans (less drawdowns on previous commitments) with respect to 2007:Q4.

Figure 8: Drawdowns and Wholesale Funding during the Crisis
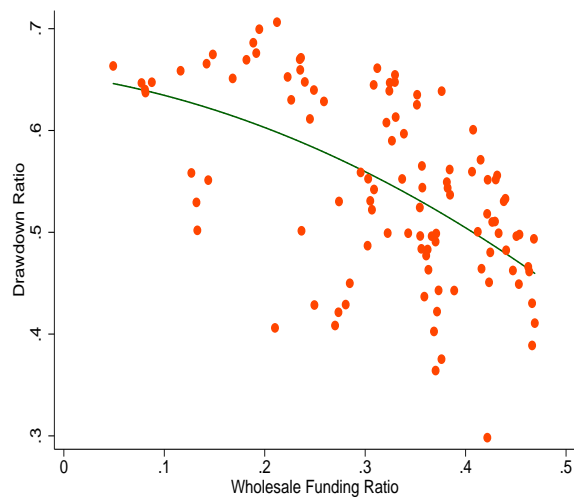
The graph shows the relationship between credit line drawdowns as a fraction of all existing credit lines and the ratio of wholesale funding over the period 2007:Q3-2009Q4.

Table 1: Summary Statistics

This table reports the summary statistics of various loan, borrower and lender characteristics. *Tranche* (or loan facility) is the dollar amount of loan facility in Canadian million dollars. *Maturity*, reported in months, is length in months between facility activation date and maturity date. *AISD*, in basis points, includes all costs of a drawn loan to the borrower. *Restruct. loan* is a dummy variable that equals one for loans intended for restructuring: leveraged buyouts, mergers and acquisitions, or share repurchases and zero for loans intended for corporate purposes, capital expenditure, or working capital. *Corporate Purpose* is a dummy variable that indicates if a loan is intended for general corporate purposes, capital expenditure, or working capital. *Credit line* is a dummy variable equal to one if the facility is credit line and zero for the rest (mainly term loans). *Syndicate size* is the number of lenders in the syndicate. *Lead share* is the percent of the loan kept by the lead arranger. Firm characteristics are from Compustat. *Firms assets* is the quarterly book value of assets by the borrower (in CAD million). *Sales* is the quarterly value of net sales from Compustat. *Market-to-Book* is the ratio of both book value of assets minus book value of equity plus market value of equity over book value of assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Profitability* is the ratio of EBITDA to sales. *Leverage* is the ratio of book value of debt to total assets. *Current ratio* is the ratio of current assets to current liabilities. *Wholesale Funding Ratio* is the ratio of wholesale funding (bank acceptances, repos, fixed term, and demand and notice deposits by deposit-taking institutions) over total funding (wholesale funding and retail funding: demand and fixed-term deposits by individuals). *Capital Ratio* is Tier 1 capital over assets. *Impaired loans* is the ratio of impaired business loans to total business loans.

	N	Mean	SD	25th	Median	75th
Loan Characteristics						
Tranche (CAD million)	4897	300	686	44	115	300
Maturity (months)	4897	41	37	12	36	60
AISD spread (bp)	1990	223	158	100	200	300
Restruct. Loan	4897	0.09	0.28			
Corporate Purpose	4897	0.62	0.48			
Credit Line	4897	0.65	0.45			
Syndicate size (number)	4897	5.23	5.02	2	4	7
Lead Share	4897	0.36	0.3	0.14	0.25	0.5
Firm Characteristics						
Firms assets	1278	3,686	5,955	489	1188	3741
Sales	1278	640.12	1,091	65	204.45	599
Market-to-Book	1278	1.26	0.71	1.01	1.26	1.65
Tangibility	1278	0.3	0.29	0.3	0.58	0.8
Profitability	1278	0.28	0.28	0.1	0.23	0.48
Leverage	1278	0.29	0.18	0.16	0.26	0.39
Current Ratio	1278	1.4	0.99	0.75	1.16	1.81
Bank Characteristics						
Wholesale Funding Ratio	1133	0.41	0.2	0.31	0.37	0.42
Cash/Assets	1133	0.06	0.03	0.04	0.06	0.08
Capital ratio	1133	0.09	0.01	0.08	0.09	0.10
Impaired loans	1133	0.03	0.002	0.01	0.02	0.04

Table 2: Syndicated Market Structure

Shares of top ten banks in the syndicated loan market. In the first column the market share is the ratio of bank deals to all deals over the sample period; in the second column, the sample period is from 2007:Q4 to 2009:Q4.

	Market Share Full Sample	Market Share (2007:Q4-2009:Q4)
Royal Bank of Canada	0.19	0.13
Canadian Imperial Bank of Commerce	0.17	0.11
Bank of Nova Scotia	0.12	0.10
Toronto Dominion Bank	0.11	0.12
Bank of Montreal	0.07	0.09
Chase Manhattan Bank	0.07	
Citibank	0.02	
National Bank of Canada	0.02	0.04
Barclays Capital	0.02	0.12
JP Morgan	0.02	
Credit Suisse First Boston	0.02	

Table 3: Summary Statistics: Public vs Private Firms

Tranche (or loan facility) is the dollar amount of loan facility in Canadian million dollars. *AISD*, in basis points, includes all costs of a drawn loan to the borrower. *Maturity* is length in months between facility activation date and maturity date. Investment grade is the percent of rated public/private firms which have senior debt rated BBB or above by S&P. *Credit line* is a dummy variable equal to one if the facility is credit line and zero for the rest (mainly term loans). *Syndicate size* is the number of lenders in the syndicate. *Number of different banks* is the number of different banks per borrower.

	Public	Private	Public-Private
Number of firms	463	1006	
Tranche (CAD million)	377.36	247.19	130.1***
AISD	214	228	14**
Number of deals	3.29	1.87	1.42***
Maturity (in months)	37.5	42.69	-5.19***
Investment loan(% firms)	63	61	2*
Credit line (% firms)	69	62	7***
Syndicate size (in number)	5.21	4.85	0.8***
Number of different banks	2.11	1.19	0.92*

Table 4: Wholesale Funding and Lending Availability

The dependent variable in columns (1)-(2) and (4) is the natural log of syndicated loan facility. In columns (3) and (5) the dependent variable is the ratio of syndicated loans over firm assets. $WHOLESALE_{2007}$ is the ratio of wholesale funding (banker acceptances, repos, fixed term, and demand and notice deposits by deposit-taking institutions) to total funding (wholesale funding and demand and fixed-term deposits by individuals). For the period 2007:Q4 to 2010:Q1 the values of $WHOLESALE_{2007}$ are fixed to the pre-crisis period that is the first three quarters of 2007. $CRISIS$ is a dummy variable that takes one for loans originated from the 2007:Q4 to 2009:Q4. *High Capital* is a dummy variable that takes the value of one for banks having capital over assets higher than the quarterly median and zero otherwise. *InvLoans* is a dummy variable for loans used for corporate purposed, capital expenditure and working capital. *Credit line* is a dummy variable equal to one if the facility is credit line and zero for the rest (mainly term loans). *Syndicate size* is the number of lenders in the syndicate. *GDP* is the quarterly growth rate of GDP. *Yield Spread* is the log of the difference between the indexes on the yield of the triple-A rated 7 year corporate bonds and seven year Canadian government bonds. *M/B* is the ratio of both book value of assets minus book value of equity plus market value of equity over book value of assets. *Tangibility* is the ratio of property, plant, and equipment to total assets. *Profitability* is the ratio of EBITDA to sales. *Leverage* is the ratio of book value of debt to total assets. *Current ratio* is the ratio of current assets to current liabilities. The standard errors in parentheses are clustered at the firm level. All models include yearly, monthly, quarterly, bank and firm fixed effects. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	Public	Private	Public	Public	Public
	$\log(loan)$	$\log(loan)$	$\log(\frac{loan}{assets})$	$\log(loan)$	$\log(\frac{loan}{assets})$
$CRISIS \times WHOLESALE_{2007}$	-0.87**	0.12	-0.58*	-0.88**	-1.04**
	(0.439)	(0.448)	(0.351)	(0.442)	(0.456)
$WHOLESALE_{2007}$	0.97*	0.26	0.39	1.00	1.01
	(0.571)	(0.755)	(0.55)	(0.678)	(0.659)
$CRISIS$	0.56*	-0.14	0.45	0.58*	0.63
	(0.317)	(0.311)	(0.331)	(0.319)	(0.361)
$Log(cash/assets)_{t-1}$	-0.08	0.06	-0.16**	-0.08	-0.09
	(0.079)	(0.087)	(0.071)	(0.090)	(0.091)
High Capital	-0.04	0.03	-0.01	-0.03	-0.05
	(0.049)	(0.038)	(0.005)	(0.050)	(0.052)
$Log(bank\ assets)_{t-1}$	0.14	-0.47	0.18	-0.13	-0.17
	(0.239)	(0.289)	(0.231)	(0.301)	(0.295)
Log(maturity)	0.22***	0.18***	0.21***	0.21***	0.21***
	(0.048)	(0.051)	(0.005)	(0.052)	(0.054)
InvLoans	0.06	0.00	-0.02	0.00	0.07
	(0.073)	(0.059)	(0.018)	(0.087)	(0.092)
Credit Line	0.10	-0.09	0.10	0.17	0.19*
	(0.094)	(0.073)	(0.101)	(0.113)	(0.115)
$log(syndicate\ size)$	0.43***	0.47***	0.30***	0.43***	0.36***
	(0.074)	(0.082)	(0.071)	(0.082)	(0.092)
GDP	0.05*	-0.03	0.01	0.08	0.05
	(0.030)	(0.035)	(0.014)	(0.077)	(0.039)
Yield Spread	0.13*	0.06	0.03	0.06*	0.09
	(0.073)	(0.069)	(0.04)	(0.035)	(0.081)
$Log(firm\ assets)_{t-1}$				0.29***	-0.46***
				(0.092)	(0.107)
M/B_{t-1}				0.08	0.03
				(0.061)	(0.07)
$Tangibility_{t-1}$				0.05	-0.01
				(0.386)	(0.37)
$Profitability_{t-1}$				0.55**	0.53**
				(0.248)	(0.258)
$Leverage_{t-1}$				0.09	0.45
				(0.424)	(0.471)
$Current\ ratio_{t-1}$				0.03	0.02
				(0.030)	(0.003)
Obs.	1,718	2,001	1,718	1,718	1,718
R^2	0.13	0.108	0.112	0.146	0.15

Table 5: Wholesale Funding and Lending Availability: Cross-Sectional Results
The dependent variable is the natural log of syndicated loan facility in columns (1) to (2); in column (3) the dependent variable *Investments* is measured as the ratio of firm capital expenditures divided by lagged property, plant and equipment. In column (1) the sample includes both private and public firms. variable is the ratio of syndicated loans over firm assets. $NONINV$ is a firm level dummy variable that takes one for investment values lower than the sample median. $PUBLIC$ is an indicator variable that takes one for firms that are publicly listed and zero otherwise. *Dealscan* indicates whether a public firm has syndicated loan in a certain quarter; it takes zero if a public firm does not access such type of financing. $WHOLESALE_{2007}$ is the ratio of wholesale funding (banker acceptances, repos, fixed term, and demand and notice deposits by deposit-taking institutions) to total funding (wholesale funding and demand and fixed-term deposits by individuals). For the period 2007:Q4 to 2010:Q1 the values of $WHOLESALE_{2007}$ are fixed to the pre-crisis period that is the first three quarters of 2007. CRISIS is a dummy variable that takes one for loans originated from the 2007:Q4 to 2009:Q4. In columns (1) to (2) all specifications include complete interaction terms (unreported for brevity) between $WHOLESALE_{2007}$, CRISIS, and the corresponding firm level dummy variables. For columns (1) to (2) firm, bank and loan controls are defined in Table 4. In column (3) the firm controls include Tobin Q (market value of equity plus the book value of debt minus deferred taxes divided by book value of assets), cash flow (net income before extraordinary items plus depreciation and amortization divided by lagged property, plant and equipment), and firm size (log of firm assets). The standard errors in parentheses are clustered at the firm level. All models include yearly, monthly, and quarterly. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	log(loan)		Investments
$CRISIS \times PUBLIC \times WHOLESALE_{2007}$	-1.214**		
	(0.592)		
$CRISIS \times WHOLESALE_{2007} \times NONINV$		-2.043**	
		(1.008)	
$CRISIS \times Dealscan$			0.02*
			(0.010)
$CRISIS$	-0.307	-0.347	-0.03***
	(0.311)	(0.494)	(0.009)
$WHOLESALE_{2007}$	0.955	2.519	
	(1.202)	(1.845)	
$CRISIS \times WHOLESALE_{2007}$	0.424	0.195	
	(0.469)	(0.747)	
Firms Controls	Yes	Yes	Yes
Bank Controls	Yes	Yes	No
Loan Controls	Yes	Yes	No
Bank FE	Yes	Yes	No
Firm FE	Yes	Yes	Yes
Observations	3.700	1,718	7,316
R^2	0.15	0.16	0.241

Table 6: Robustness Checks

$WHOLESALE_{2007}$ is the ratio of wholesale funding (banker acceptances, repos, fixed term, and demand and notice deposits by deposit-taking institutions) to total funding (wholesale funding and demand and fixed-term deposits by individuals). For the period 2007:Q4 to 2010:Q1 the values of $WHOLESALE_{2007}$ are fixed to the pre-crisis period that is the first three quarters of 2007. In the upper panel: $H\ WHOLESALE$ is a dummy variable that takes one for values higher than the monthly median for the period 1995 to 2004. CRISIS is a dummy variable that takes the value of one for loans originated from the 2001:Q3 to 2004:Q4. In the middle panel: for the period 2007Q4 to 2010Q1 the values of wholesale funding are fixed to the pre-crisis period that is the first two quarters of 2007. *Impaired loans* is the ratio of quarterly non-performing commercial and industrial loans to total amount of commercial and industrial loans. CRISIS is a dummy variable that takes the value one for loans originated from the 2007:Q4 to 2009:Q4. In the bottom panel: All specification include syndicate fixed effects. All specifications include the same set of control variables as in Table 4. The standard errors in parentheses are clustered at firm levels. All models include yearly, monthly, quarterly, bank and firm fixed effects. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	Public	Private	Public	Public	Public
	$\log(loan)$	$\log(loan)$	$\log(\frac{loan}{assets})$	$\log(loan)$	$\log(\frac{loan}{assets})$
$CRISIS_{2001} \times H\ WHOLESALE$	0.54***	0.10	0.33*	0.52***	0.48*
	(0.191)	(0.178)	(0.031)	(0.191)	(0.172)
$H\ WHOLESALE$	-0.41**	-0.01	-0.4**	-0.15	-0.72**
	(0.175)	(0.286)	(0.039)	(0.220)	(0.23)
$CRISIS_{2001}$	-0.83**	-0.14	-0.70	-0.61***	-0.22
	(0.376)	(0.334)	(0.109)	(0.380)	(0.371)
Obs.	422	485	422	422	422
R2	0.140	0.203	0.19	0.16	0.13
$CRISIS \times WHOLESALE_{2007}$	-0.68*	0.45	-0.42	-0.81*	-0.872*
	(0.371)	(0.449)	(0.561)	(0.483)	(0.501)
$WHOLESALE_{2007}$	0.45	-0.05	0.23	1.11	0.79
	(0.604)	(0.869)	(0.59)	(0.768)	(0.841)
$CRISIS$	0.47	-0.36	0.39	0.55*	0.55
	(0.324)	(0.308)	(0.39)	(0.323)	(0.37)
Impaired Loans	-0.99	-5.02**	-0.59	-2.31	-1.94
	(2.886)	(2.046)	(0.509)	(2.2)	(3.01)
Obs.	1,692	1,827	1,449	1,692	1,692
R2	0.14	0.085	0.113	0.13	0.13
$CRISIS \times WHOLESALE_{2007}$	-0.73*	0.56	-0.33	-0.54	-0.61*
	(0.425)	(0.398)	(0.541)	(0.489)	(0.38)
$WHOLESALE_{2007}$	0.82**	-0.31	0.55*	0.64*	0.66*
	(0.354)	(0.319)	(0.301)	(0.365)	(0.401)
$CRISIS$	0.39	-0.38	0.27	0.26	0.33
	(0.314)	(0.267)	(0.371)	(0.325)	(0.371)
Syndicate FE	Yes	Yes	Yes	Yes	Yes
Obs.	1,718	1,827	1,718	1,718	1,718
R^2	0.167	0.153	0.17	0.172	0.171

Table 7: Availability of Syndicated Loans and Lending Relationships

The dependent variable is log(*loan*). $WHOLESALE_{2007}$ is the ratio of wholesale funding (banker acceptances, repos, fixed term, and demand and notice deposits by deposit-taking institutions) to total funding (wholesale funding and demand and fixed-term deposits by individuals). For the period 2007:Q4 to 2009:Q4 the values of $WHOLESALE_{2007}$ are fixed to the value in the pre-crisis period that is the first three quarters of 2007. CRISIS is a dummy variable that takes the value one for loans originated from the 2007:Q4 to 2009:Q4. REL_MANY is a dummy variable that takes one if a firm has a past loan from more than one bank. The standard errors in parentheses are clustered at the firm level. All models include bank, firm and loan controls, year, month, quarter, bank, and firm fixed effects as in Table 4. In columns 3 and 4, instead of bank fixed effects we use syndicate fixed effects. ***, **, * denote significance at the 1%, 5%, and 10% levels, respectively.

	Public	Private	Public	Private
CRISIS	-8.94*	-0.37	-0.22	0.10
	(5.167)	(0.728)	(2.039)	(0.694)
$WHOLESALE_{2007}$	2.22**	0.26	1.38	-0.13
	(0.902)	(0.919)	(0.999)	(0.754)
REL_MANY	1.04**	0.42	0.75	-0.13
	(0.493)	(0.333)	(0.554)	(0.754)
$CRISIS \times WHOLESALE_{2007}$	13.96*	0.64	0.32	-0.05
	(8.139)	(1.181)	(3.260)	(1.142)
$CRISIS \times REL\_MANY$	9.30*	0.11	0.11	-0.65
	(5.155)	(0.663)	(2.068)	(0.785)
$WHOLESALE_{2007} \times REL\_MANY$	-1.72**	-0.72	-0.57	0.57
	(0.873)	(0.595)	(0.982)	(0.824)
$WHOLESALE_{2007} \times REL\_MANY \times CRISIS$	-14.55*	-0.22	-0.14	1.34
	(8.119)	(1.145)	(3.339)	(1.360)
Syndicate FE	No	No	Yes	Yes
Observations	1,619	1,911	1,619	1,911
R^2	0.094	0.069	0.154	1,911