The "Privatization" of Municipal Debt*

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Abstract

State and local governments in the U.S. have substantially increased their reliance on private bank loans in the aftermath of the Great Recession. Using loan-level data on bank lending to U.S. municipal governments, we document that these loans have high effective debt priority and are likely to allow borrowers additional debt capacity. Specifically, banks loans to municipalities are highly collateralized, include additional seniority and guarantee provisions, and have short maturities. Consistent with the idea that financially weak borrowers are more likely to resort to higher priority debt, banks' assessments indicate a non-trivial fraction of municipal borrowers to be high risk. Last, we show that exogenous adverse income shocks lead to a significant increase in bank financing in the debt structure of municipalities. These results suggests that the reliance of municipalities on private debt is likely to increase in an environment of eroding fiscal positions.

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1 Introduction

Although state and local governments in the U.S. have historically been regarded as some of the most financially sound entities, the aftermath of the Great Recession has cast doubt on this notion. For example, substantial losses in state pension funds during the financial crisis together with overly optimistic assumptions on pension asset returns have raised questions of whether state pension obligations may be sustainable (see Novy-Marx and Rauh (2012); Novy-Marx and Rauh (2011)). The financial crisis also lead to the collapse of most bond insurance companies, leaving the vast majority of obligations of state and local governments uninsured. At the same time, unmet needs for infrastructure investments, the bulk of which are typically funded by state and local governments, have been growing and estimated to amount to approximately $2 trillion in 2017.[1] In the presence of these funding shortfalls, municipal entities have rapidly increased their reliance on private bank loans. Specifically, state and local governments have increased their bank loan obligations from about $30 billion before the financial crisis to over $160 billion in late 2016 (see Figure 1).

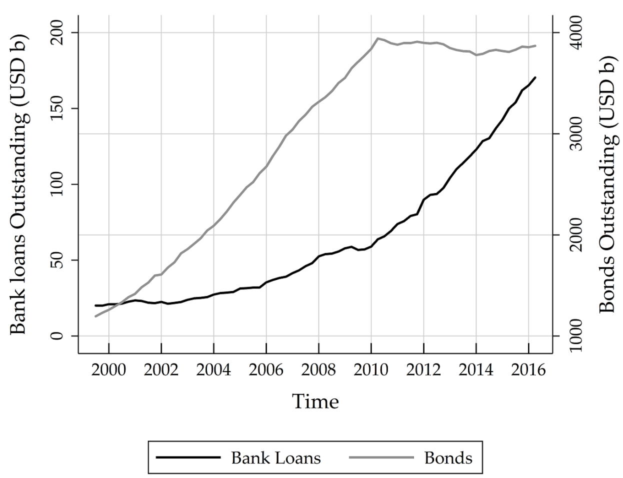

Figure 1: Volumes of bank loans and municipal bonds outstanding over time

Yet empirical evidence on this trend has been nonexistent, mainly due to the lack of data. No disclosure requirements exist for private debt claims of municipal governments, and

[1]See http://www.msrb.org/ /media/Files/Resources/MSRB-Infrastructure-Primer.ashx.

very few municipal entities choose to disclose voluntarily.[2] Using confidential supervisory loan-level data on bank lending to municipal governments in the United States, we study the municipal bank debt market. We first present key characteristics of the average bank loan contract to municipalities and discuss implications for debt seniority and potential claim dilution between private and public debt claims. We then analyze banks' internal assessment of the credit worthiness of municipalities and draw comparisons with that of rating agencies. Given that banks' are likely to have substantially more information than bond investors due to the continuous monitoring banks engage in when working with borrowers (Gustafson et al. (2018)), these results shed new light on the riskness of municipal issuers. Last, we study how exogenous adverse income shocks affects the debt structure of municipalities. This analysis helps us understand whether the trend towards private debt claims is likely to persist in an environment of eroding fiscal positions.

We obtain information on bank loans to municipalities from the Federal Reserve's Y-14Q data. The reporting panel starts in Q3 of 2012 and includes bank holding companies with at least US $50 billion in total assets. Loans to municipalities are reported in the commercial loan collection that contains detailed information on all outstanding commercial and industrial bank loans with commitment amounts exceeding $1 million. Overall, we capture approximately 60% of total bank lending to municipal borrowers as our data set does not include lending by smaller banks.

We first show that most of bank lending to states and local governments is done via credit lines, terms loans, and to a lesser extent leases.[3] The majority of bank borrowing of cities counties, cities, and distiсts (both in terms of counts and funded amounts) is done via term loans. In contrast, states that have bank borrowing exhibit greater reliance on credit

[2]For example, only less than a 100 issuances of bank loans have been reported as compared to the 44,000 state and local issuers (see https://www.sec.gov/rules/proposed/2017/34-80130.pdf and https://www.sec.gov/news/studies/2012/munireport073112.pdf). In addition, a substantial fraction of those documents are so heavily redacted that no information on bank loan interest rates, commitment amounts, maturities, or fees could be obtained.

[3]Leases represent only between 12% and 16% of bank loans in terms of counts and even less in terms of outstanding debt. Other types of lending exposure include demand loans, commercial cards, bond purchase agreements.

lines than local governments such as counties, cities, and districts. Additionally, municipal governments may have substantial additional ability to increase debt in a short time frame because of large unused revolving credit capacity.

We also show that bank lending to state and local governments is heavily collateralized, has high contractual priority, and contains additional guarantees. For example, 60% of lines of credit and 80% of term loans are secured, with banks almost always having first-lien priority on the assets that secure the loans. Whenever a bank loan is unsecured, banks are almost always senior in terms of priority. In addition, bank loan maturities are short: only 2-3 years for lines of credit and 7-8 years for term loans. Overall, given the high collateralization of bank loans combined with maturities that are likely to be substantially shorter than those of public bonds, state and local governments with outstanding bonds may dilute public bondholders when they issue new bank loans. While such bonds claim dilution through collateralization and shortening of debt maturities may be a way to maximize external finance proceeds given the realization of an adverse income shock,[4] it substantially limits the ability of a municipality to take on additional debt (see, e.g., Brunnermeier and Oehmke (2013), Donaldson et al. (2017)).

We also document the variation in credit risk distribution of the pool of state and local government borrowers from banks' perspective. We first show that banks work with state and local government borrowers that may be substantially riskier than the universe of municipalities that are rated by credit rating agencies. For example, rating agencies classify the bonds of almost all state and local governments to be of extremely unlikely to default or lead to creditor losses. Specifically, ratings agencies classify over 99% of municipal issuers to be investment-grade. In comparison, banks assessments of credit quality of municipal borrowers shows that that a substantial fraction of those borrowers may have non-trivial credit risk – approximately 18% for states, 16% for counties and cities, and 22% for districts. This finding shows that municipal issuers may not be as safe as previously assumed. It also

[4]It may be optimal ex ante for bond holders to allow for claim dilution if adverse income shocks occur with positive probability.

reinforces the idea that financially weak municipal borrowers are more likely to resort to higher priority debt in a similar way to corporate borrowers (see, Rauh and Sufi (2010)).

We next examine the cross sectional variation in municipal debt structure to gain insight on the types of municipalities that are most reliant on bank loans. For this part of the analysis we only use the sample of county governments as our income shocks are at the county-level. Specifically, we show that small, more levered, and low income counties are particularly reliant on bank debt. These summary statistics indicate that bank debt is a particularly relevant portion of total debt financing exactly in the municipalities where pledgeable income is lower and therefore uncertainty about debt repayment is higher. These findings are in line with corporate finance theory that generally predicts a shift in capital structure towards more senior debt claims as uncertainty about debt repayment increases (see, Diamond (1991); Bolton and Freixas (2000)). Even though bank loans impose an array of costly limitations on borrowers (see, Smith and Warner (1979), Smith (1993), Gilson and Warner (1998)), providing higher security and priority to the new lenders may be the only way to effectively raise additional financing as repayment uncertainty increases. We also show that small and low-income counties are more reliant on term loans rather than on credit lines. This may be because of higher substitutability of term loans with public bonds than credit lines (see Gustafson (2013) for an exposition of this idea in the corporate debt space).

As the cross sectional associations above could be confounded with other relevant factors, we study how debt structure responds to permanent and transitory income shocks that are arguably exogenous to the prospects or investment opportunities of municipal entities. We construct permanent income shocks as in Suárez Serrato and Wingender (2016). Specifically, these authors argue that a large share of federal spending and transfer programs to counties depend on population estimates. With every decennial census, these population estimates get revised and reset to the actual population counts. Importantly, the magnitude of these unexpected revisions differs across counties and, as the authors demonstrate, they are not geographically or serially correlated. We extend their approach to the most recent census of 2010, and use the difference between the Census Bureau's population estimate and the actual census count as a shock to local spending. While Suárez Serrato and Wingender (2016) consider the effect on labor outcomes, we consider the implications for municipal financing. We conduct this analysis on the bottom half of the distribution of median household income for two reasons. As our earlier results show, these counties are more likely to be reliant on bank financing. In addition, this subset of counties has lower pledgeable income and therefore higher uncertainty about debt repayment. Overall, we focus on the subset of municipal borrowers for which the tradeoff between public and private debt is empirically revelant.

One concern with the exogeneity of the permanent income shocks is that state and local governments may have private information on the actual population count of their respective jurisdictions. State and local governments may therefore anticipate the direction of federal funding changes before the Census takes place. Consequently, municipal governments may obtain financing or alter spending patterns before the Census count estimates are released. This is unlikely to be the case for several reasons. First, Suárez Serrato and Wingender (2016) argue that the difference between the actual count and the forecasted population count comes from both forecasting errors and errors in how the Census counts the actual population; both types of errors are also likely to vary from one Census to the next. In addition, the authors show the measure of permanent income shocks to be uncorrelated with past local economic growth making aniticipation effects by local governments unlikely.

We find that counties increase bank borrowing following adverse permanent income shocks. A one standard deviation unexpected decrease in federal funding, on average, increases bank loan share by approximately two percentage points. We show this pattern is driven by municipalities issuing signficantly more private debt claims (of about $250 per capita) and repaying some of outstanding bonds. As a result, we find no resulting change in total debt financing. Overall, this is consistent with additional reductions in credit quality among counties with an already low level of pledgeable income leading to an increase in demand for senior claims because of lower levels of pledgeable income and therefore uncertainty about debt repayment.

We next investigate how transitory shocks to municipal income impact municipal debt structure. We use unexpected adverse winter weather as a transitory shock to municipal income. A number of studies have demonstrated the adverse impact of winter weather on corporate cash flow.[5] To the extent that businesses in the municipality lose revenues because of unexpected adverse winter weather, the municipality will collect less in tax revenues, leading to reductions in total income. Similarly, unexpected adverse winter weather could increase the operating costs of municipal entities through lost employee productivity, further reducing municipal income. We find that counties use credit lines to buffer adverse transitory income shocks. Consistent with the transitory nature of these shocks, outstanding credit line drawn amounts increase following these transitory shocks. Overall, our evidence on both permanent and transitory income shocks suggests that in a scenario of economic stress municipal entities are likely to shift debt structure towards private debt and therefore accelerate the trend higher reliance of public entities on bank loans.

2 Data and Sample Selection

Our municipal financing data come from two sources. We obtain information on bank loans to municipalities from the Federal Reserve's Y-14Q data, collected on a quarterly basis to support the Dodd-Frank Act Stress Tests and the Comprehensive Capital Assessment and Review. The reporting panel starts in Q3 of 2012 and includes bank holding companies with at least US $50 billion in total assets. The panel has grown over time and as of 2016:Q3 includes 35 bank holding companies. Schedule H1 of these data contains detailed information on all outstanding commercial and industrial bank loans with commitment amounts exceeding $1 million.[6]

[5] For example, Gustafson et al. (2017) shows that unexpected winter weather substantially and significantly reduces annual corporate cash flow in a number of key sectors such as manufacturing, transportation, wholesale trade, and construction.

[6] More comprehensive sources containing the total funded amounts of bank loan to state and local governments are the FR-Y9C collection and the Call Reports. However, the data in these sources are highly

We identify observations corresponding to municipal borrowers in the Y-14 data by using string search techniques identified in Appendix A and supplement this algorithm with a complete list of municipalities from the Census website. Specifically, we identify four types of municipal entities: 1) "cities", 2) "counties", 3) "states", and 4) "special districts". Figure 2 shows that total outstanding municipal bank debt in our sample has grown from approximately \$60 billion in Q3 of 2012 to about \$90 billion in Q3 of 2016.[7] The same applies for commitment exposure increasing from just above \$125 billion in 2012Q3 to approximately \$170 billion in 2016Q3.

Overall, we capture the majority of municipal bank borrowing in the United States. Comparing the volumes to Figure 1, municipal bank loans in the Y-14 data represent approximately 60% of the total outstanding balances of municipal bank debt from the Call Reports. Another important benefit of our data set as indicated in panel (a) of Figure 2 is that we also capture the dollar amount of unused lines of credit – over our sample period this figure is as large as outstanding bank debt.

We obtain data on municipal bond issuance from Mergent's Municipal Securities Database. We track the identity of the issuer (city, county or state government) and separate issuance into general obligation (GO) bonds that are backed by the full faith of the municipal government and revenue bonds that are backed by project-specific revenues (such as the revenues from toll roads). We arrive at the quarterly outstanding amount of bond financing for each municipality by using comprehensive information on new bond issuance, repayment, refinancing, and bond calls. Specifically, for each municipality-quarter we sum the dollar amount of new bonds associated with new issues and refinancings to the existing balance as of the end of the previous quarter and subtract the amount of direct repayments as well as those associated with bond calls and refinancings.

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aggregated (bank-quarter level) so they does not allow to study individual loans, and as a result the contract structure, riskiness and cost of private financing to state and local governments.

[7]This trend in our sample does not appear to be driven by the addition of new institutions to the Y-14Q collection over time since the initial collection already included the largest banks in the United States. Restricting the sample to the institutions that were in the 2012Q3 collection and re-calculating the figure results in a very similar trend of utilized exposure.

As shown in Figure 1 in Section 1, the total amount of outstanding municipal bonds increased sharply until around 2010 but has leveled off since then. In late 2016, the total amount of municipal bonds outstanding was approximately $3.8 trillion.

Given that the income shocks we study in the second half of the paper are at the county-level, we later restrict attention to the subsample of county governments. We first merge the county debt data with county-level economic data from the websites of the US Census and the Bureau of Labor Statistics (BLS). Specifically, we obtain quarterly data on employment, wages, and establishments from the Quarterly Census of Employment and Wages via the BLS website. In addition, we use data on unemployment rates and median and average household income for each county from the 5-year estimates of these variables, available from the US Census website. This leaves us with 893 counties that have a bank loan outstanding and 2,146 counties that have a bond outstanding during our sample period (Q3 of 2012 through Q3 of 2016) and that have available information on key economic variables. 780 of these counties have both bank loans and bonds outstanding.

3 Bank Lending to Municipalities

3.1 Summary statistics

Table 1 presents summary statistics for the bank loans to states, counties, cities, and special districts. The sample used to arrive at these statistics is at loan-quarter level for the period between 2012Q3 and 2016Q3. We show that the vast majority of bank lending to states and local governments is done via credit lines, terms loans, and to a lesser extent leases.[8]

States that have bank borrowing exhibit greater reliance on credit lines than other local governments – 40% of loan-quarter observations for states versus 21%, 26%, and 26% for counties, cities, and districts. Average credit line commitment amounts vary between $13.55

[8]Other types of lending exposure that are less frequently observed include demand loans, commercial cards, bond purchase agreements.

million for districts and \$36.49 for states with average drawn amounts representing only a small fraction of average commitment sizes. It is important to note that only a minor fraction of aggregate credit line commitments has been drawn. Specifically, only between 48% (for states) and and 61% (for counties) of lines of credit have been at least partially drawn with the average utilization ratio of drawn revolvers varying between 34% and 47%. This suggests that state and local governments may have substantial capacity to increase debt in a short time frame. The average remaining maturity of revolvers is between 9 and 13 quarters, fairly similar to the remaining maturities of bank loans to corporate borrowers.[9]

The majority of bank lending to counties, cities, and disticts is done via term loans with 58%, 54%, and 51% of all loan-quarter observations, respectively. In addition, term loans represent the majority of total funded amounts for these entities. In contrast, term loans represent only 31% of loans to state entities. The average term loan amounts vary between \$7 million (for cities) and \$20 million (for counties). In comparison, term loans are substantially longer-term with average remaining maturities ranging between 27 and 32 quarters. This is substantially shorter than maturities for municipal bonds.

Leases represent only between 12% and 16% of bank loans in terms of counts and even less in terms of outstanding debt. Average lease amounts across the four types of entities are substantially smaller than credit line commitments and term loan amounts, while remaining maturity is similar to the other types of bank lending. Average interest rates across state and local government entities and bank loan types appear very similar and vary between 2.7% and 3.2%.

In Table 2 we also show that bank lending to state and local governments is heavily collateralized. For example, between 56% and 70% of credit lines are secured, while between 77% and 84% of terms loans are secured. Panels A and B of Figure 3 show that whenever

[9]The remaining maturity is computed as the difference between the maturity date of the loan and the data observation date. In comparison, actual maturity is computed as the difference between maturity and origination dates. We consider remaining rather than actual maturities because as Roberts (2015) shows it is infeasible to distinguish between renegotiations of existing loans and new loans for middle market and large corporate borrowers, reducing the meaning of actual maturity.

a loan is secured, banks almost always have first-lien priority on the assets that secure the loans. The remaining loans, which are not secured, are almost always senior in terms of priority. Some bank loans also employ additional contractual guarantees by entities different from the borrower – such guarantees are substantially more common in credit lines than in term loans (especially those of cities and districts). Banks also require up to 15% of credit lines and up to 3.7% of term loans to provide additional guarantees.

Table 2 also shows that between 50% and 60% of credit lines and the vast majority of term loans are fixed rate. This is in contrast with loans to corporate borrowers where the vast majority of loans are floating rate and based on benchmarks such as the LIBOR or prime rates. In addition, a non-trivial fraction of loans contain prepayment penalties. This is especially relevant for term loans where up to 35% contain prepayment penalties. A substantial fraction of loans have associated state and/or federal tax exemptions for interest income from banks' perspective. For example, between 25% and 36% of credit lines and between 42% amd 55% of term loans are tax exempt. Last, few of the loans are syndicated despite the sizeable commitment amounts.

3.2 Credit Quality and Banks' Private Information

We next document the variation in credit risk distribution of the pool of state and local government borrowers from banks' perspective. The Y-14 data provides information on the bank internal borrower rating associated with each loan-quarter observation. The heterogeneous design of internal rating scales across banks makes direct cross sectional comparisons difficult. In order to generate a consistent credit rating that allows cross-bank comparisons, each Y-14 reporting bank provides a concordance map that converts the given bank's internal rating scale to a 10-grade S&P scale, ranging from AAA to D (see, Gutierrez-Mangas et al. (2015)). We use each bank's internal rating scale in combination with the concordance maps to arrive at an S&P equivalent rating for each municipal borrower in our sample.

Figure 4 shows that banks work with state and local government borrowers that may be substantially riskier than the universe of agency-rated municipalities. For example, both in terms of S&P and Moody's ratings almost all state and local governments are rated investment-grade and meaning that rating agencies deem municipal obligations extremely unlikely to default or impose losses on debt holders. In comparison, a substantial fraction of municipal borrowers that obtain bank finance are in the junk-rated category – approximately 18% for states, 16% for counties and cities, and 22% for districts – and are therefore characterized as having substantial risk.

Given that it is possible that banks and ratings agencies rate differently, in Figure 5 we present the average prodbability of default (Panel A) and the average loss given default for each bank rating category (Panel B). These estimates confirm that bank internal ratings of BB and below are associated with a non-trivial probability of default – BB-rated, B-rated, and CCC-and-worse-rated loans have probabilities of default of 0.84%, 3.7%, and 22.84%, respectively. The average losses given default vary between 25% and 40% for the vast majority of the sample and are a little more volatile in lower-rated categories. Thus, even though bank loans are heavily collateralized and senior, banks nevertheless assess the riskiness of a substantial fraction of lending to state and local governments to be high.

3.3 Municipal Debt Structure

Figure 6 depicts scatter plots of the association between the mix of bank loans and public bonds and county characteristics such as the number of households, median household income, debt-to-income, as well as bank loans' credit rating. Specifically, Panel (a) shows that less populated counties are more reliant on bank financing than larger counties. This is intuitive as smaller issuers are less likely to have access to public bond markets due to economies of scale in bonds issuance (see, e.g., Smith (1986)).

In Panels (b) and (c) of Figure 6, we also observe a negative association between the share of bank loans and county median household income or county total debt to income.

In other words, lower-household-income and lower debt-to-income counties have a larger share of bank loans in their capital structure. Both of these associations are consistent with issuers with higher pledgeable income and higher credit quality raising more of their financing through public bonds. These patterns are also consistent with the previously observed association between bank loan share and county size as smaller counties are more likely to be characterized by lower household income and debt-to-income. Therefore these findings exhibit resemblance to theories of corporate borrowers (Diamond (1991)) where the highest quality borrowers rely primarily on public debt markets and lower quality borrowers obtain bank loans.

Intertestingly, panel (d) of Figure 6 shows there does not appear to be a robust association between credit ratings (in terms of Moody's bond rating) and bank loan share. This finding may be a byproduct of constructing this graph with a select sample of municipal borrowers – only a fraction of all municipal borrowers are rated by ratings agencies.

In Figure 7, we investigate the relation between key county characteristics and the share of term loans relative to total bank borrowing. While term loans are shorter in maturity they are more likely to be substitutable with public bonds than lines of credit (see, e.g., Gustafson (2013)). In this setting, we expect to find similar associations between the share of term loans and key county characteristics as for the level of bank debt in county capital structure. As figure 7 shows, smaller counties and those with lower median household income are characterized by a larger share of term loans. These patterns are consistent with smaller issuers or those with lower pledgeable income being less likely to have access to public bonds markets due to economies of scale or otherwise higher costs in bonds issuance (see, e.g., Smith (1986)).

Table 3 analyzes the association between bank loan/term loan share and the key county characteristics in an OLS multivariate regression setting to determine the factors that are most relevant. Column (1) of this table shows that we observe the same associations between county size, median household income, debt-to-income and bank debt share even after controlling for county unemployment and major demographic factors such as the share of home ownership and residents age. Column (2) shows that these associations are once again statistically and economically significant when we restrict the sample to counties that have some bank debt in their capital structure. Last, column (3) indicates that in the multivariate setting the only statistically important determinant of term loan share is county size.

4 Municipal debt structure and income shocks

Using our newly constructed database of municipal debt structure, we turn to the question of how municipalities respond to permanent and transistory cash-flow shocks. We describe the construction of shocks first, discuss the empirical strategy afterwards and show results in sections 4.3 and 4.4.

4.1 Constructing permanent and transitory income shocks

4.1.1 Permanent income shock

We construct permanent cash flow shocks as in Suárez Serrato and Wingender (2016). Specifically, Suárez Serrato and Wingender (2016) argue that a large share of federal spending and transfer programs to counties depend on population estimates. With every decennial census, these population estimates get revised and reset to the actual population counts. Importantly, the magnitude of the revision differs across counties and, as the authors demonstrate, it is not geographically or serially correlated. The difference between the Census Bureau's population estimate and the actual census count can thus be used as a shock to local spending. While Suárez Serrato and Wingender (2016) consider the effect on local employment, we consider the implications for municipal financing.

Suárez Serrato and Wingender (2016) construct the shock for 1980, 1990 and 2000, so we follow their idea to calculate the corresponding county-level shocks for the 2010 census. Since the Census Bureau does not provide population estimates for census years, we estimate the following regression on county-level data within the 2001–2009 period:

$$\Delta Pop_{ct} = \gamma_1 \text{Births}_{ct} + \gamma_2 \text{Deaths}_{ct} + \gamma_3 \text{Net Migration}_{ct} + u_{ct} \tag{1}$$

In equation (1), ΔPop_{ct} denotes the change in the population of county c in year t, and all data series come from the Census Bureau. When we estimate the equation on data from 2001 to 2009, we find that the coefficients are very close to expectations, that is, $\hat{\gamma}_1$ and $\hat{\gamma}_3$ are close to 1 and $\hat{\gamma}_2$ is close to -1, and the regressors explain roughly 96% of the variation in population changes as reported by the Census Bureau. We predict population in 2010 from the estimated model, and contrast it to the actual population counts from the census in that year. We define the census shock as

$$CS_c = \log(Pop_c^{Census}) - \log(\widehat{Pop}_{2010}), \tag{2}$$

where the first component is the census count and second component is the predicted value for 2010 from the model in equation (1).

Panel (a) of Figure 8 shows the distribution of the census shock. The shock is slightly positive on average, meaning that population was, on average, underestimated before the 2010 census. There is considerable variation across counties, with some counties having their population counts reset by more than 20% (positive or negative). Most shocks are smaller than that, however: A county at the 10th percentile of the distribution has a census shock of around -3%, and a county at the 90th percentile of the distribution has a census shock of around 6%. The standard deviation across counties is roughly 5 percentage points.

As discussed in detail in Suárez Serrato and Wingender (2016), final census numbers are not released until up to two years after the decennial census, and local budgets should therefore not be affected immediately. Even after that, federal transfers might only adjust partially in each subsequent year as some federal agencies use a past moving average of population data to allocate transfers. Our financing data start in 2012 which is the first year in which we might see an effect on local budgets.

One concern with the exogeneity of the permanent income shocks is that state and local governments may have private information on the actual population count of their respective jurisdictions. State and local governments may therefore anticipate the direction of federal funding changes before the Census takes place. Consequently, municipal governments may obtain financing or alter spending patterns before the Census count estimates are released. This is unlikely to be the case for several reasons. First, Suárez Serrato and Wingender (2016) argue that the difference between the actual count and the forecasted population count comes from both forecasting errors and errors in how the Census counts the actual population; both types of errors are also likely to vary from one Census to the next. In addition, the authors show the measure of permanent income shocks to be uncorrelated with past local economic growth making aniticipation effects by local governments unlikely.

Note that the decennial census resets local population levels, permanently, that is, even though the population count is again estimated in years after the decennial census, the new estimates start from a different level. Hence, the entire path of expected population estimates is affected by the decennial census, making the effect on municipal budgets a permanent one. That motivates our interpretation of the census shock as a permanent income shock.

4.1.2 Transitory income shocks

We use unexpected adverse winter weather as a transitory shock to municipal income. A number of academic studies have demonstrated the adverse impact of winter weather on corporate profits. For example, Gustafson et al. (2017) shows that unexpected winter weather substantially and significantly reduces annual corporate profitability in a number of sectors such as manufacturing, transportation, wholesale trade, and construction. In addition, it negatively impacts sectors that constitute a major fraction of economic activity such as retail trade, business services, real estate, and accomodation and food although these effects are not statistically significant. Similarly, Tran (2016) finds that adverse weather decreases in-store retail sales by an economically large amount. Finally, Bloesch and Gourio (2015) find that the abnormally cold and snowy winter of 2013-2014 had a temporary but significant effect on the U.S. economy.

The strong empirical evidence of adverse effects of winter weather on corporate profitability implies that municipal income is also likely to be impacted. For instance, if businesses in the municipality lose revenues because of unexpected adverse winter weather, the municipality will collect less in tax revenues. Similarly, unexpected adverse winter weather could increase the operating costs of municipal entities through lost employee productivity.

Importantly, adverse winter weather constitutes a plausible transitory shock because it is likely to affect current income but unlikely to influence the long-run prospects of a municipality. For example, using a comprehensive sample of small, middle market, and large corporate borrowers Gustafson et al. (2017) show that even though unexpected adverse winter weather significantly affects profitability, it does not have any effect on corporate investment.

Following Gustafson et al. (2017), our measure of abnormal winter weather relies on the average snow cover in a given county during the first calendar quarter of each year. As the authors point out this measure combines the intuitive negative effects that both snowfall and cold weather may have on municipal revenues and operating costs. We use daily data on snow cover (in inches) from NOAA to construct this measure. Specifically, for each day and county, we first compute the median value of snow cover across weather stations.[10] We then calculate the average snow cover for each county for each year from 2002 to the present. Finally, we compute abnormal snow cover by subtracting the average snow cover from the time series average of snow cover for each county-year using the previous 10 years worth of data.

Panel (b) of Figure 8 shows the distribution of abnormal snow cover in our sample (for the sake of presentation the measure is scaled by 1000). The distribution of abnormal weather shocks in our sample looks very similar to that in Gustafson et al. (2017) – Figure 1 (b) in

[10]Using the median mitigates concerns that the effect of weather in high elevation geographic areas may not have much of an effect on municipal outcomes.

their paper, even though the shocks in our sample exhibit slightly higher dispersion. This is likely because fewer firms are located in counties with high volatility of weather conditions.

4.2 Empirical Strategy

Our strategy for estimating the effects of permanent or transitory income shocks is reminiscent of the direct projections approach in Jorda (2005), but differs slightly for each type of shock and we describe each implementation in turn.

Equipped with the census shock from the 2010 census, we run the following regression for each quarter t:

$$y_{c,t_0+t} - y_{c,t_0} = \beta_0^{(t)} + \beta_1^{(t)} CS_c^+ + \beta_2^{(t)} CS_c^- + X_c' \gamma^{(t)} + \alpha_s^{(t)} + \epsilon_{c,t_0+t}. \tag{3}$$

In equation (3), the outcome y_{c,t_0+t} is one of the following variables: bank loan share, bank or bond debt per capita relative to its level y_{c,t_0} in 2012:Q3. We separate the positive and negative components of the census shock (such that, e.g. $CS_c^+ = max(CS_c, 0)$) in order to allow for an asymmetric response to adverse and positive income shocks.

We include state-level fixed effects to account for co-movement of counties within the same state. For instance, it is possible that counties within the same state receive census shocks that are correlated because population estimates are off by more for the entire state. Including state-fixed effects assures that estimates rely on cross-county variation within states.

Census shocks might also be correlated with local economic conditions if, say, a booming local economy attracts more workers to the region, potentially resulting in a larger population projection error and a larger census shock. This would bias our estimates since census shocks and debt levels might display correlation because they both rely on economic conditions. We therefore include county-level annual employment growth and wage growth, debt-to-income, unemployment rate, median household income, homeowner share, share of the population under 18 years of age or over 60 years of age (X_c) to control for economic and demographic conditions at the county-level.

We estimate equation (3) for each quarter $t > t_0$, and report the coefficient estimates $\hat{\beta}_1^{(t)}, \hat{\beta}_2^{(t)}$ below.

To understand the effect of transitory income shocks on financing outcomes, we estimate regressions over all quarters in the sample to arrive at the average effect. These regressions take the form:

$$\Delta y_{c,t} = \beta_0 + \beta_1 \text{Snow Cover}_{c,t} + X_c' \gamma + \alpha_s + \alpha_t + \epsilon_{c,t}. \tag{4}$$

Coefficient β_1 in equation (4) gives the average effect of abnormal snow in county c at time t (where the shock occurs only in the first quarter of each year) on debt growth. As before, we run regressions for bank and bond debt per capita, separately.

We also study the effect of transitory shocks within each quarter of the calendar year using a regressions of the form:

$$y_{c,Qk} - y_{c,Q1} = \beta_0^{(k)} + \beta_1^{(k)} \text{Snow Cover}_{c,Q1} + X_c' \gamma^{(k)} + \alpha_s^{(k)} + \alpha_t^{(k)} + \epsilon_{c,Qk}. \tag{5}$$

Here, all variables are defined as above, except that $k \in \{1, \ldots, 4\}$ denotes the quarter of the calendar year and we pool observations over all county observations in the same calendar quarter. Since each regression pools over quarters in several calendar years, we include time fixed effects, $\alpha_t^{(k)}$, to control for common trends that would affect all counties.

4.3 Response to permanent income shocks

Figure 9 shows the response of municipalities bank loan share to our measure of permanent income revisions – the census shock – following adverse income shocks. We conduct this analysis on the bottom half of the distribution of median household income for two reasons. As our earlier results show, these counties are more likely to obtain bank financing and most likely to face difficulty in raising external finance in the presence of adverse income shocks. Reductions in credit quality (or income) of counties with already a low level of pledgeable income may lead to an increase of senior claims in their capital structure in order to raise additional financing (see, e.g., Brunnermeier and Oehmke (2013) and Donaldson et al. (2017)). In other words, we focus on the subset of municipal borrowers for which the tradeoff between public and private debt is empirically revelant.[11]

Consistent with the delayed nature with which the census shock affects federal transfers to municipalities, effects are small and not statistically significant up to two and a half years after Q4 of the census year (the 2010 census). After that, we find that the bank loan share increases after negative shocks. A one standard deviation decrease in the census shock, on average, increases the bank loan share by approximately two percentage points. These results are consistent with existing literature in corporate finance – Rauh and Sufi (2010) show that the fraction of both high priority and high seniority claims in corporate capital structure increases following adverse revisions in credit quality. We do not find a corresponding change in debt structure after positive income shocks.

Specifically, we find that after negative shocks, municipal financing in low-median income counties is characterized by an increase in the dollar volume of bank financing and a decrease in the dollar volume of bond financing, with bank financing increases at an approximately 4 times faster pace than the reduction in bond financing. Overall, this leads to an increase in the bank debt share as seen previously. This result provides further support to the idea that municipalities actively rebalance their capital structure towards more senior debt claims following adverse permanent income revisions consistent with Diamond (1991) and Bolton and Freixas (2000).

Figure 10 shows that after positive permanent revision to expected income, low-median income counties decrease their amounts of outstanding bonds and slightly increase the issuance of bank loans, leading to no change in the fraction of bank debt claims. In effect, low-median

[11]The results in the full sample are qualitatively similar to those in he bottom half of the distribution of the median household income, however they are a little more noisy and less statistically significant.

income municipal entities repay outstanding bonds, possibly to substitute more expensive previous issues following the upward adjustment in permanent income.

4.4 Response to transitory income shocks

Finally, we analyze the debt structure response of municipalities to transitory income revisions. While these shocks do not affect the fundamentals of a given county, they may elevate the the riskiness of a county in the short and the intermediate term. Therefore, it is important to understand if the capital structure of municipalities is tilted towards more senior debt claims to accommodate these types of income shocks.

In columns (1) through (5) of Table 4, we present how the quarterly change in credit line commitments, utilized amounts under credit lines, term loans, as well as bonds varies with transitory income shocks as proxied by the abnormal snow cover in the first calendar quarter of the year. We show that abnormal snow cover is positively and statistically significantly correlated with the quarterly change in drawn amount under credit lines but statistically unrelated to all other debt structure outcomes. These results indicate that municipalities buffer transitory income shocks with increasing bank borrowing, thereby adding relatively more senior debt to their capital structure.

In columns (6) through (10) of Table 4 we investigate whether transitory shocks have a lasting effect on debt structure of municipalities. Specifically, given the weather shocks occur in Q1 of each year we investiagte whether the effects we find in columns (1) through (5) of Table 4 disappear by Q4. Therefore, we regress year-over-year changes in the financing variables in Q4 on the weather shock in Q1. Our results once again indicate that municipal entities have larger outstanding drawn amount under credit lines following transitory income shocks in the first calendar quarter. We do no find a statistically significant results for any other financing variables. Figure 11 explains why transitory shocks may have a lasting effects on the debt structure of municipalities. It shows that while, the draws and line size increases we observe in columns (1) and (2) of Table 4 are primarily coming from the first two quarters of the year, there does not apopear to be corresponding repayment/commitment reduction of credit lines over the remaining quarters.

5 Conclusion

State and local governments have substantially increased their reliance on private bank loans in recent years. Using confidential supervisory loan-level data on bank lending to municipal governments in the United States, we document the key characteristics of these loans. We show that bank loans to state and local government entities are highly collateralized, with relatively short maturities, and often provide tax exemptions to lenders. In addition, the pool of municipal entities with bank loans contain a non-trivial fraction of high risk borrowers. This suggests that financially weak municipal entities may be more likely to resort to higher seniority bank debt to create additional debt capacity. We strengthen this conclusion by showing that exogenous adverse income shocks lead to a significant increase in bank financing in the debt structure of municipalities.

Overall results suggest that the trend towards increased reliance on private debt claims is likely to persist as more municipalities are facing eroding fiscal positions. Importantly, from the pespective of a municipal issuer, increasing the effective debt priority in its capital structure may make it difficult to raise additional debt in the future as there may be little space to dilute bank lenders.

Our paper also contributes to the finance literature studying conflicts of interest between different types of claimholders. While publicly-traded corporations face timely and comprehensive disclosure requirements for all cash flow claims, disclosure of different debt instruments used by municipal governments is less regulated. In this setting, the claimholder conflict may be severe because bank debt generally has higher priority in terms of both explicit contractual provisions (see, Barclay and Smith (1995b)) and higher effective priority in time than public bonds (see, e.g., Ho and Singer (1982); Barclay and Smith (1995a)). We demonstrate that municipalities actively issue bank loans following adverse income resivision suggesting claim dilution may be a relevant consideration for pre-existing bond holders. Overall, the absence of disclosure of private claims may lead to higher costs of bond financing for state and local governments.

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A Figures and Tables

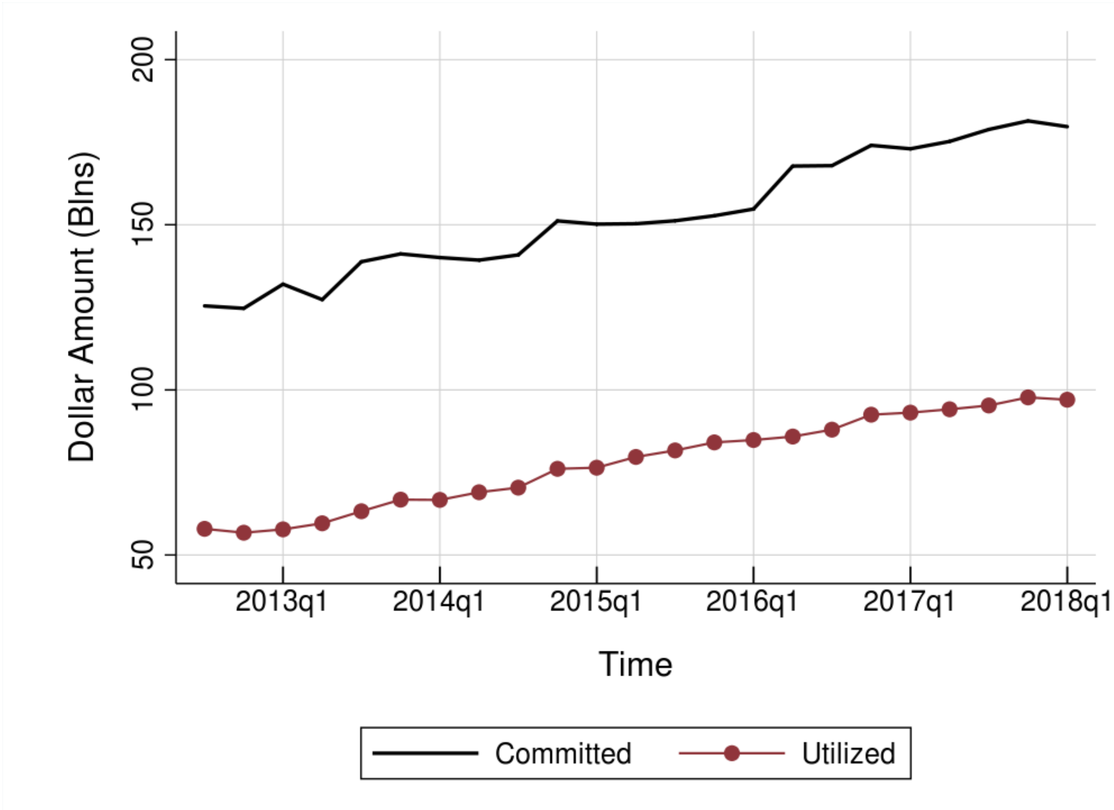
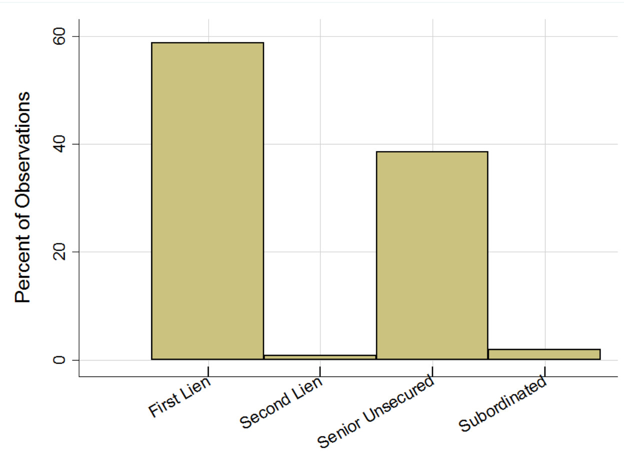
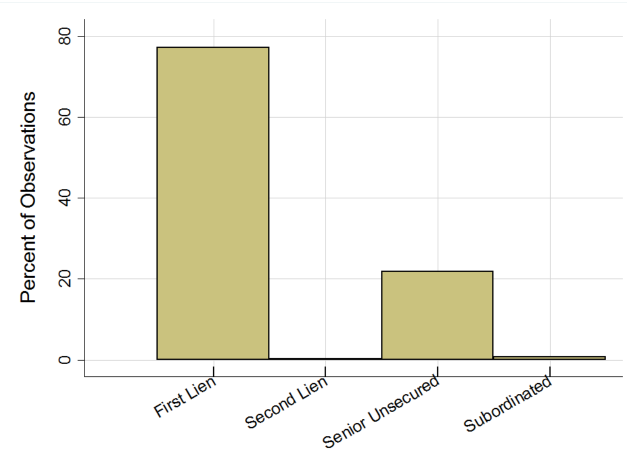


Figure 2: Municipal Bank Debt: This figure presents the total dollar amount of utilized and committed bank loan exposure of Y-14 banks to municipalities during our sample period. Panel B presents the average fraction of bank debt to total debt for different groups of municipal issuers over the sample period (both bank debt represents utilized outstanding amounts under all types of bank loans to municipalities).

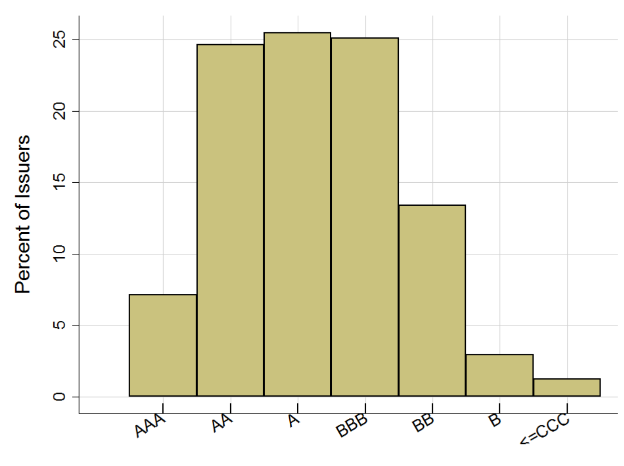


(a) Lines of Credit

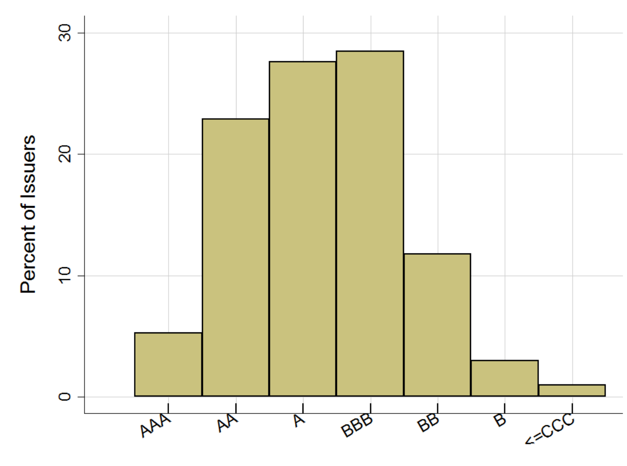


(b) Term Loans

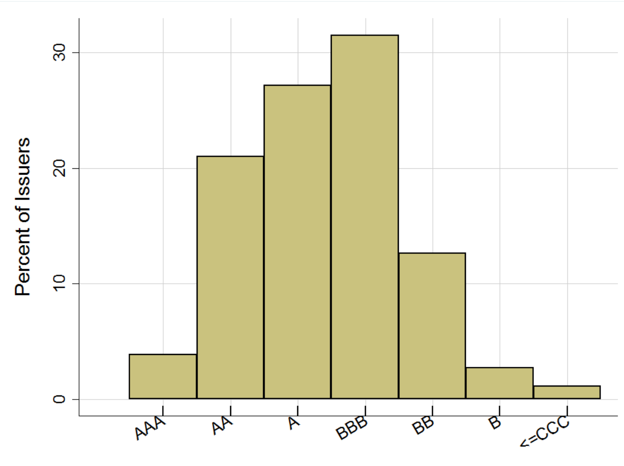
Figure 3: Bank Loan Collateral. This figure presents details on the collateralization of municipal bank loans. The top two panels show the extent to which lines of credit (Panel A) and term loans (Panel B) have first- or second-line collateral, are senior unsecured or contractually subordinated. The bottom two panels detail the type of assets that secure first- and second-lien loans from the the top two panels for both lines of credit (Panel C) and term loans (Panel D).



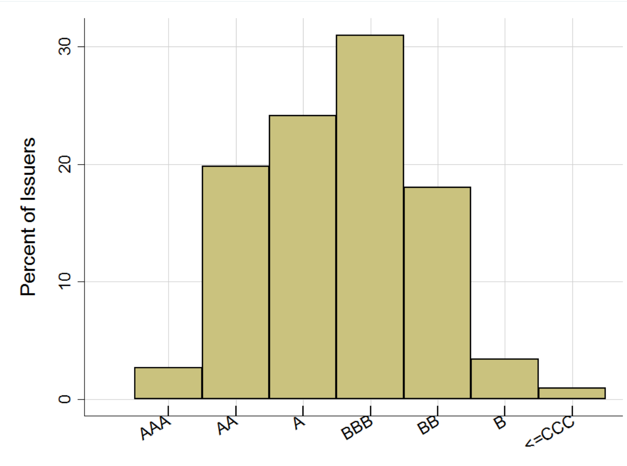
(a) States



(b) Counties

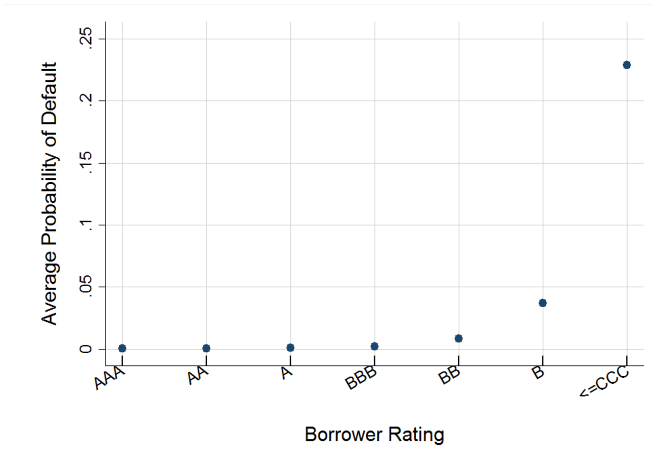


(c) Cities

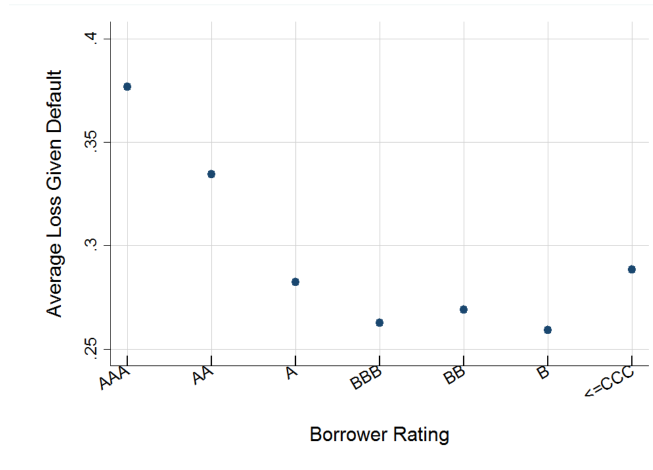


(d) Districts

Figure 4: Credit Quality of Municipal Borrowers. This figure presents histograms of the distributions of the concordance mapped bank internal ratings of municipal borrowers by borrower type.

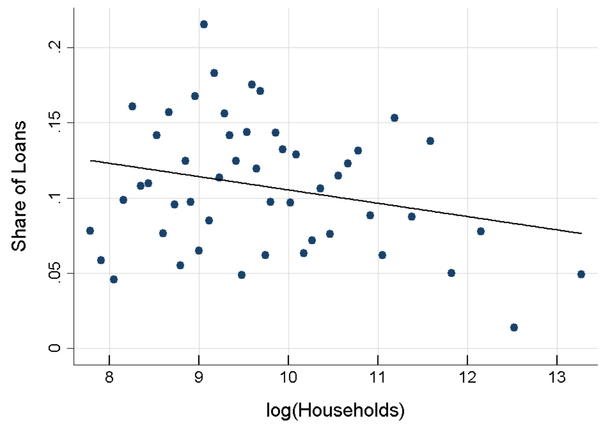


(a) Probability of Default

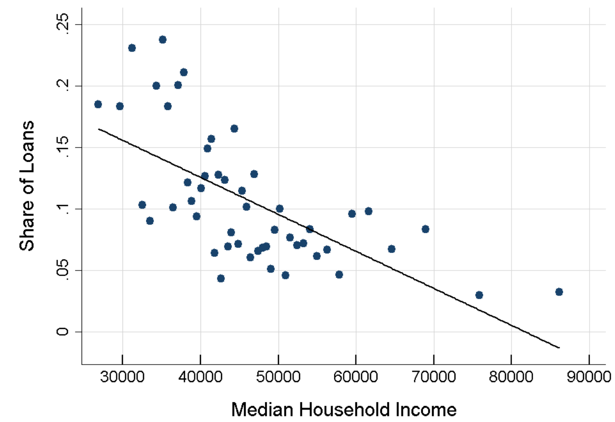


(b) Loss Given Default

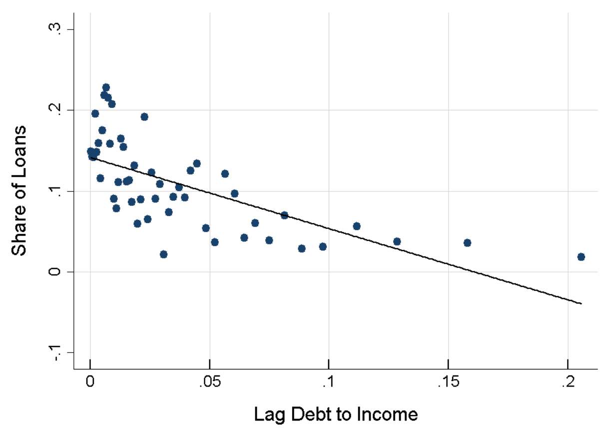
Figure 5: Default estimates and bank internal ratings. This figure presents the average probability of default and the loss given default for each bank internal rating category.



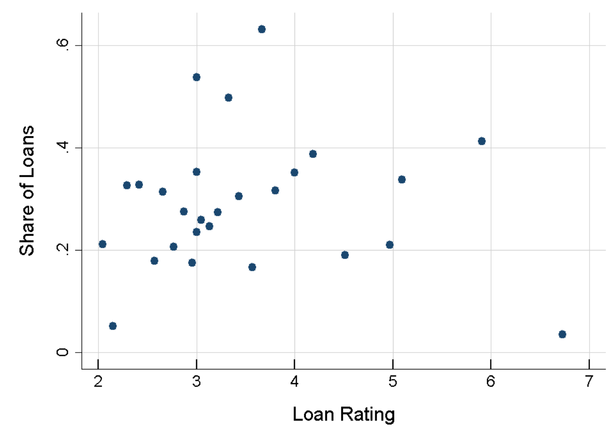
(a) Population



(b) Median household income

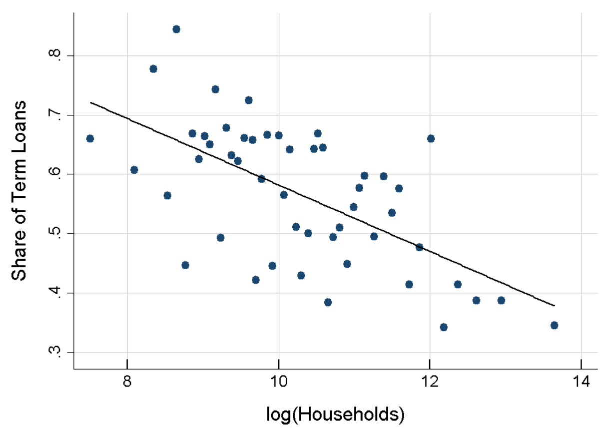


(c) Debt to income

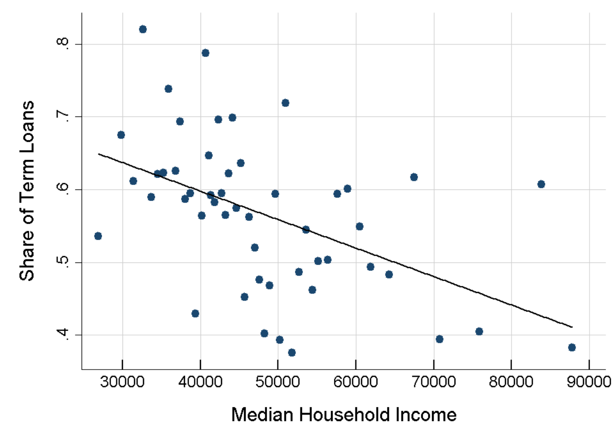


(d) Credit rating

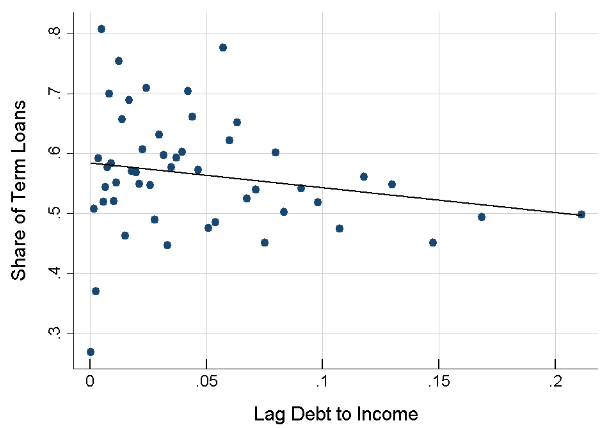
Figure 6: Municipal bank debt share and county characteristics: This figure presents scatter plots of the relation between bank debt share of municipalities and key county characteristics. The bank debt share is defined as the the total dollar amount of bank loans (utilized exposure) divided by the dollar value of total debt (utilized outstanding amounts of bank debt and revenue and general obligation bonds). For the sake of presentation the scatter plot points are aggregated into 50 bins or less. The Debt-to-Income variable is defined as total debt per household divided by the average household income, the credit rating variable comes from the Y-14 data and represents a bank-generated mapping from the bank internal rating of the borrower to an external 10-bucket S&P scale.



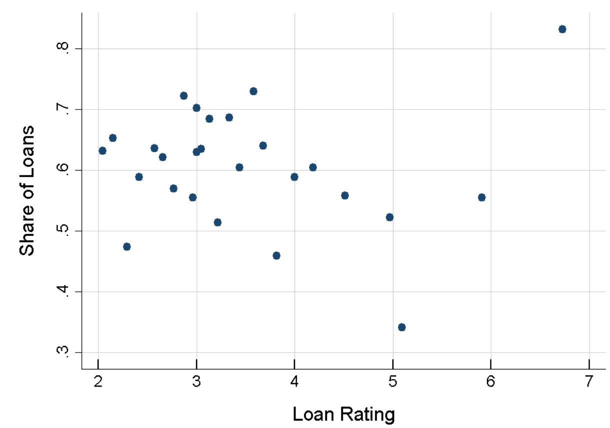
(a) Population



(b) Median income

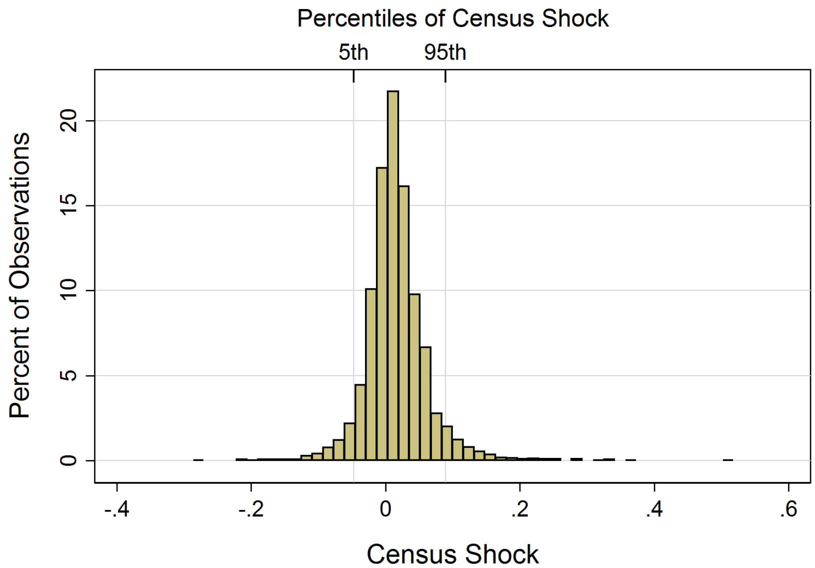


(c) Debt to income

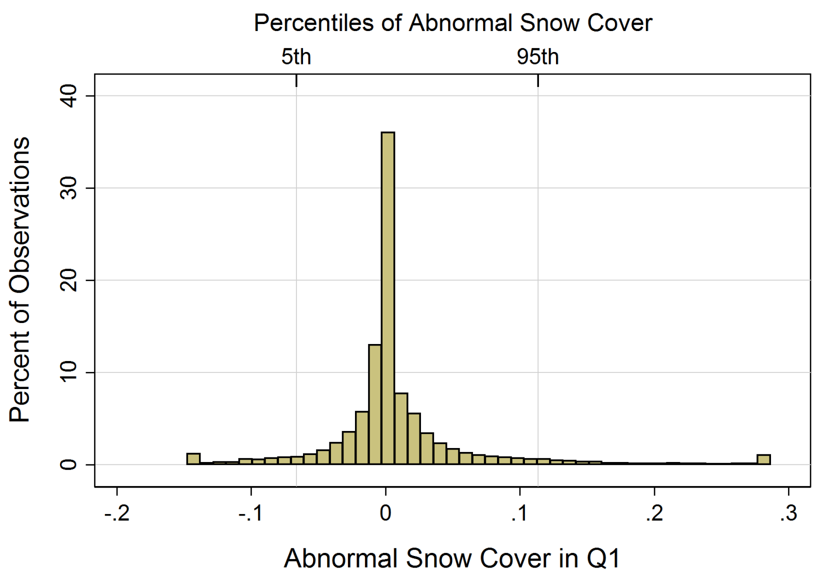


(d) Credit rating

Figure 7: Municipal term loan share and county characteristics: This figure presents scatter plots of the relation between term loan share of municipalities and key county characteristics. The term loan share is defined as the the total dollar amount of term loans divided by the dollar value of bank debt (committed exposure). For the sake of presentation the scatter plot points are aggregated into 50 bins or less. The Debt-to-Income variable is defined as total debt per household divided by the average household income, the credit rating variable comes from the Y-14 data and represents a bank-generated mapping from the bank internal rating of the borrower to an external 10-bucket S&P scale.

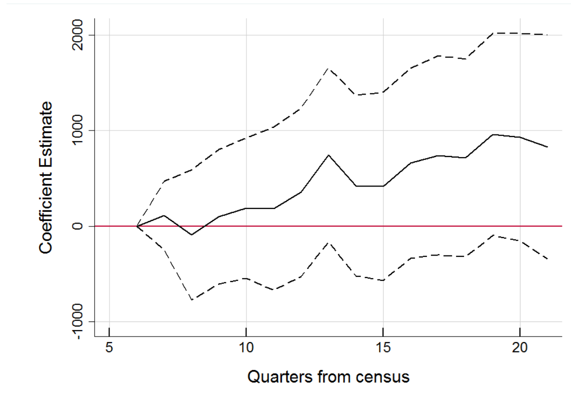


(a) Census shock

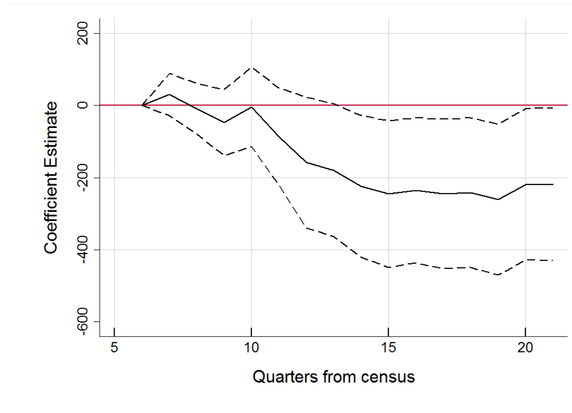


(b) Weather shock

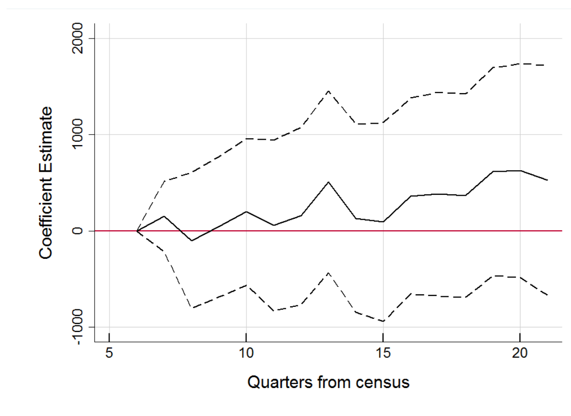
Figure 8: Permanent and transitory income shocks: This figure presents the distributions of permanent and transitory income shocks for the counties in our sample. We construct permanent income shocks in Panel A as in Suárez Serrato and Wingender (2016) as the difference between the Census Bureau's population estimate and the actual census count. We follow Gustafson et al. (2017) to construct the transitory income shock, relying on abnormal winter weather (snow cover). Specifically, we compute abnormal snow cover by subtracting the average snow cover during the first calendar quarter from the time series average of snow cover for each county-year in Q1 using the previous 10 years worth of data.



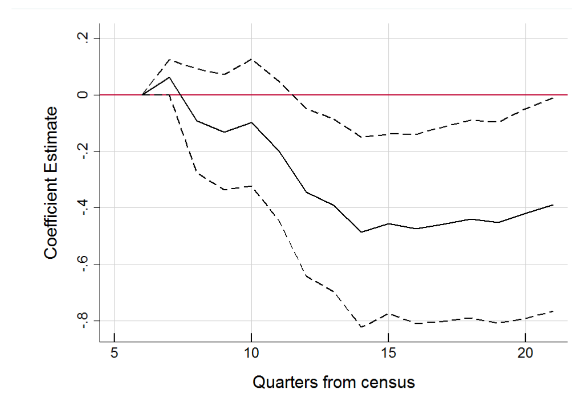
(a) Bond Financing



(b) Bank Financing

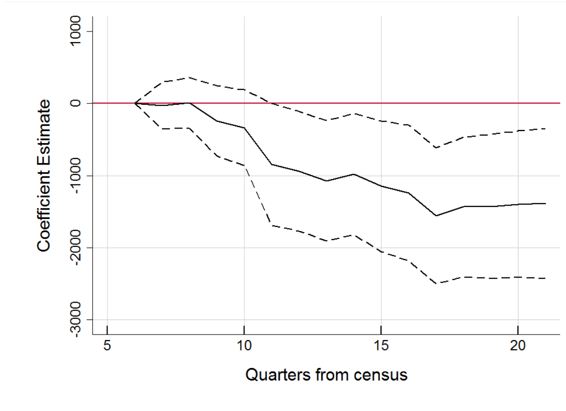


(c) Total Financing, Positive shock

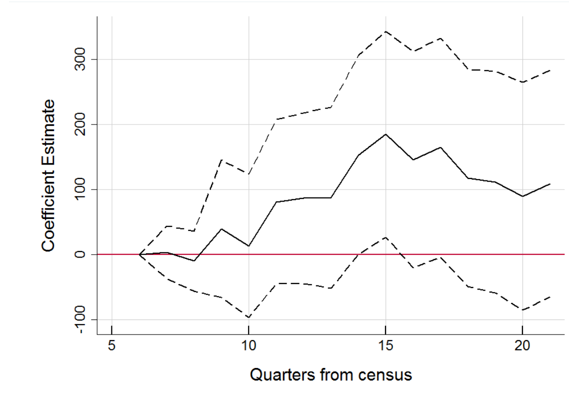


(d) Share of Loans

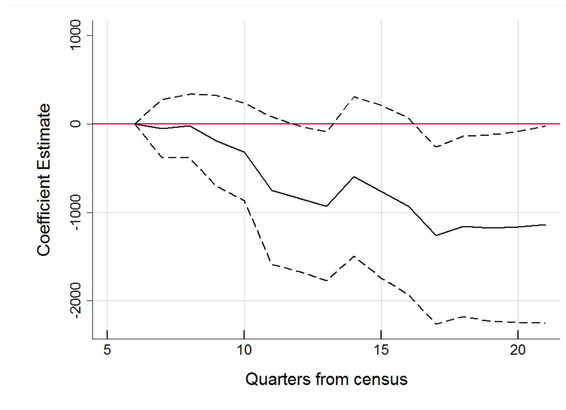
Figure 9: Response of Financing to negative income shocks. This figure presents the time series evolution of the sensitivity of bond, bank, total financing per capita, and total loan share (Panels A through D) in low income counties to negative permanent income shocks in event time. To obtain these sensitivities for every quarter in our sample we estimate cross sectional regressions of the change in dollar value of bonds/bank/total debt per capita as well as the loan share of municipalities since 2012Q3 on the positive and negative part of permanent income shocks and controls. Bank debt and bonds per capita are defined as in Appendix B, while the regression used to estimate the sensitivity is discussed in Section 3.2. The dashed lines represent the 90% confidence interval for these estimates.



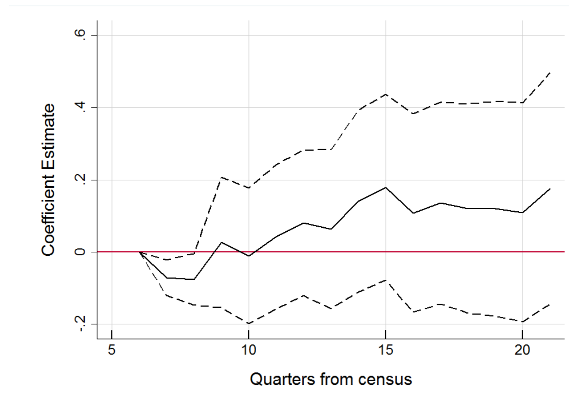
(a) Bond Financing



(b) Bank Financing

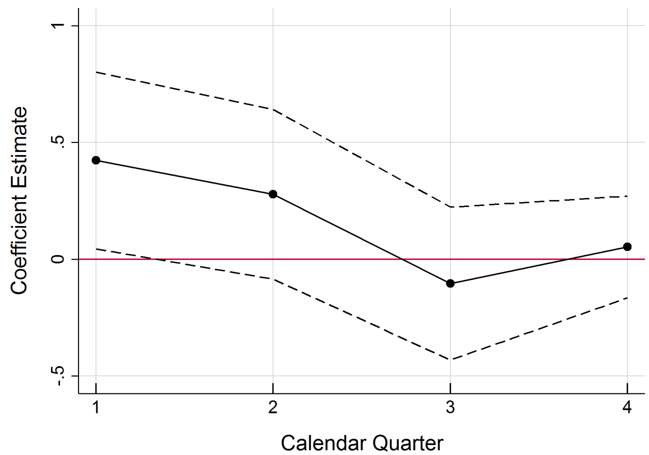


(c) Total Financing, Positive shock

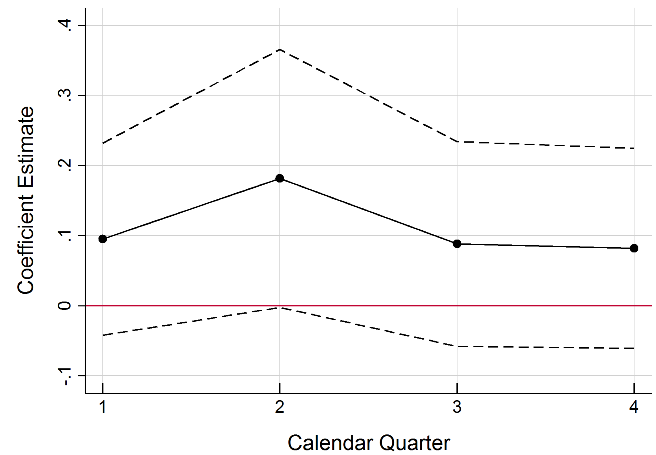


(d) Share of Loans

Figure 10: Response of Financing to negative income shocks. This figure presents the time series evolution of the sensitivity of bond, bank, total financing per capita, and total loan share (Panels A through D) in low income counties to positive permanent income shocks in event time. To obtain these sensitivities for every quarter in our sample we estimate cross sectional regressions of the change in dollar value of bonds/bank/total debt per capita as well as the loan share of municipalities since 2012Q3 on the positive and negative part of permanent income shocks and controls. Bank debt and bonds per capita are defined as in Appendix B, while the regression used to estimate the sensitivity is discussed in Section 3.2. The dashed lines represent the 90% confidence interval for these estimates.



(a) Effect on credit line size



(b) Effect on credit line utilization

Figure 11: Financing dynamics following transitory income shocks. This figure presents the quarterly response of bank and bond financing per capita to transitory income shocks. Specifically, each point on the solid line in the figure represents the estimated effect of abnormal first quarter snow cover on quarterly change in financing during the calendar quarter indicated on the x-axis (for example, Q1 represents the change in financing between the end of Q4 of the previous year and the end of Q1 of the current year). The dashed lines represent the 90% confidence interval for these estimates.

Table 1: Loan Characteristics. This table presents summary statistics (means) for key characteristics of bank loans to state, county, cty, and special district governments. All other variables in this table are defined as in Appendix B.

	States	**Counties**	**Cities**	**Districts**
Credit Lines				
Fraction of all loans	0.4064	0.2073	0.2575	0.2613
Committed Amount	36.4864	19.3063	22.6609	13.5478
Drawn Amount	6.2310	5.4806	4.0749	3.2409
Utilization	0.3418	0.4646	0.4243	0.4733
Fraction Drawn	0.4764	0.6061	0.5551	0.5591
Interest Rate	0.0267	0.0271	0.0272	0.0272
Rem. Maturity	8.7729	12.3432	12.5093	12.6418
Maturity	21.7944	24.2838	25.0721	25.6789
N	10,848	7,289	25,817	11,505
Term Loans				
Fraction of all loans	0.3072	0.5801	0.5366	0.5138
Committed Amount	20.3693	8.9857	7.2732	6.9167
Interest Rate	0.0279	0.0308	0.0298	0.0300
Rem. Maturity	27.3422	30.8969	32.0201	30.9567
Maturity	39.8487	45.3618	46.0983	46.3925
N	8,202	20,395	53,796	22,618
Leases				
Fraction of all loans	0.1564	0.1330	0.1202	0.1365
Committed Amount	5.8847	5.7039	5.1610	4.7543
Interest Rate	0.0310	0.0292	0.0303	0.0323
Rem. Maturity	23.3813	28.4548	30.4028	31.3756
Maturity	34.3037	37.4882	40.0677	40.6037
N	4,175	4,676	12,047	6,009

Table 2: Contractual Provisions. This table presents summary statistics (means) for key contractual provisions of bank loans to state, county, cty, and special district governments. All variables in this table are defined as in Appendix B.

	States	**Counties**	**Cities**	**Districts**
Credit Lines				
Secured	0.5600	0.6732	0.6332	0.6968
Guaranteed	0.0437	0.0532	0.0715	0.1546
Fixed Rate	0.5066	0.5328	0.5709	0.6151
Prepayment Penalty	0.1159	0.1843	0.1704	0.1944
Tax Exempt	0.2540	0.3203	0.3036	0.3583
Syndicated	0.0692	0.0454	0.0510	0.0403
N	10,848	7,289	25,817	11,505
Term Loans				
Secured	0.7775	0.8350	0.7718	0.7847
Guaranteed	0.0369	0.0322	0.0214	0.0372
Fixed Rate	0.6884	0.8709	0.8799	0.8527
Prepayment Penalty	0.1755	0.3474	0.3323	0.2693
Tax Exempt	0.4193	0.5082	0.5483	0.3988
Syndicated	0.0677	0.0245	0.0314	0.0184
N	8,202	20,395	53,796	22,618
Leases				
Secured	0.9890	0.9970	0.9911	0.9925
Guaranteed	0.0053	0.0120	0.0111	0.0012
Fixed Rate	0.9870	0.9822	0.9854	0.9863
Prepayment Penalty	0.2526	0.1739	0.2342	0.2318
Tax Exempt	0.5622	0.5379	0.5399	0.5129
Syndicated	0.0029	0.0015	0.0024	0.0013
N	4,175	4,676	12,047	6,009

Table 3: The determinants of bank debt shares: In columns (1) and (2) of this table we present cross sectional regression estimates of average bank debt share on key county characteristics. In column (3) we restrict the sample to counties with a positive amount of bank debt and present regression estimates of average term loan share on key county characteristics. For each county, average bank loan share and term loan share are defined as the time-series average of bank loan share and term loan share (see Appendix B for definitions of these variables).

Sample:	All counties	Counties with bank debt	
Dependent variable:	Total Loan share	Total Loan share	Term Loan share
Log(Households)	-0.012*	-0.084***	-0.061***
	(0.006)	(0.012)	(0.013)
Median income	-0.002***	-0.004***	0.000
	(0.001)	(0.001)	(0.002)
Debt to income	-0.382***	-1.034***	-0.004
	(0.057)	(0.157)	(0.149)
Unemployment rate	0.003	-0.001	0.003
	(0.002)	(0.005)	(0.006)
Homeowner share	0.290***	0.463**	-0.060
	(0.109)	(0.211)	(0.277)
Share under 18	-0.565**	-0.884*	-0.194
	(0.235)	(0.486)	(0.687)
Share over 60	-0.436**	-0.633*	-0.365
	(0.190)	(0.338)	(0.439)
Constant	0.332***	1.397***	1.332***
	(0.117)	(0.195)	(0.257)
R_a^2	.331	.447	.163
N	2361	926	926

Standard errors indicate significance at the 10%, 5% and 1% levels, respectively.

Table 4: Changes in financing and temporary income shocks. The table presents quarterly panel regression estimates of changes in financing (committed credit lines, utilized credit lines, term loans, and bonds) on temporary income shocks (abnormal snow cover). All variables are defined as in Appendix B.

Dependent variable:	Δ Line Size	Δ Drawn	Δ Term Loans	ΔGO Bonds	ΔRev Bonds	Δ Line Size	Δ Drawn	Δ Term Loans	ΔGO Bonds	ΔRev Bonds
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
avg_snow_cover	0.1319*	0.1282*	0.3392	4.9715	-1.2174	1.8238	1.7038**	8.7958	39.6444	-116.7959
	(0.0777)	(0.0688)	(0.7379)	(4.1715)	(5.0427)	(1.4369)	(0.6883)	(5.6620)	(25.3272)	(159.8637)
LogHouseholds	0.0048	-0.0007	0.3507***	0.8397***	-0.3882	0.0520	0.0520	1.9448***	2.1424*	72.8089**
	(0.0061)	(0.0039)	(0.0629)	(0.2544)	(0.4827)	(0.1007)	(0.0400)	(0.5172)	(1.2511)	(34.2036)
median_income	0.0000**	0.0000	-0.0000	0.0000	-0.0001	0.0000*	0.0000	-0.0000	0.0000	-0.0038
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0001)	(0.0000)	(0.0000)	(0.0001)	(0.0002)	(0.0042)
l1_debt_to_income	-0.1687	-0.0504	0.0522	-11.4942***	-63.8960***	-0.1583	1.1661	9.7385	24.2074*	18063.8933***
	(0.1113)	(0.0398)	(0.8180)	(2.8940)	(11.9800)	(1.1628)	(0.7670)	(7.3217)	(14.1227)	(755.5628)
pch_wage	-0.0191	-0.0045	-0.8324	2.8262	1.2488	-0.4113	-0.7440	-35.4692**	19.8775	6.2489
	(0.1025)	(0.0577)	(1.5027)	(6.3578)	(9.3231)	(2.1258)	(0.8632)	(15.1795)	(37.2327)	(310.5753)
pch_emp	-0.1995*	-0.1528**	1.9087	-3.0771	-15.1981	-4.3201*	-1.0578	25.6838	68.0806*	-678.7427
	(0.1100)	(0.0765)	(1.6763)	(6.3097)	(10.2423)	(2.4365)	(0.8360)	(17.9729)	(41.0140)	(429.9037)
percent_own	-0.1128	-0.0113	0.4626	4.0289	12.3363	-1.4504	0.0646	15.6630*	0.5651	11.2321
	(0.1049)	(0.0761)	(0.9980)	(5.1231)	(8.6961)	(1.7437)	(0.7987)	(8.8171)	(23.7326)	(627.3109)
percent_age18under	0.3740	0.3572	2.9203	-0.4109	-2.1828	3.4656	1.8518	19.0853	44.8426	-2433.7695**
	(0.3049)	(0.2291)	(2.4933)	(9.9761)	(17.2718)	(3.4240)	(1.9358)	(19.9885)	(52.5111)	(1167.6590)
percent_age60up	0.4441*	0.1970	2.9717	0.6109	-27.8491	5.2561	1.7098	44.4190*	36.2099	697.2107
	(0.2398)	(0.1657)	(2.2375)	(6.7511)	(17.4021)	(3.9610)	(1.4595)	(23.1434)	(38.4178)	(779.5814)
Constant	-0.1876	-0.1318	-4.7496***	-10.9433**	2.3117	-2.0182	-1.2804	-32.3344***	-44.3703**	-531.3890
	(0.1719)	(0.1236)	(1.2595)	(4.8717)	(8.6072)	(2.1554)	(0.9826)	(10.8203)	(22.3533)	(573.3540)
r2_a	0.0027	0.0011	0.0180	0.0030	0.0117	0.0085	0.0081	0.0363	0.0078	0.7278
N	30,506	30,506	30,506	30,506	30,506	7,030	7,030	7,030	7,030	7,030

Standard errors indicate significance at the 10%, 5% and 1% levels, respectively.

Appendix A

We identify municipal entities in the Y14 data set by searching the borrower name field for the following key words:

a) Cities/towns/townships/minor civil divisions: "CITY',"TOWNSHIP", "TOWN OF", "VILLAGE OF", "BOROUGH";

b) Counties: "COUNTY", "PARISH";

c) States: "STATE", "COMMONWEALTH", "DISTRICT OF COLUMBIA";

d) Fire/water/utility/school districts: "DIST", "FIRE", "WATER", "UTILITY", "SCHOOL", "MUNICIPAL", "AUTHORITY", "METROPOLITAN", "BRIGADE";

We classify a borrower to be a "city" if the borrower name countains any of the keywords in a). We next classify a borrower to be a "county" if there are no keywords from a) in the borrower name but we identify at least one keyword from b). We then define a borrower to belong to the "state" category if the borrower name countains any of the words in c) but does not cantain any words from a) and b). Last, we classify a borrower to be a "special district" if it contains any of the keywords in d).

One disadvantage with the classification algorithm so far is that we are likely to omit municipalities in the Y-14 data that do no contain any of the keywords above. Given that we supplement the identification procedure using the complete list of municipality names from the Census website. Specifically, we match all government and not-for-profit borrowers in the Y-14 to the list of municipalities in the Census using the zipcode of each borrower. We then apply the following sequence of steps:

1) If the Census City field and the borrower name field are an exact match, we define to entity to belong to a city government.

2) We next classify entities to belong to the county level if the Census City field is not an exact match with the borrower name but the Census County name field is.

3) If neither the Census City nor the Census County fields match exactly with the borrower name but the state is an exact match, we classify the entity into the "state" category.

Finally we update municipal categories a) through c) above with the Census match.

Appendix B - Variable Definitions

Below we present variable definitions, the item numbers of data fields refer to Schedule H1 of the Y-14Q data on the Federal Reserve's website:

$https://www.federalreserve.gov/reportforms/forms/FR\_Y-14Q20160930\_i.pdf$

Total Loan Share – defined as the sum of utilized outstanding amounts under all banks loans (field #25) of a given municipality divided by the sum of all outstanding amounts under bank loans and all outstanding general obligation and revenue bonds for the same municipality.

Term Loan Share – defined as the committed amounts under the term loans of a given municipality (based on fields #20 and #24) divided by the total committed amounts under all banks loans (field #24) for the same municipality.

$Log(Households)$ – The log of the number of households in a given county-year. For each year, information on the number of households comes from the American Community Survey at the Census reflecting 5-year Census estimates.

Median Income – The median household income in a given county-year. Information on the number of median household income come from the American Community Survey at the Census reflecting 5-year Census estimates.

Debt to income – This variable is defined as the total debt of a given municipality divided by the aggregate household income in the same municipality. Total debt represents the sum of all outstanding amounts under bank loans (field #25) and all outstanding general obligation and revenue bonds. Aggregate household income is defined as the average household income in a given county-year multiplied by the number of households in the same county-year. Data on the average household income and the number of households in a given county-year come from the American Community Survey at the Census reflecting 5-year Census estimates.

Wage growth – This variable is defined as the year-over-year percent change in quarterly wages in a given county. Data on county-level quarterly wages come from the Bureau of Labor Statistics website.

Employment growth – This variable is defined as the year-over-year percent change in quarterly employment in a given county. Data on county-level quarterly employment come from the Bureau of Labor Statistics website.

Homeowner share – The share of homeowners in a given county. This variable comes from the 2010 Census.

Share under 18 – The share of the population in a given county that is under 18 years of age. This variable comes from the 2010 Census.

Share over 60 – The share of the population in a given county that is over 60 years of age. This variable comes from the 2010 Census.

Credit rating – This variable is only defined for the counties with bank debt in Schedule H1 of the Y-14Q data. This is the internal rating assigned by the bank (field #10) converted to a 10-grade S&P ratings scale, with 1 denoting AAA and 10 denoting D.

Abnormal snow – We follow Gustafson et al. (2017) to construct the transitory income shock, relying on abnormal winter weather (snow cover). Specifically, we compute abnormal snow cover by subtracting the average snow cover during the first calendar quarter from the time series average of snow cover for each county-year in Q1 using the previous 10 years worth of data.