Institutional Investors, the Dollar, and U.S. Credit Conditions*

Friederike Niepmann and Tim Schmidt-Eisenlohr†

March 29, 2019

Abstract

This paper documents that an appreciation of the U.S. dollar is associated with a reduction in the supply of commercial and industrial loans by U.S. banks. An increase in the broad dollar index by 2.5 points (one standard deviation) reduces U.S. banks' corporate loan originations by 10 percent. This decline is driven by a reduction in the demand for loans on the secondary market where prices fall and liquidity worsens when the dollar appreciates, with stronger effects for riskier loans. Today, the main buyers of U.S. corporate loans—and, hence, suppliers of funding for these loans—are institutional investors, in particular mutual funds, which experience outflows when the dollar appreciates. A shift of traditional financial intermediation to these relatively unregulated entities, which are more sensitive to global developments, has led to the emergence of this new channel through which the dollar affects the U.S. economy, which we term the *secondary market channel*.

Keywords: leveraged loan market, commercial and industrial loans, U.S. dollar exchange rate, credit standards, institutional investors

JEL-Codes: E44, F31, G15, G21, G23

*The authors are grateful to Mark Carey, Ricardo Correa, Daniel Dias, Wenxin Du, Egemen Eren, Seung Lee, Ryan Monarch, Hyun Song Shin, Viktors Stebunovs, and Egon Zakrajsek, as well as participants in workshops at the Federal Reserve Board for helpful comments. The authors also thank Inaki Aldasoro, Andreas Schrimpf, Nathan Converse, Pablo Cuba Borda, Wenxin Du, Juan-Miguel Londono, and Ralf Meisenzahl for making available some data used in this reasearch, as well as Elizabeth Doppelt and Beau Bressler for excellent research assistance. Part of this paper was written while the authors were visiting the BIS as Central Bank Research Fellows.

†The authors are staff economists in the Division of International Finance, Board of Governors of the Federal Reserve System, Constitution Avenue NW, Washington, D.C. 20551, USA. Emails: Friederike.Niepmann@frb.gov and Tim.Schmidt-Eisenlohr@frb.gov. The views in this paper are solely the responsibility of the authors and should not necessarily be interpreted as reflecting the views of the Board of Governors of the Federal Reserve System or of any other person associated with the Federal Reserve System.

1 Introduction

Commercial and industrial loans (C&I) are an important source of credit for U.S. corporates. C&I loans on the balance sheet of U.S. banks stood at more than $2.1 trillion at the end of 2017. That said, the total volume of these loans is significantly bigger because banks sell a large portion of the loans they originate, especially the riskier ones, on the secondary market to institutional investors within 30 days of origination (Lee et al. (2017)). The size of the syndicated loan market, which captures the majority of loans that are originated and then sold, has increased tremendously since the 1990s, and so has the role of institutional investors as buyers of these loans, as figure 1 documents.[1] While roughly 65 percent of the buyers were U.S. banks in 1993, this share fell to 18 percent in 2014.[2] Today the largest buyers on the secondary market are mutual funds and CLOs.[3]

This paper shows that the increased importance of institutional investors as a funding source for C&I loans has led to the emergence of a new macro-financial channel that we term the *secondary market channel*. Because these investors are sensitive to global developments, and, in particular, to dollar movements, credit conditions for U.S. corporates are affected by the dollar exchange rate: When the dollar appreciates, institutional investors reduce their demand for loans on the secondary market. As a consequence, U.S. banks tighten credit standards and originate fewer C&I loans. A tightening in credit standards and a reduction in the supply of loans have real effects on investment, employment, and GDP (see, for example, Peek and Rosengren (2000), Chodorow-Reich (2013), Bassett et al. (2014), Greenstone et al. (2014)). Therefore, a stronger dollar weighs negatively on U.S. economic activity through the *secondary market channel*, which is distinct from traditional channels linked to the terms of trade or monetary policy.

We start by documenting the surprising correlation between U.S. banks' corporate loan originations and the dollar, illustrated in figure 2. The solid line shows the log difference of

[1] When a loan is syndicated, the lead bank screens the borrower and looks for participants in the syndicate, first among other banks, then among institutional investors. The share of non-bank participants has increased over time and is estimated at around 20 percent (Lee et al. (2017)).

[2] Data underlying figure 1 come from Irani et al. (2018).

[3] For more information on the secondary market for U.S. corporate loans, see, for example, Yago and McCarthy (2004) and Ivashina and Sun (2011).

the value of corporate loan originations for 16 major U.S. banks at a quarterly frequency. The dashed line depicts the quarterly change in the broad dollar index, a trade-weighted index that includes the bilateral dollar exchange rates of major U.S. trading partners. A clear relationship is apparent: When the dollar appreciates, U.S. banks reduce lending and vice versa. A one-standard deviation rise in the index (equivalent to an increase of 2.5 points) leads to a 10 percent reduction of new loan originations. Further analysis that employs detailed information on banks' internal risk ratings of loans reveals that banks not only lend less but also shift to safer borrowers when the dollar appreciates. The same picture emerges from an analysis of credit standards. Based on data from the Senior Loan Officer Opinion Survey (SLOOS), an appreciation of the dollar is associated with a tightening of credit standards for C&I loans by U.S. banks both before and after the 2008/2009 Global Financial Crisis (GFC).

We also run a vector autogression (VAR) in which the National Financial Conditions Credit (NFCI Credit) Subindex is explained by standard macroeconomic and financial variables to check for additional explanatory power of the dollar for U.S. financial conditions.[4] Figure 3 shows the impulse response function of the monthly change in the NFCI Credit to a one standard deviation change in the monthly dollar change for the post-GFC period (from October 2009 to March 2018). The contemporaneous effect is significant at a 95-percent significance level and quantitatively relevant. A one-standard-deviation increase in the dollar leads to a decrease of the NFCI Credit by 0.012 points in the same month (9 percent of a standard deviation of D NFCI Credit) and 0.025 after 8 months (19 percent of a standard deviation of D NFCI Credit). We obtain very similar results when using the overall National Financial Conditions Index (NFCI) as shown in the right panel.

Having established this striking correlation between U.S. credit conditions for corporates and the dollar, we provide evidence for the channel that drives this relationship. The SLOOS asks loan officers for the reasons why they tightened or eased credit standards for C&I loans.

[4]More specifically, we run a VAR where the following variables explain the monthly change in the NFCI Credit (in the following order): the change in the fed funds rate, the change in the term spread, the change in the excess bond premium, the log difference of the VIX, the log difference of the CPI, the log difference of industrial output, the log difference of nonfarm employment, and the change in the dollar. We allow for two lags of all endogenous variables.

The only reason that is correlated with dollar movements is the availability of liquidity in the secondary market. That is, when the dollar appreciates, demand in the secondary market drops, worsening the conditions under which banks can offload their loans. In line with loan officers' explanations, a bank's loan originations and credit standards are more sensitive to dollar movements when a larger share of the bank's loans are held for sale, a proxy for the extent to which the bank sells its loans on the secondary market.

We provide further evidence for the proposed channel with pricing data of loans traded on the secondary market available from the Loan Syndications and Trading Association (LSTA). Regressions of monthly price changes and changes in bid-ask spreads, which measure liquidity conditions, show that prices fall and liquidity on the secondary market deteriorates when the dollar appreciates. Consistent with a shift to safer borrowers, price effects are stronger for the riskier portion of the traded loans—those with a price below 97 percent of the par value. Thus, when the dollar appreciates, prices for traded loans fall at the same time as U.S. banks contract lending, which implies that the dollar shifts the demand for loans on the secondary market. In fact, regressing the log change of U.S. banks' loan origination on the change in the U.S. Leveraged Loan 100 Index and instrumenting the index by dollar movements delivers quantitatively similar results to those from the reduced-form regression of changes in loan originations on changes in the broad dollar index. That is, quantitatively, the *secondary market channel* can fully explain the link between the dollar exchange rate and U.S. banks' corporate lending that we uncover.

As mentioned before, U.S. banks only represent a small portion of the buyers on the secondary market for C&I loans and their share of syndicated loan purchases has fallen steadily since the 90s.[5] Today, institutional investors dominate this market. This evolution is crucial for the correlation between U.S. credit conditions and the dollar. Precisely, the correlations of both prices and bid-ask spreads with the dollar have increased as the share of U.S. banks as buyers has fallen. To show this, we interact changes in the dollar index with the yearly share of syndicated loans bought by U.S. banks and include this term in the price and liquidity regressions, which show highly significant coefficients. We conclude that the

[5]See Demsetz (2000), Yago and McCarthy (2004), Irani et al. (2018), Drucker and Puri (2008), Lee et al. (2017), and Lee et al. (2015).

growing importance of institutional investors in the secondary loan market has led to the emergence of the *secondary market channel*.

We can push the analysis one step further by looking at investment flows to mutual funds, one of the most important type of buyer of syndicated loans in the secondary market, with a share of around 22 percent in 2014. For this, we use EPFR data on U.S. domiciled, U.S. dollar-denominated mutual funds that invest in bank loans exclusively in the United States. Controlling for fund performance in the preceding month, an increase in the broad dollar index is associated with lower net inflows into these funds. That is, when the dollar strengthens, institutional investors withdraw from mutual funds specialized in buying U.S. bank loans on the secondary market, with the effect of lowering the demand in the secondary market and, consequently, reducing C&I lending by U.S. banks.

A key challenge for interpreting our results is that the dollar is endogenous and closely linked to macroeconomic and financial conditions. To shed more light on the mechanism and check the robustness of our results, we follow four strategies. First, we exploit heterogeneity across banks in the share of loans held for sale to estimate a specification, where we look for a differential effect of the dollar on lending across banks. In that specification, we can directly control for all macroeconomic effects by including a time-fixed effect. We further estimate this specification at the bank-borrower-time level, which allows for the inclusion of borrower-time fixed effects that control for any demand effects at the borrower level.

Second, we directly control for changes in U.S. economic and financial conditions as well as the U.S. economic and financial outlook. The variables we include are the U.S. unemployment rate and real GDP, the U.S. unemployment outlook and real GDP outlook, the oil price, U.S. short-term interest rates, and the term-spread, as well as future expected interest rates.[6] Moreover, we add various measures of risk aversion and uncertainty, namely: the CBOE Volatility Index (VIX), the U.S. excess bond premium (Gilchrist and Zakrajšek (2012)), the U.S. variance risk premium (Londono and Zhou (2017)), the 3-year U.S. treasury basis (Du et al. (2018b)), and an estimate of the world recession probability (Cuba-Borda et al. (2018)). Adding these controls neither materially affects the significance nor the

[6]Values of expected short rates and the term spread are from the Survey of Professional Forecasters.

magnitude of our results.

Third, we instrument changes in the broad dollar index with the response of the dollar exchange rate to monetary policy announcements by five advanced countries' central banks within a 90-minute window of the announcements, available from Ferrari et al. (2017) and Cieslak and Schrimpf (2019). These surprise dollar movements should be exogeneous to developments in the United States and are unlikely to reveal any news about the U.S. economy.[7] Results on credit standards continue to hold when the broad dollar index is instrumented with surprise dollar movements triggered by foreign monetary policy changes. Therefore, dollar movements caused by foreign developments affect the credit standards set by U.S. banks.[8]

Finally, we directly test for alternative hypotheses. First, when the dollar appreciates, credit risk on banks' books might rise which may make banks more risk averse. However, risk ratings of existing loans on banks' books do not move with the dollar. Second, even if loans to U.S. firms might not get riskier, a dollar appreciation could raise credit risk for banks with dollar loans to foreign borrowers (for example, Yesin (2013), Bruno and Shin (2014)). When the dollar appreciates, foreign firms might have a harder time repaying their loans if they have a currency mismatch and are not fully hedged. However, the correlation between loan originations and the dollar even holds for U.S. banks with basically zero foreign business. Moreover, the relationship between lending and the dollar is uncorrelated with the share of foreign assets on a bank's balance sheet. Third, a stronger dollar might make it harder for U.S. firms to sell their goods abroad. Hence, these firms might invest less and demand less credit. But banks reduce lending to all firms, even to firms in industries that do not import and export, whose business should not be directly affected by dollar movements. In addition, the results go though when we control explicitly for changes in the demand for credit. Combining the different pieces of evidence, we conclude that U.S. banks do not

[7]Monetary policy suprises abroad might have a direct effect on U.S. credit conditions. While this could potentially invalidate the exlusion restriction, any bias arising from a direct spillover through the interest rate channel should have the opposite sign of the secondary market channel we are interested in. For a more detailed discussion see section 4.1.

[8]In this regard, the U.S. economy might also be affected by what has been termed the global financial cycle. In this context, see works by Baskaya et al. (2017), Miranda-Agrippino and Rey (2015), and Cerutti et al. (2014), for example.

respond directly to dollar movements or changes in the demand for credit that may come with it but instead to conditions on the secondary market for bank loans, which become less favorable when the dollar appreciates.

The key open question that then remains is why institutional investors invest less in U.S. corporate loans when the dollar appreciates. To shed further light on this question, we split the broad dollar index into an emerging markets dollar index and an advanced economies dollar index. Results are mainly driven by the emerging markets dollar index, especially post-GFC. This finding is consistent with the idea that institutional investors could be sensitive to the dollar because of exposures to dollar-denominated emerging market corporate debt (Bruno and Shin (2014)). The issuance of this type of debt has surged since 2009, and it becomes riskier when the dollar appreciates because firms are often not fully hedged (Miyajima and Shim (2014), Chui et al. (2014), Niepmann and Schmidt-Eisenlohr (2017)). That said, our findings might also be explained by theories of financial intermediary asset pricing, if institutional investors pull out of U.S. corporate debt at the same time as they make other adjustments to their portfolios that affect the dollar.[9] Whatever the underlying mechanisms are, the dollar is undoubtedly closely linked to the risk preferences of institutional investors (Avdjiev et al. (forthcoming)), a fact that is also reflected in U.S. corporate bond yields as we show in section 5.2.[10]

As institutional investors have become more involved in traditional financial intermediation in the United States, they are changing macro-financial linkages as demonstrated in this paper. Through the secondary market channel, U.S. banks' credit supply to U.S. firms has become dependent on non-bank investors, who adjust their investments in response to foreign developments. It is crucial that these unregulated entities, whose behaviour clearly differs from traditional banks, are studied further and monitored. More data on their asset allocations are needed to better understand their investment behavior, and more broadly, to ensure the stable supply of credit to U.S. firms.

[9]See Gabaix and Maggiori (2015), Du et al. (2017), Adrian et al. (2014), Jiang et al. (2018a), Verdelhan (2018), He et al. (2017), and Malamud and Schrimpf (2016).

[10]In that paper, changes in the dollar and cross-border bank flows have also been linked to CIP violations. In this context, see also Braeuning and Ivashina (2017a) and Du et al. (2018a).

2 Data

The data used in this paper come from a variety of sources. We discuss three of the main data sources in this section. Other data that complement the analysis are detailed in the data appendix.

2.1 Introducing key data sources

SLOOS The Senior Loan Officer Survey (SLOOS) is conducted by the Federal Reserve on a quarterly basis. The survey asks loan officers about their lending practices and reasons for any changes over a three-month period. The aggregated survey responses are published on the Federal Reserve's website.[11] Confidential bank-level responses are kept at the Federal Reserve and are available to researchers there. The survey was established in 1990 and has been widely used in research (for example, Bassett et al. (2014), Hirtle (2009), and Paligorova and Santos (2017)). The reporting panel consists of up to 80 large U.S. chartered commercial banks and up to 24 U.S. branches and agencies of foreign banks. This paper will largely rely on information about credit standards for commercial and industrial loans, including the reported reasons for changes in standards.

U.S. loan-level data Loan-level data for large U.S. banks come from the so called FR Y-14 reports available at the Federal Reserve.[12] All Bank Holding Companies (BHCs) that participate in the U.S. stress tests must report detailed, confidential information on their corporate loans and leases with a committed exposure above $1 million on a quarterly basis.[13] The data start in 2011:Q3, and the sample used in this paper runs through 2017:Q4. Among others, the data provide information on committed and utilized exposures, the date when the loan was originated, the probability of default and/or the rating that the bank assigns to the loan, and the industry in which the borrower is located. From these data, we obtain bank-level loan originations with information on total volumes, the number of loans, and

[11] https://www.federalreserve.gov/data/sloos/about.htm.
[12] https://www.federalreserve.gov/apps/reportforms/reportdetail.aspx.
[13] These data have been used in Bidder et al. (2017) and Brown et al. (2017), for example.

weighted-average risk ratings.[14]

Data on the secondary loan market For information on pricing and the liquidity of loans in the secondary loan market, we draw on data from the Loan Syndications and Trading Association (LSTA). These data are daily and contain information on the name of the borrower as well as the mean bid and mean ask price of each loan, among other things. As a measure of liquidity, we compute the spread between the mean ask and mean bid price of a loan (for example, Santos and Shao (2018)). Prices are defined as the average of the mean bid and mean ask price by loan. In addition to the loan-level data, we employ the U.S. Leverage Loan 100 Index, also provided by the LSTA. Loan pricing data are available from 1998 onward.

Other data sources For balance sheet data of U.S. banks, we draw on the FR Y-9C reports. Information on dollar exchange rates is from the Federal Reserve, which calculates several trade-weighted dollar indexes, most importantly the broad dollar index.[15] Information on the economic and the interest rate outlook are from the Survey of Professional Forecasters. For more information on additional data sources, see the data appendix.

2.2 Lending standards and loan originations

In this paper, we will use credit standards as reported by banks and their quarterly loan originations to characterize U.S. credit conditions. Table 1 demonstrates that these two measures are highly correlated: Easier lending standards predict an increase in loan originations at the bank level in the same quarter and in the following quarter. Column (1) of the table shows results of a bank-level regression, where the log of new loans issued by bank b to U.S. firms is regressed on a dummy variable and its lag, which takes the value of 1 if the bank reported that it eased credit standards for medium-sized and large firms in a

[14] A loan is labeled a new loan if its reported origination date lies in the quarter in which the loan was first reported by the bank.

[15] The broad dollar idex is a weighted average of the foreign exchange value of the U.S. dollar against the currencies of the following major U.S. trading partners: Euro Area, Canada, Japan, Mexico, China, United Kingdom, Taiwan, Korea, Singapore, Hong Kong, Malaysia, Brazil, Switzerland, Thailand, Philippines, Australia, Indonesia, India, Israel, Saudi Arabia, Russia, Sweden, Argentina, Venezuela, Chile, and Colombia.

given quarter or zero otherwise. The regression also includes a dummy variable and its lag that takes the value of 1 if the bank reported that it tightened credit standards for these firms.[16] The coefficients associated with easing credit standards are positive and significant at the 5-percent level, suggesting that easier credit standards in quarter t and quarter $t-1$ are associated with larger loan originations in quarter t. Columns (2) and (3) confirm this result in the aggregate. The dependent variable in each of these columns is the log volume of all loan originations in the Y-14 data. The right-hand side variables were computed by first multiplying the bank-level dummy variables with each bank's average total C&I loans from 2011 to 2017, then summing them over all banks and taking the log values.[17] Column (3) controls for the total volume of C&I loans of the banks that answered the question that quarter. These regressions confirm that an easing of credit standards is associated with higher loan orginations today and in the next three months. We can therefore interpret both SLOOS credit standards and loan originations from the Y-14 data as measures of current U.S. credit conditions.

3 U.S. Credit Conditions and the Dollar

This section explores the relationship between credit conditions for U.S. firms, liquidity in the secondary market for U.S. bank loans, and the dollar. It starts by documenting the striking correlation between U.S. banks' loan originations and credit standards and the dollar, and then presents the reason for the correlation: a drop in the demand for U.S. bank loans by institutional investors in the secondary market. The regressions presented in this section are largely run on aggregate data to emphasize the aggregate relevance of the correlations shown and include only a few key macro and financial control variables. Robustness of the results and the discussion of possible confounding factors can be found in section 4.

[16] SLOOS responses, which cover credit standards in the first quarter and are published in the second quarter, are related to new loans in the first quarter.

[17] The Y-14 data are reported by BHCs, while the SLOOS data are reported by commercial banks. We map commercial banks to BHCs and sum responses over all commercial banks by BHC, assigning an equal weight to each commercial bank owned by the same BHC. Note that 1 was added to the quarterly weighted average dummy variables before taking the log to avoid dropping zero values.

3.1 A stronger dollar implies tighter U.S. credit conditions

Corporate loan originations decline As shown in figure 2 in the introduction, U.S. banks' loan originations are highly correlated with the dollar. Table 2 presents this result in the form of regression analysis. In column (1), the quarterly log change of domestic loan originations of the 16 U.S. banks that are continuously in the sample is regressed on the change in the average quarterly broad dollar index. The estimated coefficient of -0.04 indicates that a one standard deviation rise in the broad dollar index (equivalent to an increase of 2.5 points and reflecting an appreciation of the dollar) leads to a 10 percent reduction in new loans issued by U.S. banks. The R^2 of this simple time series regression is remarkably high, at 18 percent.

Of course, the dollar is related to other factors that also affect banks' loan supply. First, when U.S. monetary policy tightens and interest rates rise, the dollar appreciates at the same time as bank lending declines. We therefore include in the regressions the spread between the 10-year and 3-month treasury rate as well as the change in the effective federal funds rate, which we set equal to the Wu-Xia shadow rate (Wu and Xia (2016)) at the zero lower bound. Second, the dollar tends to appreciate in times of uncertainty, when banks may de-lever and issue fewer loans. Therefore, we control for the change in the log of the CBOE Volatility Index (VIX). The dollar might also reflect expectations about the future performance of the U.S. economy and, thereby, affect loan supply. To control for this channel, we exploit the excess bond premium introduced by Gilchrist and Zakrajšek (2012), which is a leading indicator of U.S. economic activity. We also obtain the U.S. unemployment outlook through the Survey of Professional Forecasters.[18] Both variables are included in the regressions as simple quarterly changes. We work with this set of control variables to produce the baseline results and later expand the set in the robustness section.

The effect of the dollar on loan originations is little changed when the control variables are included (column (2) of table 2). As columns (3) through (6) highlight, the correlation between the dollar and loan originations stems mainly from the extensive margin. The

[18] Unemployment outlook is defined as the mean 4-quarter-forward forecasted unemployment rate, minus the mean "nowcasted" unemployment rate.

coefficient associated with the dollar is significant and equal to -0.3 when the log change in the number of loans is the dependent variable (columns (3) and (4)). In contrast, it is not significant in the regression of the change in the average loan size and smaller, estimated at -0.1 (columns (5) and (6)). Accordingly, the extensive margin accounts for 75 to 80 percent of the effect.

Credit standards tighten While the U.S. loan-level data from the FR Y-14 reports are only available from 2011:Q3, the SLOOS data are available for a longer time series, going back to 1990. Table 3 shows regressions that employ these data. In each column, the dependent variable, the net percentage of banks that report tightening in credit standards for C&I loans to large and medium-sized corporations, is regressed on changes in the broad dollar index (and control variables). Because survey responses are persistent, the lagged value is also included as a regressor. In columns (1) and (2), the coefficients associated with the broad dollar index are insignificant. However, once we exclude U.S. recessions from the sample, the dollar coefficient becomes highly significant (columns (3) and (4)).[19] The coefficient of 0.92 in column (4) implies that a one-standard deviation rise in the broad dollar index increases the net percentage of survey respondents that report tightening credit standards by 2.3 percentage points, corresponding to a beta coefficient of 15 percent. This compares to a beta coefficient of the log VIX of 19 percent. Thus the dollar effect is almost as strong as the effect of the VIX. Table 26 in the appendix splits the SLOOS sample into a pre- and post-GFC period, showing that the correlation between U.S. banks' credit standards and the dollar holds during both time periods with relatively stable dollar coefficients. Because we are interested in the relationship between the dollar and credit supply in normal times, we exclude recession quarters from now on in all regressions.[20]

[19]Specifically, we drop all quarters during NBER recessions and the Global Financial Crisis from the sample, that is, 1990, 1991, 2001, and 2007:Q3 to 2009:Q2. Results are very similar when we only drop the Global Financial Crisis.

[20]The SLOOS not only provides information on credit standards for C&I loans, but also for other types of lending. Appendix table 25 highlights that credit standards for C&I loans to small firms as well as those for commercial real estate are also correlated with the dollar. We also ran regressions on credit standards for consumer loans and residential real estate lending, for which the dollar coefficients were always insignificant.

Banks lend to safer borrowers Not only the quantity of new loans and credit standards are affected when the dollar appreciates, but also the riskiness of the new loans. Table 4 documents that banks lend to safer borrowers when the dollar appreciates. In the table, the change in the weighted average probability of default of new loans is regressed on the change in the dollar index.[21] Changes in the dollar index alone explain 33 percent of the variation in the change in the weighted average probability of default. According to the estimate in column (2), a one-standard deviation increase in the broad dollar index reduces the average probability of default that banks assign to their new loans by 9 basis points. This compares to an average probability of default of 100 basis points.

3.2 The secondary market as the driver

Loan officer survey points to secondary market as the cause Having documented that U.S. credit conditions for corporations tighten when the dollar appreciates, we search for an explanation. Fortunately, the SLOOS asks banks for their reasons for tightening or easing credit standards. Table 5 presents regressions of the share of banks that mentioned a particular reason for tightening (top panel) or easing (bottom panel) credit standards out of all banks that reported tightening or easing credit standards on the change in the broad dollar index. Banks are free to mention any of the following reasons: (i) changes in the bank's capital position, (ii) changes in competition from other lenders, (iii) legislative changes, supervisory actions, or changes in accounting standards, (iv) changes in the bank's current or expected liquidity position, (v) changes in the economic outlook, (vi) changes in the bank's risk tolerance, (vii) changes in liquidity in the secondary market for these loans, (viii) industry-specific problems. As the table shows, the single reason that is significantly associated with dollar movements is "changes in the liquidity in the secondary market for these loans". When the dollar appreciates, fewer banks mention increased liquidity in the secondary market as a reason for easing. Table 8 explores this result further, displaying the

[21] The probability of default is from the banks' internal risk models and captures the probability that a borrower defaults on its obligations within the next 12 months. The weighted average probability of default was constructed as follows: First, loans for which the probability of default was missing were assigned the average probability default of loans with the same rating. Second, probabilities of default above 10 percent were dropped. Third, only loans of the 16 banks that are always in the sample were included in the calculation.

full regression in column (1) and including the set of control variables in column (2). As in earlier regressions, the dollar coefficient continues to be significant and its magnitude is little changed when these variables are added to the regression. According to the coefficient of -0.012 in column (2), the share of banks that report secondary market liquidity as a reason for easing decreases by 3 percentage points when the dollar index rises by 2.5 points.[22]

While we explore secondary market prices and liquidity of U.S. corporate loans below, figure 4 visually confirms loan officers' responses. The figure plots the three-quarter moving average share of banks that reported secondary market liquidity as a reason for easing against the three-quarter moving average S&P/LSTA Leverage Loan 100 Index, which reflects the performance of the largest facilities in the U.S. leveraged loan market. Clearly more loan officers report favorable conditions on the secondary market for corporate loans as a reason for easing when prices on the secondary market are higher and vice versa.

Share of loans held for sale explains bank's sensitivity to the dollar To confirm the central role of the secondary market, we study the effects of the dollar on U.S. banks' loan originations at the bank level. From FR Y-9C data, we obtain the average share of loans held for sale over a bank's total loans and lease financing receivables and interact this share with changes in the dollar index. Results of these bank-level regressions are presented in table 7. Column (1) includes the interaction term that tests whether banks' sensitivities to the dollar depend on the extent to which they sell off loans. The interaction term is significant at the 1 percent level, indicating that loan originations of banks that pass on more loans to outside investors are more responsive to dollar movements, entirely consistent with the role of the secondary market for the presence of the documented correlation. This result is robust to controlling for a bank's Tier1-capital ratio and its ratio of wholesale funding to total loans (column 2) as well as time-fixed effects (column 3).[23] Of note, the regressions shown in these columns indicate that conditional on a bank's share of loans held for sale, the bank's loan originations are less sensitive to the dollar when its Tier1-capital ratio is higher. In this case,

[22]It is somewhat surprising that changes in secondary market liquidity as a reason for tightening are not associated with dollar movements, which may be related to banks' reporting incentives and practices.

[23]A bank's wholesale funding share was computed following Choi and Choi (2016).

the bank might be less constrained to keep risky loans on its balance sheet.[24]

We also find differences in the sensitivities of banks' credit standards to dollar movements. In column (4), individual bank responses are regressed on changes in the dollar and their interaction with a bank's share of loans that are held for sale. The dependent variable now takes three values: -1 corresponds to easing standards, 0 corresponds to no change, and +1 represents tightening standards. The regressions based on SLOOS responses draw the same picture as those based on Y-14 data. The positive and statistically significant coefficient in column (4) indicates that the credit standards of banks with a higher share of loans held for sale are more sensitive to the dollar, a finding that is robust to the inclusion of macro and financial control variables and time-fixed effects (columns (5) and (6)).[25]

Prices and liquidity fall in the secondary market Next, we take a closer look at the secondary market for U.S. corporate loans, employing data from the Loan Syndication and Trading Association (LSTA). We start by regressing log changes in the S&P/LSTA Leverage Loan 100 Index, which reflects the performance of the largest facilities in the U.S. leveraged loan market, on changes in the dollar index at a monthly frequency.[26] According to column (1) of table 8, 10.4 percent of the variation in monthly changes in the index are explained by changes in the dollar index. Column (2) adds macro and financial control variables, still delivering a significant dollar coefficient. Columns (3) and (4) replicate the analysis with individual prices of loans issued to U.S. borrowers and deliver very similar results.[27] The coefficient of -0.0017 in column (2) implies that a one-standard-deviation increase in the dollar decreases the leveraged loan index by 0.4 percentage points with a beta coefficient

[24]To strengthen identification and control for changes in the demand for loans, we present additional regressions using Y-14 data in the robustness section. There, regressions are run at the loan level, which allows us to test for differential sensitivities to dollar movements across banks while controlling for borrower-time fixed effects.

[25]For Columns (1) through (3), the average share is computed over the period 2011 to 2017. In columns (4) to (6), the average share is a yearly average over the period 1992 to 2017. For this reason, these variables are not picked up by the bank-fixed effects in columns (4) through (6) and we need to include them directly in the regressions.

[26]We prefer to run regressions at this higher frequency for identification, but results on quarterly data are very similar and are reported in the appendix. All control variables included vary at a monthly frequency except the unemployment outlook, which varies at a quarterly frequency.

[27]Observations with only one quote are dropped from the sample. Price changes and change in bid-ask spreads in the first and 99th percentile are also excluded.

of 21 percent. Because we know that banks are originating fewer loans and tighten loan standards when the dollar appreciates, we can interpret the negative effect of the dollar on prices as driven by demand: Non-bank investors, the main buyers on the secondary market, buy fewer loans when the dollar appreciates.

In line with the response of prices, we see liquidity in the loan market deteriorate when the dollar appreciates. Columns (5) and (6) show regressions of the average monthly spread between the daily mean bid and mean ask price at the loan level. Again, the dollar coefficient is highly statistically significant across all specifications. We conclude that demand for U.S. corporate loans on the secondary market, which is dominated by non-bank investors, falls when the dollar appreciates. This has an effect on the supply of loans by U.S. banks, which subsequently originate fewer loans and tighten credit standards.[28]

Effects are stronger for riskier loans As shown previously, U.S. banks not only originate fewer loans when the dollar appreciates, they also shift to safer borrowers. Consistent with this finding, the effects of the dollar on loan prices in the secondary market are stronger for riskier loans. Table 9 provides evidence for this pattern based on monthly data. In the table, the dollar is interacted with a dummy variable that takes the value of 1 if the average price of the loan is 97 percent of the par value or below, which proxies loan risk. For risky loans, the price effect of a one-standard deviation increase in the dollar is -0.7 percentage points compared with an effect of -0.04 percentage points for the less risky category. Differences in the effect of the dollar on liquidity are less pronounced and not significant when control variables or time-fixed effects are included in the regression, suggesting that the effects on liquidity are similar across loans.

3.3 The role of institutional investors

Effects strengthen with participation of institutional investors The role of non-bank investors in the primary and secondary market for syndicated loans has steadily in-

[28]This mechanism is consistent with that described in Bruche et al. (2017). Banks have loans in the pipeline of which they retain larger shares when investors are willing to pay less than expected. They subsequently arrange fewer loans and lend less.

creased over time. Table 10 shows that the effect of the dollar on secondary market prices and liquidity is linked to the share of investors that are U.S. banks (shown in figure 1 as the dashed line). In the table, changes in the dollar index are interacted with the yearly share of buyers in the secondary market that are U.S. banks. The sample period runs from March 2007 to December 2017, excluding periods during the GFC. The interaction terms are highly significant and economically relevant. According to the estimates, the correlation between the dollar and secondary market prices (bid-ask spreads) becomes negative (positive) when the share of U.S. banks drops below 26 (23) percent, which happened for the first time around 2001. We acknowledge that there is a time trend in the participation of institutional investors in the data, but the presented evidence strongly suggests that the participation of non-banks and foreign investors in the secondary market for corporate loans is the driver of the negative correlation between the dollar and demand in this market.

Investors reduce positions in funds that buy U.S. bank loans Data from Irani et al. (2018) suggest that mutual funds are the second largest buyer group on the secondary market with an estimated share of about 22 percent in 2014. Using weekly EPFR data on mutual funds flows, we compile a sample of U.S. domiciled, U.S. dollar-denominated mutual funds that invest in bank loans exclusively in the United States. In December 2017, these funds had total assets under management of $146 billion. Based on this sample, we analyze the correlation between net flows into these funds and the dollar.

Figure 5 presents graphical evidence, documenting a clear negative correlation between fund inflows and the broad dollar index.[29] Table 11 presents regression results where the dependent variable is the ratio of monthly aggregate net inflows over assets under management for all funds in the sample. Column (1) shows the simple correlation, column (2) controls for a fund's performance in the previous quarter, and column (3) adds the baseline control variables. When the dollar appreciates, funds specialized in U.S. bank loans experience outflows, as investors pull money out. Faced with these outflows, funds then need to reduce their holdings of U.S. corporate bank loans, which leads to a fall in the demand for these

[29]The graph shows total flows into all funds reported by EPFR, including funds that enter during the sample period. If we only look at funds that operate continuously throughout the sample period, the qualitiative picture is unchanged, but quantities are smaller.

loans on the secondary market. Effects are material. A one-standard-deviation (monthly) appreciation of the dollar implies an outflow of 0.77 percent of assets under management. To compare the implied quantities to the estimated reduction in loan issuance by U.S. banks, we estimate effects again at a quarterly frequency. A one-standard-deviation rise in the dollar then leads to outflows of around $3.2 billion.[30] Given that mutual funds make up around 22 percent of the secondary market, this effect would scale to about $11.9 billion if all other non-bank buyers in the secondary market reacted similarly to the dollar.[31]

3.4 Quantitative aggregate implications for the U.S. economy

As discussed before, a 2.5 point increase in the dollar index, reduces U.S. banks' loan originations by 10 percent. At the end of 2017, the utilized exposures of U.S. banks' total loan originations totaled $125 billion. A reduction in the growth of loan originations of 10 percentage points implies $12.5 billion less lending. The broad dollar index increased by more than 20 points from 2014:Q1 to 2017:Q1. We calculate that U.S. banks would have lent an additional $100 billion to U.S. firms had the dollar remained flat over this period.

These quantifications likely underestimate the effect on U.S. corporate loans, primarily, because loan originations on the balance sheets of U.S. banks do not correspond to the total C&I loans originated in the quarter. As mentioned earlier, a large portion of the loans is quickly sold and may not appear on bank balance sheets. Second, Y-14 data only include banks participating in Fed-run stress tests, but there are many more banks involved in C&I loan originations and distribution. Third, tightening of credit standards in one quarter weighs on loan originations in the next quarter. Therefore, we conjecture that dollar movements have economically notable effects on U.S. banks' credit supply through the described channel. And, as an extensive academic literature has shown, credit supply shocks have economically significant effects on investment, employment and output.[32]

[30] At a quarterly frequency, the estimated dollar coefficient is 0.0012.

[31] The effect increases further when we regress flows on the emerging markets dollar index, which delivers a coefficient of -0.0211. Combined with the slightly larger standard deviation of the emerging markets dollar index of 2.9, this coefficient implies outflows of about $7 billion from the secondary market from mutual fund flows alone.

[32] Peek and Rosengren (2000), Chodorow-Reich (2013), Bassett et al. (2014), Greenstone et al. (2014), and Gilchrist et al. (2017).

To strengthen our quantitative analysis, we run two-stage least squares regressions. Specifically, we regress changes in loan originations and credit standards on changes in secondary market prices instrumented by changes in the broad dollar index. Results are shown in table 12. Using the first stage combined with the second stage coefficients (columns (2) and (3)), we obtain exactly the same effect from a one-standard deviation increase in the broad dollar index as compared to the reduced form regression (column (1) of table 2). The same holds for regressions with changes in credit standards as the dependent variable. This exercise implies that the movements in quantities and credit standards we observe can be fully explained by changes in prices in response to dollar movements.

4 Addressing Endogeneity Concerns

The analysis so far has treated the dollar exchange rate as an exogenous variable but, of course, it is an equilibrium object. A myriad of factors, even though not well understood, drive the dollar, and whatever moves the dollar might also affect banks' credit supply and non-bank financial intermediaries' investment decisions.[33] We have already addressed multiple possible third factors that could drive the presented correlations by controlling for the federal funds rate, the term spread, the VIX, the excess bond premium, and the unemployment outlook. Note also that several key results rely on variation across banks and are robust to the inclusion of time-fixed effects. Nevertheless, to address concerns further, this section presents an instrumental variable strategy where the broad dollar index is instrumented with movements of the dollar in response to foreign monetary policy announcements. This exercise excludes that U.S.-specific developments correlated with the dollar are responsible for our results. Finally, the dollar could affect credit supply through additional channels. This section also tests for these alternative channels but does not find support for their relevance.

[33]The difficulty to find fundamental drivers of the exchange rate has been termed the "exchange rate disconnect puzzle". See Frankel and Rose (1995) and Froot and Rogoff (1995).

4.1 Instrumenting the dollar

To explore whether an unobservable third factor associated with U.S. economic or financial conditions drives the correlation between U.S. credit conditions and the dollar, we take an instrumental variable approach. In our case, the instrument needs to broadly move the dollar but should not affect U.S. economic and financial conditions. Such an instrument is inherently hard to find. Foreign monetary policy changes, which affect the dollar, qualify in principle as instruments. Cieslak and Schrimpf (2019) provides the response of the dollar exchange rate from 15 minutes before to 90 minutes after monetary policy announcements in Australia, Canada, the euro area, Japan, Switzerland, and the United Kingdom. Because foreign central banks do not have private information about the U.S. economy, monetary policy decisions in these countries should not move expectations about the U.S. economy. Also, importantly, any direct effect of foreign monetary policy on U.S. interest rates should have the opposite effect on lending from our channel. When the foreign authorities loosen monetary policy more than expected, this should lower interest rates in the United States, which would ease U.S. credit conditions. However, the same policy should lead to an appreciation of the dollar, and should, through the *secondary market channel*, tighten U.S. credit conditions.

We instrument quarterly changes in the broad dollar index with the cumulative response of the respective bilateral dollar exchange rate to announcements by five major central banks within the same time period. Data on the response of the dollar exchange rates are available from 2000 to 2017. Table 13 presents the results of the IV regression for credit standards. Column (1) of table 13 shows the OLS regression for the reduced sample. The first stage and second stage regressions are shown in columns (2) and (3), respectively. The IV coefficient associated with the dollar is significant at a 5 percent level and around 50 percent higher than the OLS coefficient. We take this as evidence that credit standards of U.S. banks are sensitive to the component of the dollar exchange rate that is driven by non-U.S. developments.

IV results for loan originations and secondary market prices are not significant at standard levels, likely because of the limited power of the instrument for the post-GFC period. As we will show later, most of the results for the time period after the GFC are driven by

the emerging markets dollar index. Therefore, it is not surprising that advanced economy monetary policy shocks do not have enough power to serve as instruments for the regressions that employ Y-14 and LSTA data. Unfortunately, we currently do not have data on exchange rate responses to monetary policy announcements in emerging markets, but we will keep working on constructing instruments for the emerging markets dollar index.

4.2 Excluding alternative explanations

Monetary policy, additional risk and uncertainty proxies, and the U.S. economic outlook As argued before, the dollar is affected by economic risk and uncertainty, U.S. monetary policy and interest rates, and expectations about the performance of the U.S. economy. We included several controls in prior regressions, but we can add additional proxies that capture these factors. As additional risk and uncertainty measures, we incorporate the 3-year treasury basis from Du et al. (2018b), the world recession probability from Cuba-Borda et al. (2018), the U.S. variance risk premium from Londono and Zhou (2017), as well as the oil price. To capture changes in interest rate expectations, we add changes in the one-year ahead forecast of the 3-month treasury yield and the forecast spread between the 10-year and 3-month treasury yield from the Survey of Professional Forecasters to the regressions. From the same data source, we obtain changes in the 4-quarter ahead forecast of real GDP, and we add the contemporaneous real annual GDP growth and the annual change in the unemployment rate. Table 27 through 32 in the appendix show that the dollar coefficient is largely robust to the inclusion of these financial and macroeconomic controls.[34]

Export channel and broader demand channels The fact that U.S. banks' loan originations decline when the price for corporate loans on the secondary market falls tells us that the dollar acts as a driver of change in demand for loans on the secondary market and, through this channel, as a shifter of banks' credit supply. That said, in principle, U.S. firms' credit demand could also react to the dollar. In particular, firms that export might have

[34]The oil price is highly correlated with the dollar for some quarters after the GFC. Therefore, the dollar coefficient becomes generally less significant when the oil price is included. However, in most regressions, the point estimates are little changed.

a harder time selling their goods abroad when facing a stronger dollar and might therefore invest less and demand less credit. At the same time, firms that import might find it more attractive to source goods from abroad.[35] The demand of firms that neither import nor export should not be affected by dollar movements in a major way.

To test for demand effects associated with the dollar, we obtain data from the Bureau of Economic Analysis and the U.S. Census Bureau to calculate import and export intensities of U.S. industries at the 3-digit NAICS level for the pre-sample year 2010.[36] We merge these export and import intensities with data on U.S. banks' loan originations from Y-14 reports aggregated to the bank-industry level and interact the change in the dollar index with an industry's export and import intensity, respectively. Table 14 presents the results. Column (1) shows the baseline regression of the change in loan originations on the dollar for the industry-bank-level data. Columns (2) and (3) include the two interactions terms, which are insignificant at standard significance levels. The dollar coefficient in turn is unaffected and becomes slightly larger as macro and financial control variables are added. The remaining columns provide sample splits. Columns (3) and (4) show results for loan originations to firms in industries that neither import nor export. Columns (5) and (6) show results for industries with positive imports or exports. Given that the dollar coefficients are the same across these two groups, we find no evidence that the dollar affects the demand for credit differentially across firms in different industries.

To address concerns that all firms could change their demand for credit in response to dollar movements, we include proxies for changes in credit demand in the regressions. Employing the Y-14 data, we compute the bank-level change in the utilized exposures of pre-existing loans.[37] The idea is that changes in the demand of credit from firms should be reflected in a higher share of committed exposures drawn. Results of a regression that include this variable are shown in column (2) of table 15. The coefficient on the change in

[35] Goods are often priced in USD. It is therefore unclear whether the import channel is really operative at a quarterly frequency (Casas et al. (2016)).

[36] An industry's import and export intensity is computed as exports or imports over domestic absorption (production + imports - exports).

[37] Specifically, we calculate the change in utilized exposures of pre-existing credit lines at the bank level, normalizing the change by the lagged sum of committed exposures. We drop the top and bottom percentile of the obtained variable to reduce the impact of outliers.

exposures drawn is positive and significant at the 10 percent level, suggesting that when firms draw down more credit, banks' loan originations also increase.

The SLOOS offers another demand control. The survey asks banks about any changes in the demand for credit by large and medium enterprises. Column (4) of table 15 includes the net percentage of firms that said that demand decreased as well as its lagged value in a regression of the net percentage of firms that said that they tightened credit standards on the change in the dollar. Compared to the baseline regression presented in column (3), the dollar coefficient increases slightly. Of note, the demand controls are not significant at standard levels.

Finally, we check the robustness of the results that explain banks' sensitivities to dollar movements with their shares of loans held for sale in total loans. To this end, we exploit the Y-14 data at the loan-level to control for borrower-time fixed effects, which should absorb any factors that affect the firm-level demand for loans. Results are presented in table 16. In the regressions, we look at the extensive margin of lending at the bank-borrower-time level.[38] In line with the analysis performed on bank-level data, the negative correlation between the dollar and loan originations is stronger for banks with a larger share of loans held for sale. Based on this analysis, we conclude that demand effects associated with dollar movements do not play a large role in explaining changes in credit standards and do not confound our results.

Credit risk of U.S. firms The instrumental variable exercise presented in the previous subsection highlights that credit conditions respond to components of the dollar that are driven by foreign developments. To address further concerns that changes in U.S. conditions, specifically changes in the risk environment for U.S. firms, could be responsible for tightening credit standards, we analyze the credit risk in U.S. banks' portfolios. If banks contract lending because U.S. firms have become riskier, this should be reflected in the risk ratings banks assign to the firms they lend to. The Y-14 data allow us to track loans on banks'

[38]More specifically, the dependent variable takes the value of 1 if a bank originates a loan to a specific borrower in a quarter but did not originate a loan to that borrower in the previous quarter. The variable is 0 if there was no change in origination behavior, and -1 if a bank originated a loan to a borrower last quarter but does not originate a loan this quarter.

books, their risk rating, and the probability of defaults banks assign over time. Columns (1) and (2) of table 17 present regressions where the dependent variable takes the value of 1 if a firm was upgraded, zero if the firm's rating remained unchanged, and -1 if the firm was downgraded. As indicated by the statistically insignificant dollar coefficients, an appreciation of the dollar is not associated with an increase in credit risk of existing loans. Results are simliar for changes to the probability of default assigned by banks (columns (3) and (4)). Therefore, we reject the hypothesis that banks contract lending because credit risk in their U.S. loan book has gone up. It also likely means that the riskiness of the pool of domestic loans the banks could originate is unchanged.[39]

U.S. banks' foreign operations While credit risk associated with U.S. borrowers is unaffected when the dollar moves, this might not be the case for foreign borrowers. One prominent story why bank lending responds to dollar movements is formulated in Bruno and Shin (2014). There, banks provide lending in dollars to foreign firms that earn revenues in their local currency. As a result, the firms' debt burden increases when the dollar appreciates. This, in turn, raises the credit risk in banks' books. Under a value-at-risk constraint, the balance sheet capacity of banks goes down, meaning that credit supply contracts. While this mechanism could, in principle, directly affect U.S. banks, it does not appear to be quantitatively relevant for them (Niepmann and Schmidt-Eisenlohr (2017)).[40]

Table 18 presents evidence for this. The dependent variable in this table is the change in U.S. banks' domestic loan originations. It is regressed on changes in the dollar index interacted with different measures of banks' foreign activities derived from U.S. banks' FFIEC009 Foreign Exposure Reports. Column (1) includes the average share of a bank's foreign claims over total assets. Foreign claims are defined as claims on foreign residents held both by the parent company as well as on the balance sheet of foreign branches and subsidiaries. Column

[39]This conclusion is based on the premise that banks' reported risk ratings and probabilities of default reflect banks' current risk assessments. Because the Federal Reserve closely monitors banks' Y-14 submissions and analyzes the appropriateness of their risk management and risk models, we believe that risk ratings and probabilities of default of existing loans would reflect broad shifts in banks' credit risk assessments. That said, Plosser and Santos (2018) raise doubts about the accuracy of banks' reported risk ratings.

[40]As we discuss later, this mechanism could explain why global investors invest less in U.S. bank loans when the dollar appreciates. However, it does not appear relevant for U.S. banks themselves.

(2) has a bank's share of international claims, which exclude claims held in foreign offices in local currency from total foreign claims. Column (3) uses banks' local claims over total assets, those held by foreign offices. Column (4) employs the average share of local liabilities over total liabilities. The interaction terms between the dollar and these different measures are always insignificant. Column (5) shows the baseline regression for a sample of banks with foreign claims below 1 percent of total assets, while column (6) only includes banks without foreign offices. Even for these banks, which clearly are focused on the United States, loan originations are negatively correlated with the dollar. Under the story proposed in this paper, this finding is easy to explain: Because most U.S. banks offload a portion of their loans to other financial intermediaries on the secondary market, they face worse conditions when the dollar appreciates and reduce lending, independently of their foreign claims positions.

Another way to investigate whether the foreign operations of U.S. banks might play a role in explaining their sensitivities to the dollar is to analyze the sensitivities of their cross-border loan issuance to dollar movements. U.S. banks not only lend to U.S. firms, but also to corporations in foreign countries, either from their U.S. offices or through branches and subsidiaries located abroad. Some of these loans are also syndicated and sold on the secondary market.[41] Table 19 studies changes in aggregate foreign loan originations. The response of cross-border lending is essentially the same as that of U.S. lending, and there is no difference between lending to emerging and advanced economies.[42] U.S. banks reduce loan originations to all borrowers symmetrically when the dollar appreciates. That said, cross-border loan originations decline more when the excess bond premium rises compared with U.S. loan originations (coefficient of -0.02 versus -0.4 and -0.5). An increase in the excess bond premium reflects a reduction in the risk-bearing capacity of the U.S. financial sector (Gilchrist and Zakrajšek (2012)). Therefore, in line with much of the literature on

[41] Cerutti et al. (2015) estimate that about one third of all cross-border lending corresponds to syndicated lending. De Haas and Van Horen (2013) estimate that two-thirds of cross-border lending to emerging markets is in the form of syndicated lending. In this context, see also Lee et al. (2017) and Niepmann and Schmidt-Eisenlohr (2017).

[42] We are aware that the dollar has a mechanical effect on the non-U.S. dollar denominated portion of cross-border loan originations. Unfortunately, information on the currency denomination of the loans is only available starting from 2014:Q3. Analysis of dollar-denominated loans where available indicates the same response to the dollar as total cross-border loan originations. Note also that only around 25 percent of loans in the Y-14 data are denominated in local currency.

cross-border lending, we find that this lending is more volatile and contracts more when banks become more risk averse.[43]

U.S. banks' funding costs As a final step, we check whether funding conditions for U.S. banks change when the dollar appreciates. Monthly data from CRANE delivers information on U.S. banks' funding obtained from money market mutual funds (MMMF) in the form of repos, commercial papers, or certificates of deposit.[44] The rates on MMMF funding reflect banks' marginal funding costs. Analysis of the correlation between rate changes and changes in the dollar can therefore shed light on funding pressures banks might face. Table 20 shows the results based on a sample of 13 U.S. banks covering the period from February 2011 to December 2017. All regressions shown in the table include instrument-fixed effects a well as the weighted average maturity of a bank's instruments outstanding. The significant negative dollar coefficient implies that the interest rates that U.S. banks pay for funding go down when the dollar appreciates. According to the findings in this paper, the reason might be that banks' willingness to pay goes down when they cut lending and shift to safer borrowers as a result of a dollar appreciation.[45] In any case, banks do not face higher marginal funding costs when the dollar appreciates.

5 Why Are Institutional Investors Sensitive to the Dollar?

The key open question that remains is why global investors change their demand for U.S. corporate loans when the dollar moves. Because of a lack of data on these investors' balance sheets, we are not able to delve deeper and provide a conclusive answer. However, the results presented below suggest that investors' holdings of emerging market dollar denominated debt could play a role.

[43]See, for example, Allen (2011) and Avdjiev et al. (2012).

[44]We thank Inaki Aldasoro, Torsten Ehlers, and Egemen Eren for valuable support with the funding cost analysis. For their work with CRANE data on the price of dollar funding for global banks, see Aldasoro et al. (2018).

[45]Regressions of the volume of funds that U.S. banks borrow from MMMF on the dollar result in insignificant coefficients. It appears that the amount of funding banks obtain from MMMF does not changes with the dollar.

5.1 The role of the emerging markets dollar index

Until now, we have employed the broad dollar index in the regressions. To explore whether a particular component of the dollar exchange rate drives the demand for U.S. corporate loans by non-bank financial investors, we use two different trade-weighted dollar indices as independent variables in table 21, one that includes dollar exchange rates vis-a-vis emerging economies (EMEs) and one vis-a-vis advanced economies (AFEs).[46] Altogether the results in the table highlight the role of the emerging market dollar index for our proposed mechanism. Specifically, only the coefficient of the emerging economies dollar index is statistically significant when changes in the riskiness of new loans, secondary market liquidity of loans as a reason for tightening, and changes in the U.S. Leverage Loan 100 Index are regressed on the two dollar indices (see columns (5) through (8)). Both indices have predictive power for loan price changes in column 8. However, the point estimate is considerably larger for the emerging economies dollar index than for the advanced economies dollar index. The regressions based on SLOOS credit standards show that the emerging market dollar index explains tightening of credit standards after the GFC, while the advanced economies dollar index is statistically significant prior to 2008 (columns (3) and (4)). The result for loan originations, presented in column (1), is less clear cut. The loadings on the two dollar indices are very similar both in magnitude and in statistical significance.

Table 22 presents regressions of net fund inflows from the EFPR data on the two dollar indices. Again, only the emerging market dollar index coefficient is statistically significant. In sum, the emerging market dollar appears to be the driver of the secondary market channel post-GFC. When emerging market currencies depreciate vis-a-vis the dollar, bank loan funds experience outflows, prices and liquidity on the secondary market fall, and U.S. banks tighten credit standards.

[46]The AFE list is: Canada, Euro, Japan, Sweden, Switzerland, United Kingdom and Australia. The EME list is: Argentina, Brazil, China, Chile, Colombia, Hong Kong, India, Indonesia, Israel Korea, Malaysia, Mexico, Philippines, Saudi Arabia, Singapore, Russia, Taiwan, Thailand, and Venezuela.

5.2 Possible explanations and current literature

As this paper highlights, the dollar is closely linked to the investment behavior of non-bank intermediaries. As has been argued before, the dollar can be understood as a "barometer of the risk-taking capacity in global capital markets" (Avdjiev et al. (forthcoming)), where investors move to safer assets when the dollar appreciates. This risk factor is not reflected in any other proxy of risk sentiment that has been used in the literature.[47]

In light of the instrumental variable results and the relevance of the emerging market dollar index documented in this paper, the dollar appears to be a global risk factor that is not primarily linked to developments in the United States and the risk-bearing capacity of U.S. banks, but associated with institutional investors' risk attitudes, which respond also to foreign developments. Several explanations have been put forward to rationalize why the dollar may be a risk factor. In particular, researchers at the BIS have argued that the dollar has emerged as a risk factor because of the significant amount of emerging market corporate debt which has been issued since 2009 (Bruno and Shin (2014), Miyajima and Shim (2014), Bruno and Shin (2017)). When the dollar appreciates, this debt becomes riskier and investors might want to reduce their exposures. Other work has highlighted how the dollar might endogenously move with changes in the risk aversion of intermediaries (Gabaix and Maggiori (2015), Jiang et al. (2018b), He et al. (2017)). Camanho et al. (2018) find evidence that portfolio rebalancing flows affect exchange rates.

If institutional investors retrench from risky U.S. bank loans when the dollar appreciates, other debt instruments might also be sensitive to the dollar. Table 23 shows that this is indeed the case. Columns (1) through (3) present regressions of monthly changes in bond yields on changes in the broad dollar index. The sample consists of indices of bond yields of 5- and 10-year maturities and different risk ratings, where a higher number indicates higher risk. The sample runs from January 1992 to December 2017. The significant coefficients on the dollar and its interaction with the ratings variable in column (1) indicate that the yields of bonds with ratings below AA are positively correlated with the dollar. When the dollar

[47]The dollar's role as a risk factor almost certainly stems from its dominant role in global banking and the world economy more broadly. See Gopinath and Stein (2018) for a recent contribution explaining the existence of a dominant currency.

appreciates, yields rise (prices fall)—the more so, the riskier the bond. For a BB bond, a 2.5 point increase in the broad dollar index increases the yield by 10 basis points. Column (2) indicates that yields are particularly correlated with the emerging markets dollar index in line with earlier results on bank loans. Column (3) confirms that the interaction term is robust to the inclusion of time-fixed effects. These results for U.S. corporate bonds mirror the results for bank loans and reaffirm that credit conditions for U.S. corporations worsen when the dollar appreciates, with stronger effects for riskier firms.

6 Conclusions

Recent academic literature links the dollar to the risk aversion of financial intermediaries and global credit conditions. This relationship might be conventional wisdom for market observers who often describe the connection between the dollar and institutional investors' asset allocations as risk-off/risk-on episodes. These episodes are typically thought to mainly concern emerging markets, whose bonds are particularly risky.[48] This paper shows, however, that credit to U.S. firms also depends on the behavior of global investors and, hence, the dollar because of these investors' increasing role for traditional financial intermediation in the United States. Because U.S. banks offload a large portion of their loans to non-bank investors, conditions on the secondary market affect U.S. banks' credit supply, which worsen when the dollar appreciates. In line with Bruche et al. (2017), not only credit to those firms that borrow through the syndicated lending market may be affected. Because it takes time to originate loans, banks are forced to hold larger shares of risky loans on their books when secondary market conditions worsen. In response, they might reduce lending to all firms. Shocks to the credit supply can have real consequence as the GFC and numerous academic papers in its aftermath have shown. As traditional financial intermediation moves to non-bank financial institutions such as mutual funds and CLOs, new macro-financial channels are emerging. As this paper shows, foreign developments that affect the dollar have effects on credit supply to U.S. firms because of the response of institutional investors. To insure that credit supply remains stable, especially in times of turmoil, attention needs to be paid

[48]For example, Braeuning and Ivashina (2017b).

to these relatively unregulated entities.

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Tables

Table 1: Correlation between loan originations and credit standards

	Log Util. Exp.		
	(1)	(2)	(3)
F Easing	0.230***		
	(0.0728)		
F Tight.	-0.0309		
	(0.0970)		
Easing	0.156**		
	(0.0761)		
Tight.	-0.0998		
	(0.101)		
F W. Easing		0.219**	0.218**
		(0.0831)	(0.0865)
F W. Tight.		-0.00234	-0.00146
		(0.00490)	(0.00510)
W. Easing		0.0333***	0.0150
		(0.00424)	(0.0111)
W. Tight		0.00824	0.00531
		(0.00613)	(0.00577)
F W. All Resp.			-1.331
			(1.519)
W. All Resp.			1.611
			(1.204)
Constant	21.14***	20.01***	13.54
	(0.0989)	(1.885)	(10.76)
Observations	655	25	25
R^2	0.764	0.528	0.586

Note: This table explores the extent to which loan originations as reported in the Y-14 data are correlated with credit standards for C&I loans as reported in the SLOOS. In column (1), the dependent variable is the quarterly log loan originations (utilized exposures) of bank b. These are regressed on the response of bank b's loan officer regarding credit standards of C&I loans. The variable Easing (Tight.) takes the value of 1 if the loan officer said that the bank eased (tightened) credit standards and zero otherwise. The regression shown includes both contemporaneous values as well as lagged values. Columns (2) and (3) are run at the aggregate level, hence the small number of observations. Here, the aggregate quarterly loan originations of U.S. banks in the Y-14 data are regressed on these banks' weighted average change in credit standards in logs and their lagged values. The last column controls for the log of the total volume of C&I loans of the surveyed banks. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 2: U.S. banks' loan originations and the dollar

	D Util. Exp.		D Number of Loans		D Av. Size of Loans	
	(1)	(2)	(3)	(4)	(5)	(6)
D Dollar	-0.0402**	-0.0454*	-0.0305**	-0.0401*	-0.00976	-0.00526
	(0.0145)	(0.0223)	(0.0132)	(0.0212)	(0.00883)	(0.00641)
D Log Vix		-0.0463		0.281		-0.328
		(0.434)		(0.312)		(0.196)
D Excess BP		0.0304		-0.206		0.236**
		(0.175)		(0.123)		(0.0877)
D Fed Funds R.		0.0700		0.0815		-0.0115
		(0.143)		(0.132)		(0.0692)
D Term Spread		0.130		0.126		0.00386
		(0.146)		(0.124)		(0.0732)
D Unempl. Outl.		1.396		0.279		1.117***
		(0.987)		(0.935)		(0.356)
Constant	0.0530	0.0376	0.0275	0.0365	0.0255	0.00108
	(0.0469)	(0.0526)	(0.0391)	(0.0510)	(0.0260)	(0.0198)
Observations	25	25	25	25	25	25
R^2	0.181	0.294	0.163	0.250	0.039	0.462
Adjusted R^2	0.145	0.059	0.127	-0.000	-0.003	0.282

Note: This table documents the strong correlation between changes in 16 U.S. banks' aggregate quarterly loan originations and the dollar. In columns (1) and (2), the log change in loan originations is regressed on the change in the broad dollar index. Columns (3) through (6) separately show the correlations of the extensive and intensive margins of lending with the dollar. In columns (3) and (4), the dependent variable is the log change in the number of new loans. In columns (5) and (6), the log change in the average size of new loans is regressed on changes in the broad dollar index. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 3: U.S. banks' credit standards for C&I loans and the dollar

	Full Sample		Exclude Recessions	
	(1)	(2)	(3)	(4)
	Sh. Tight.	Sh. Tight.	Sh. Tight.	Sh. Tight.
D Dollar	0.548	-0.0763	1.379***	0.918**
	(0.419)	(0.454)	(0.420)	(0.398)
Sh. Tight (prev.)	0.875***	0.883***	0.842***	0.914***
	(0.0563)	(0.0628)	(0.0833)	(0.0814)
D Log Vix		12.09*		15.70***
		(6.496)		(5.451)
D Excess BP		5.992		2.966
		(4.341)		(3.512)
D Fed Funds R.		2.366		3.051
		(2.914)		(2.627)
D Term Spread		0.533		-1.559
		(2.199)		(2.041)
D Unempl. Outl.		-3.704		9.052
		(7.863)		(9.504)
Constant	-0.140	0.106	-1.132	-1.046
	(0.797)	(0.785)	(0.864)	(0.960)
Observations	111	111	92	92
R^2	0.813	0.841	0.716	0.787
Adjusted R^2	0.810	0.830	0.709	0.769

Note: This table documents the strong correlation between credit standards and the dollar. In each column, the net percentage of banks that reported tightening credit standards is regressed on its lagged value and the change in the broad dollar index. Columns (1) and (2) present results for the full sample. In columns (3) and (4), the underlying sample excludes quarters during NBER recessions and the GFC. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 4: The riskiness of new loans and the dollar

	(1) D PD	(2) D PD
D Dollar	-0.000290***	-0.000357***
	(0.0000947)	(0.000111)
D Log Vix		0.00113
		(0.00156)
D Excess BP		-0.00107
		(0.00123)
D Fed Funds R.		0.00121**
		(0.000532)
D Term Spread		0.00125*
		(0.000661)
D Unempl. Outl.		-0.00108
		(0.00404)
Constant	0.000201	0.000239
	(0.000293)	(0.000281)
Observations	25	25
R^2	0.228	0.308
Adjusted R^2	0.195	0.077

Note: This table shows that U.S. banks lend to safer borrowers when the dollar appreciates. In both columns, the change in the weighted average probability of default of new loans is regressed on the change in the broad dollar index. Column (1) shows the baseline results. Column (2) includes the standard set of macro and financial control variables. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 5: The reasons for easing and tightening credit standards and the dollar

				Tightening				
	(1) Capital	(2) Competit.	(3) Legal	(4) Liqui.	(5) Econ. Outl.	(6) Risk	(7) Sec. Liqu.	(8) Spec.
D Dollar	0.00117	-0.00269	-0.00649	-0.00189	0.00270	0.00298	-0.00295	0.0159*
	(0.00526)	(0.00551)	(0.0112)	(0.00720)	(0.00846)	(0.00866)	(0.00970)	(0.00829)
Observations	81	80	31	35	88	80	66	84
R^2	0.001	0.003	0.009	0.002	0.001	0.001	0.001	0.036
				Easing				
D Dollar	0.00957	0.00460	0.00315	-0.00823	-0.0106	-0.00423	-0.0151***	0.00705
	(0.00878)	(0.00497)	(0.00449)	(0.00565)	(0.0114)	(0.00550)	(0.00463)	(0.0104)
Observations	90	82	31	35	90	80	66	91
R^2	0.010	0.009	0.017	0.070	0.009	0.005	0.105	0.004

Note: This table provides evidence that the reason why credit standards for C&I loans set by U.S. banks tighten when the dollar appreciates is related to the liquidity of these loans on the secondary market. In each column, the share of banks that mentioned the reason displayed in the title of the column as a reason for easing or tightening in the SLOOS is regressed on the change in the broad dollar index. For example, column (1) shows the coefficient obtained from a regression of the share of banks that said in quarter t that they tightened credit standards because of changes in the bank's capital position on the change in the broad dollar index in quarter t. The various reasons that banks are free to mention are as follows: (i) changes in the bank's capital position, (ii) changes in competition from other lenders, (iii) legislative changes, supervisory actions, or changes in accounting standards, (iv) changes in the bank's current or expected liquidity position, (v) changes in the economic outlook, (vi) changes in the bank's risk tolerance, and (vii) changes in liquidity in the secondary market for these loans, (viii) industry-specific problems. Some of these reasons were introduced over time. This explains the varying number of observations across regressions. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 6: The reason for easing in response to dollar movements

	(1) Share Easing	(2) Share Easing
D Dollar	-0.0151***	-0.0118**
	(0.00463)	(0.00500)
D Log Vix		0.0550
		(0.0635)
D Excess BP		-0.155***
		(0.0476)
D Fed Funds R.		0.0484
		(0.0415)
D Term Spread		0.0452
		(0.0339)
D Unempl. Outl.		0.168
		(0.106)
Constant	0.196***	0.197***
	(0.0127)	(0.0119)
Observations	66	66
R^2	0.105	0.250
Adjusted R^2	0.091	0.174

Note: This table provides evidence that the reason why credit standards for C&I loans set by U.S. banks change with the dollar is related to the liquidity of these loans on the secondary market. Here the regression from column (7) of the lower panel of table 5 is repeated in column (1). Column (2) includes the baseline macro and financial control variables. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 7: Differences in banks' sensitivities to the dollar and loan securitization

	D Util. Exp.			Net Tight.		
	(1)	(2)	(3)	(4)	(5)	(6)
D Dollar	-0.0200**	-0.157*		0.00340	0.0106	
	(0.00936)	(0.0825)		(0.00448)	(0.0225)	
D Dollar X Av. HFS Share	-0.852**	-1.237**	-1.294***	0.327***	0.374***	0.399***
	(0.367)	(0.518)	(0.483)	(0.126)	(0.140)	(0.138)
D Dollar X Av. T1 Ratio		0.0112	0.0113*		-0.000599	-0.00306
		(0.00704)	(0.00661)		(0.00184)	(0.00236)
D Dollar X Av. Wholes. Fund. Share		-0.00315	-0.00360		-0.00302	-0.00140
		(0.0119)	(0.0106)		(0.00282)	(0.00277)
Net Tightening (prev)				0.342***	0.340***	0.244***
				(0.0345)	(0.0346)	(0.0357)
Av. HFS Share				0.964**	1.097**	0.680
				(0.482)	(0.513)	(0.504)
Av. Wholes. Fund. Share					-0.0148	-0.00889
					(0.0117)	(0.0106)
Av. T1 Ratio					0.00274	0.00320
					(0.00559)	(0.00872)
Time FE	No	No	Yes	No	No	Yes
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	679	679	679	1352	1352	1352
R^2	0.048	0.054	0.241	0.200	0.202	0.288
Adjusted R^2	-0.000	0.003	0.170	0.181	0.181	0.237

Note: This table tests for differences in the sensitivity of loan originations to dollar movements across banks. In columns (1) through (3), the dependent variable is the log change in loan originations (utilized exposures) of bank b in quarter t. Explanatory variables are the change in the broad dollar index and its interaction with three bank characteristics: a bank's average share of loans held for sale in its total loans, a bank's average Tier1 capital ratio, and its average wholesale funding share. For columns (1) through (3), averages were computed over quarterly values from 2011 to 2017. In columns (4) through (6), the dependent variable is the response of bank b's loan officer in the SLOOS to the question whether C&I lending standards of the bank eased or tightened. +1 corresponds to tightening credit standards, 0 means no change, and -1 reflects easing standards. Regressions in these columns also include last quarter's response, the change in the broad dollar index, and its interactions with bank characteristics. For the regressions with SLOOS data, bank characteristics were computed as yearly averages from 1992 to 2017. Columns (3) and (6) include time-fixed effects. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 8: The secondary loan market and the dollar

	Agg. Price		Price		Bid-Ask	
	(1)	(2)	(3)	(4)	(5)	(6)
D Dollar	-0.00252***	-0.00165***	-0.00140***	-0.00124***	0.0126***	0.00700***
	(0.000533)	(0.000441)	(0.000280)	(0.000261)	(0.00306)	(0.00260)
D Log Vix		-0.0248***		-0.00550*		0.139***
		(0.00686)		(0.00291)		(0.0286)
D Excess BP		-0.00186		-0.00102		0.0129
		(0.00333)		(0.00156)		(0.0117)
D Fed Funds R.		-0.00471		0.00105		-0.00383
		(0.00620)		(0.00241)		(0.0248)
D Term Spread		0.00798**		0.00383**		-0.0169
		(0.00339)		(0.00163)		(0.0154)
D Unempl. Outl.		-0.0203***		-0.0286***		0.127***
		(0.00650)		(0.00395)		(0.0315)
Constant	0.00456***	0.00492***	0.000481	0.000435	-0.00284	-0.00269
	(0.000714)	(0.000667)	(0.000369)	(0.000316)	(0.00341)	(0.00283)
Observations	168	168	224256	224256	181774	181774
R^2	0.104	0.387	0.009	0.032	0.008	0.033
Adjusted R^2	0.098	0.365	0.009	0.032	0.008	0.033

Note: This table shows that an appreciation of the dollar is associated with lower prices and worse liquidity conditions for loans sold on the secondary market. Data on secondary market prices and bid-ask spreads come from the Loan Syndication and Trading Association (LSTA). Columns (1) and (2) use as dependent variable the monthly change in the U.S. Leveraged Loan 100 Index. Columns (3) through (6) are based on a loan-level sample. In columns (3) and (4), the change in the monthly average price of a loan traded on the secondary market is regressed on the change in the monthly broad dollar index. Columns (5) and (6) display regressions of the change in the monthly average bid-ask spread of a loan. Columns (1) and (2) have robust standard errors in parentheses. In columns (3) through (6), standard errors are clustered by month. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 9: The greater sensitivity of riskier loans to the dollar

	D Price			D Spread		
	(1)	(2)	(3)	(4)	(5)	(6)
D Dollar	-0.000521***	-0.000458***		0.00922***	0.00575**	
	(0.000154)	(0.000153)		(0.00305)	(0.00254)	
Risky X D Dollar	-0.00242***	-0.00224***	-0.00204***	0.00303	0.000477	0.000533
	(0.000529)	(0.000544)	(0.000441)	(0.00245)	(0.00269)	(0.00166)
Risky	0.000391	-0.0000447	-0.000920**	-0.00429	-0.00319	-0.000726
	(0.000687)	(0.000580)	(0.000463)	(0.00276)	(0.00234)	(0.00181)
c1	0	0		0	0	
	(.)	(.)		(.)	(.)	
D Log Vix		-0.00496			0.118***	
		(0.00311)			(0.0239)	
D Excess BP		-0.00103			0.0101	
		(0.00155)			(0.00967)	
D Fed Funds R.		0.000991			-0.00514	
		(0.00238)			(0.0200)	
D Term Spread		0.00375**			-0.0147	
		(0.00162)			(0.0125)	
D Unempl. Outl.		-0.0285***			0.112***	
		(0.00389)			(0.0254)	
Constant	0.000257	0.000379**		-0.000495	-0.000954	
	(0.000172)	(0.000176)		(0.00305)	(0.00257)	
Time FE	No	No	Yes	No	No	Yes
Observations	224256	224256	224256	223620	223620	223620
R^2	0.016	0.037	0.098	0.007	0.028	0.078
Adjusted R^2	0.016	0.037	0.097	0.007	0.028	0.078

Note: This table shows that the correlation between secondary market loan prices (liquidity) and the dollar are stronger for riskier loans. The regressions are parallel to those of changes in monthly loan prices and bid-ask spreads in columns (3) through (6) of table 8 but now include an interaction term between the change in the dollar index and a dummy variable that takes the value of 1 if the average price of a loan is at 97 percent of the par value or below and zero otherwise. Standard errors clustered by month are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 10: The role of non-bank investors

	D Price		D Spread	
	(1)	(2)	(3)	(4)
D Dollar	-0.00437***	-0.00362***	0.0392***	0.0265***
	(0.00114)	(0.00111)	(0.00791)	(0.00788)
Sh. US banks X D Dollar	0.0173***	0.0126**	-0.176***	-0.118***
	(0.00593)	(0.00584)	(0.0413)	(0.0427)
Sh. US banks	-0.0296***	-0.0268***	0.126***	0.106***
	(0.00703)	(0.00562)	(0.0457)	(0.0399)
D Log Vix		-0.00437		0.115***
		(0.00367)		(0.0296)
D Excess BP		-0.000284		0.00538
		(0.00169)		(0.0112)
D Fed Funds R.		0.00422*		-0.0134
		(0.00224)		(0.0215)
D Term Spread		0.00427**		-0.0132
		(0.00166)		(0.0131)
D Unempl. Outl.		-0.0263***		0.0982***
		(0.00344)		(0.0222)
Constant	0.00505***	0.00460***	-0.0194**	-0.0168**
	(0.00135)	(0.00104)	(0.00839)	(0.00709)
Observations	177000	177000	176447	176447
R^2	0.025	0.047	0.017	0.036
Adjusted R^2	0.025	0.047	0.017	0.036

Note: This tables shows that the correlations between secondary market loan loan prices, liquidity and the dollar have become stronger as the share of U.S. banks as buyers of loans on the secondary market has fallen over time. The regressions are parallel to those of changes in monthly loan prices and bid-ask spreads in columns (3) through (6) of table 8, but now include an interaction term between the change in the dollar index and the yearly share of syndicated loans that are bought by U.S. banks from Irani et al. (2018). Standard errors clustered by month and are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 11: Net flows into U.S. mutual funds specialized in U.S. bank loans

	(1)	(2)	(3)
	Net Flows	Net Flows	Net Flows
D Dollar	-0.00709***	-0.00546**	-0.00529**
	(0.00232)	(0.00224)	(0.00240)
Lag Av. Perf.		0.00645**	0.00191
		(0.00285)	(0.00292)
D Log Vix			0.00564
			(0.0226)
D Excess BP			0.0268*
			(0.0147)
D Fed Funds R.			-0.0479***
			(0.0156)
D Term Spread			0.101***
			(0.0173)
D Unempl. Outl.			-0.0459
			(0.0296)
Constant	0.0151***	0.0118***	0.0160***
	(0.00332)	(0.00341)	(0.00306)
Observations	106	106	106
R^2	0.064	0.099	0.398

Note: This table shows that U.S. domiciled, U.S. dollar denominated mutual funds that are specialized in investing in bank loans in the United States experience net outflows when the dollar appreciates. In column (1), net inflows are regressed on the change in the broad dollar index. Column (2) controls for funds' lagged performance. Column (3) includes the baseline macro and financial control variables. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 12: Instrumenting secondary market prices with the dollar

	D Util. Exp.			Sh. Tight.		
	(1) OLS	(2) First	(3) IV	(4) OLS	(5) First	(6) IV
D Price	2.001		14.13*	-147.1***		-332.2**
	(3.498)		(7.243)	(38.18)		(134.3)
D Dollar		-0.00285**			-0.00346***	
		(0.00128)			(0.00128)	
Sh. Tight (prev.)				0.758***		0.825***
				(0.0587)		(0.111)
Constant	-0.00842	0.0139***	-0.144	-0.0761	0.0143***	2.918
	(0.0547)	(0.00315)	(0.0935)	(0.986)	(0.00257)	(2.150)
Observations	25	25	25	56	56	56
R^2	0.017	0.214	.	0.788	0.146	0.685
Adjusted R^2	-0.026	0.180	.	0.780	0.130	0.673

Note: This table presents instrumental variable regressions where change in the U.S. Leverage Loan 100 Index are instrumented with changes in the broad dollar index. Columns (1) to (3) show regressions based on loan originations data. Columns (4) to (6) present the corresponding regressions for data on banks' credit standards. Columns (1) and (4) display simple OLS regressions for the IV samples. Columns (2) and (5) show regressions of the change in the loan price index on the change in the broad dollar index, the first stage regressions. Columns (3) and (6) give the second-stage results, displaying the dollar coefficients estimated via IV. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 13: IV regressions for SLOOS credit standards

	Sh. Tight.		
	(1) OLS	(2) First	(3) IV
D Dollar	1.540***		2.265**
	(0.414)		(1.130)
U.S. Mon. Surpr.		-0.000787	-0.00307
		(0.00383)	(0.00857)
EMU Mon. Surpr.		-0.00577**	
		(0.00225)	
Japan Mon. Surpr.		-0.00285	
		(0.00388)	
UK Mon. Surpr.		-0.00180	
		(0.00413)	
Canada Mon. Surpr.		-0.00173	
		(0.00389)	
Austr. Mon. Surpr.		0.00592	
		(0.00421)	
Sh. Tight (prev.)	0.889***	0.00821	0.886***
	(0.0843)	(0.0164)	(0.0799)
Constant	-0.495	-0.179	-0.502
	(0.909)	(0.273)	(0.907)
Observations	64	64	64
R^2	0.821	0.188	0.811

Note: This table presents the IV results for the relationship between credit standards for C&I loans and the dollar where the broad dollar index is instrumented with the response of dollar exchange rates to monetary policy announcements in five advanced economies. Columns (1) shows the baseline OLS regression of the quarterly net percentage of banks that said that they tightened credit standards on the change in the broad dollar index. Column (2) presents the first-stage regression, where the broad dollar index is regressed on the response of the dollar exchange rate vis-a-vis the Canadian dollar, the Euro, the British Pound, the Yen, and the Australian dollar to monetary policy announcements in the respective advanced economy taken from Ferrari et al. (2017) and Cieslak and Schrimpf (2019). These responses, computed from 15 minutes before to 90 minutes after monetary policy announcements, were summed within a quarter and cover the period from 2000 to 2017. Column (3) displays the second-stage results. As an additional control variable, the IV regressions includes the response of the USD-EUR exchange rate to U.S. monetary policy announcements from the same sources. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 14: Regressions for sectors with different trade intensities

	Baseline	Int. terms		No Trade		Exp or Imp	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
D Dollar	-0.0387**	-0.0375***	-0.0532***	-0.0392**	-0.0579**	-0.0377***	-0.0472**
	(0.0151)	(0.00621)	(0.00750)	(0.0176)	(0.0211)	(0.0134)	(0.0212)
D USD X Exp. Int.		0.0178	0.0174				
		(0.0769)	(0.0784)				
D USD X Imp. Int.		-0.0249	-0.0258				
		(0.0576)	(0.0584)				
Exp. Int.		-0.0909	-0.0872				
		(0.166)	(0.165)				
Imp. Int.		0.0305	0.0328				
		(0.111)	(0.111)				
D Log Vix			0.235**		0.308		0.0825
			(0.102)		(0.297)		(0.329)
D Excess BP			-0.0384		-0.0109		-0.0934
			(0.0631)		(0.181)		(0.185)
D Fed Funds R.			0.105**		0.103		0.109
			(0.0453)		(0.161)		(0.141)
D Term Spread			0.223***		0.252*		0.166
			(0.0523)		(0.146)		(0.128)
D Unempl. Outl.			1.722***		1.719**		1.725***
			(0.237)		(0.818)		(0.584)
Constant	0.0392	0.0419***	0.0368**	0.0440	0.0445	0.0294	0.0145
	(0.0450)	(0.0153)	(0.0164)	(0.0458)	(0.0505)	(0.0454)	(0.0449)
Observations	27460	27460	27460	18433	18433	9027	9027
R^2	0.004	0.004	0.009	0.004	0.010	0.003	0.007

Note: This table tests for differences in the sensitivity of banks' loan originations to the dollar across sectors. Column (1) shows the baseline regression of the log change in loan originations on the change in the broad dollar index for Y-14 data aggregated at the bank-industry level. Loans are grouped by industry according to the 3-digit NAICS industry to which the borrowing firm belongs. Columns (2) and (3) include interaction terms between the change in the broad dollar index and the export and import intensity of an industry. Columns (4) and (5) are based on a sample of industries that neither export nor import. The sample underlying results in columns (6) and (7) only include industries that export or import. Standard errors clustered by industry × quarter are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 15: Controlling for the demand for loans

	D Util. Exp.		Sh. Tight.	
	(1)	(2)	(3)	(4)
D Dollar	-0.0487**	-0.0477**	0.918**	1.130***
	(0.0222)	(0.0221)	(0.398)	(0.382)
D Share of Comm. Expos. Drawn		6.292*		
		(3.518)		
Sh. Tight (prev.)			0.914***	0.798***
			(0.0814)	(0.111)
Sh. Less Demand				-0.0375
				(0.0968)
Sh. Less Demand (prev.)				-0.101
				(0.0806)
D Log Vix	0.0340	0.0205	15.70***	12.65*
	(0.339)	(0.337)	(5.451)	(6.659)
D Excess BP	-0.00621	-0.00135	2.966	3.513
	(0.168)	(0.170)	(3.512)	(3.645)
D Fed Funds R.	0.113	0.118	3.051	4.123
	(0.157)	(0.159)	(2.627)	(2.500)
D Term Spread	0.307**	0.305**	-1.559	-1.892
	(0.145)	(0.146)	(2.041)	(2.085)
D Unempl. Outl.	1.334	1.325	9.052	12.70*
	(0.834)	(0.813)	(9.504)	(7.246)
Constant	0.0302	0.0145	-1.046	-0.825
	(0.0455)	(0.0423)	(0.960)	(0.804)
Observations	605	605	92	92
R^2	0.080	0.085	0.787	0.802

Note: This table shows that results are robust to controlling for the demand for loans. Column (1) presents the baseline Y-14 regression run on a sample that varies by bank and quarter. Column (2) includes the change in the exposures drawn by bank and quarter as a demand control. Columns (3) and (4) are based on the SLOOS data. Column (3) displays the baseline regression identical to column (4) of table 3, while column (4) includes the net percentage of banks that said that credit demand increased as well as its lagged value in the regression. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 16: Differences in banks' sensitivities to the dollar, obligor-level regressions

	D Loan Dummy		
	(1)	(2)	(3)
D Dollar	-0.0000788*	-0.000329**	
	(0.0000415)	(0.000155)	
D Dollar X Av. HFS Share		-0.00174*	-0.00174*
		(0.000904)	(0.000945)
D Dollar X Av. T1 Ratio		0.0000200	0.0000200
		(0.0000121)	(0.0000130)
D Dollar X Av. Wholes. Fund. Share		0.0000251	0.0000251
		(0.0000220)	(0.0000248)
Bank-Borrower FE	Yes	Yes	Yes
Borrower-Time FE	No	No	Yes
Observations	57285325	57285325	57285325
R^2	0.002	0.002	0.079

Note: This table tests for differences in the sensitivity of loan originations to dollar movements across banks at the obligor-bank time level. The dependent variable takes the value of 1 if a bank originates a loan to a borrower in a quarter but did not originate a loan to the same borrower in the previous quarter. It takes the value -1 if the bank issued a loan last quarter to a borrower but does not originate a new loan this quarter. It takes the value 0 if a bank continues to originate loans (to not originate a loan) to a borrower in a quarter. Explanatory variables are the change in the broad dollar index and its interaction with three bank characteristics: a bank's average share of loans held for sale in its total loans, a bank's average Tier1 capital ratio, and its average wholesale funding share. The averages were computed over quarterly values from 2011 to 2017. Standard errors are clustered by time in column (1) and by bank-time in columns (2) and (3) and are shown in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 17: Risk ratings of existing loans

	Rating Impr.		PD Lower.	
	(1)	(2)	(3)	(4)
D Dollar	-0.000415	0.000616	0.0252	0.0467
	(0.000596)	(0.000876)	(0.0216)	(0.0292)
D Log Vix		-0.00131		-0.172
		(0.0289)		(0.427)
D Excess BP		-0.0128		0.443
		(0.00910)		(0.299)
D Fed Funds R.		-0.0148		-0.706
		(0.00884)		(0.431)
D Term Spread		-0.0130		-0.354
		(0.0112)		(0.244)
D Unempl. Outl.		0.0437		1.252
		(0.0716)		(1.358)
Constant	-0.00558	-0.00601**	0.157***	0.293**
	(0.00346)	(0.00242)	(0.0400)	(0.107)
Observations	2130057	2130057	1668636	1668636
R^2	0.000	0.001	0.019	0.081

Note: This table shows that the risk ratings of existing loans on banks' books are not correlated with the dollar. In columns (1) and (2), the dependent variable is a categorial variable that takes the value of 1 if the borrower associated with a loan was upgraded, 0 if the rating remained unchanged, and -1 if the borrower was downgraded compared to the previous quarter based on the ratings that the banks report in the Y-14 data. For columns (3) and (4), the dependent variable is very similar to the one in the other columns but loans are now classified according to whether the probability of default of the borrower as reported by the bank changed. By construction, the sample excludes any loans that were newly issued in a quarter. Standard errors clustered by quarter are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 18: Banks' foreign activities do not matter

	(1) For cl	(2) Int cl	(3) Lo cl	(4) Local liab	(5) <1 pc for cl	(6) No local cl
D Dollar	-0.0400***	-0.0324***	-0.0455***	-0.0467***	-0.0357*	-0.0493**
	(0.00805)	(0.00853)	(0.00752)	(0.00743)	(0.0180)	(0.0198)
Av. For. Cl. Share	0.0381					
	(0.150)					
D Dollar X Av. For. Cl. Share	0.0347					
	(0.0634)					
Av. Int. Cl. Share		0.100				
		(0.205)				
D Dollar X Av. Int. Cl. Share		-0.0412				
		(0.0922)				
Av Local Share			0.0237			
			(0.313)			
D Dollar X Av. Local Share			0.199			
			(0.124)			
Av Loc. Curr. Share				0.00799		
				(0.555)		
D Dollar X Av. Loc. Curr. Share				0.326*		
				(0.172)		
Constant	0.0419**	0.0382*	0.0457**	0.0462**	0.0563	0.0668
	(0.0185)	(0.0199)	(0.0180)	(0.0187)	(0.0468)	(0.0520)
Observations	628	628	628	628	101	97
R^2	0.034	0.033	0.039	0.043	0.087	0.140
Adjusted R^2	0.029	0.028	0.035	0.038	0.077	0.131

Note: This table investigates whether differences in banks' foreign operations predict the sensitivity of a bank's loan originations to the dollar. The regression in column (1), run at the bank level, includes an interaction term between the change in the broad dollar index and a bank's average share of foreign claims in total assets over the years 2011 to 2017. In column (2), the interaction term with the dollar is constructed using a bank's average international claims (foreign claims minus claims in foreign offices in local currency). In column (3), the interaction is computed using a bank's average local claims, those held in foreign offices. In column (4), the interaction term is based on a bank's average local liabilities. The regression displayed in column (5) is based on a sample of banks with a share of foreign claims of less than 1 percent of total assets. The sample that underlies column (6), only includes banks with zero claims held in foreign offices. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 19: Cross-border loan originations and the dollar

	Dom.		AFE		EME	
	(1) Dom.	(2) Dom.	(3) AFE	(4) AFE	(5) EME	(6) EME
D Dollar	-0.0402**	-0.0454*	-0.0403*	-0.0358	-0.0337	-0.0423
	(0.0145)	(0.0223)	(0.0201)	(0.0223)	(0.0328)	(0.0315)
D Log Vix		-0.0463		-0.0206		0.280
		(0.434)		(0.468)		(0.277)
D Excess BP		0.0304		-0.395*		-0.429*
		(0.175)		(0.207)		(0.230)
D Fed Funds R.		0.0700		0.0553		0.224
		(0.143)		(0.180)		(0.145)
D Term Spread		0.130		0.205		0.183
		(0.146)		(0.204)		(0.161)
D Unempl. Outl.		1.396		1.268		-0.678
		(0.987)		(1.079)		(0.557)
Constant	0.0530	0.0376	0.0524	0.0299	0.0176	0.0239
	(0.0469)	(0.0526)	(0.0538)	(0.0586)	(0.0250)	(0.0405)
Observations	25	25	25	25	25	25
R^2	0.181	0.294	0.126	0.275	0.110	0.286
Adjusted R^2	0.145	0.059	0.088	0.034	0.071	0.048

Note: This table compares the sensitivities of new loans issued to U.S. borrowers versus borrowers in advanced foreign economies (AFE) and emerging markets (EME). Columns (1) and (2) repeat the baseline results from columns (1) and (2) of table 2, which document the correlation between U.S. banks' domestic loan originations and the dollar, to facilitate the comparison. Columns (3) and (4) include new loans to borrowers residing in advanced foreign economies. Columns (5) and (6) are for loans to borrowers in emerging markets. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 20: U.S. banks' rates paid for money market mutual funds funding

	(1)	(2)	(3)
D Dollar	-6.038*	-6.528**	-5.006**
	(2.827)	(2.888)	(1.809)
WAM	-0.0428	-0.0424	0.00113
	(0.0310)	(0.0321)	(0.0285)
D log VIX	-0.202	-0.755	0.640
	(0.642)	(0.680)	(0.799)
D Excess BP	2.507	-3.892	7.826
	(16.42)	(15.76)	(7.451)
D Fed Funds R.	36.03**	35.21**	-3.466
	(15.72)	(15.03)	(12.76)
D Term Spread	-14.95	-14.03	-10.22
	(18.67)	(17.90)	(14.92)
D World Rec. Prob		36.31*	
		(19.61)	
D VRP US		0.0928	
		(0.0696)	
D 4q Unempl. Rate			15.47**
			(6.688)
D Unempl. Outlook			172.2***
			(22.91)
Observations	2,716	2,716	2,716
R-squared	0.035	0.040	0.266
Instrument type FE	YES	YES	YES
No Banks	13	13	13

Robust standard errors in parentheses
*** p<0.01, ** p<0.05, * p<0.1

Note: This table shows that marginal funding costs of U.S. banks decline when the dollar appreciates. It presents regressions of the change in the interest rate in basis points paid by 13 U.S. banks on Treasury Repos, Government Agency Repos, Other Repos, Certificates of Deposits, Commercial Paper, and Asset-Backed Commercial Paper on the change in the broad dollar index and control variables. All regressions include instrument-type fixed effects. Standard errors clustered by time are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 21: The emerging and advanced economies dollar indices

	(1) Y-14	(2) SLOOS	(3) SL. Pre-2008	(4) SL. Post-2008	(5) Risk	(6) SL. Reason	(7) Price Index	(8) Price	(9) Bid-Ask Spr.
D Dollar AFE	-0.0296	0.853**	1.330**	-0.707	-0.00000102	-0.00317	-0.000425	-0.000379***	0.000805
	(0.0268)	(0.407)	(0.528)	(0.440)	(0.000188)	(0.00576)	(0.000394)	(0.0000330)	(0.00185)
D Dollar EME	-0.0162	0.0786	-0.0871	1.452**	-0.000364**	-0.0112	-0.00153***	-0.00108***	0.00658**
	(0.0208)	(0.281)	(0.327)	(0.541)	(0.000141)	(0.00672)	(0.000533)	(0.0000361)	(0.00260)
D Log Vix	-0.0720	16.49***	23.08*	9.148*	0.00219	0.0851	-0.0222***	-0.00381***	0.106***
	(0.424)	(5.389)	(11.98)	(4.639)	(0.00181)	(0.0709)	(0.00748)	(0.000290)	(0.0247)
D Excess BP	0.0220	2.734	-1.066	-0.0285	-0.000967	-0.160***	-0.00157	-0.000876***	0.00911
	(0.178)	(3.676)	(6.722)	(3.786)	(0.00172)	(0.0465)	(0.00331)	(0.000191)	(0.00955)
D Fed Funds R.	0.0677	3.023	6.989	-1.015	0.00131**	0.0436	-0.00450	0.00138***	-0.00632
	(0.148)	(2.650)	(4.389)	(3.068)	(0.000578)	(0.0418)	(0.00618)	(0.000260)	(0.0196)
D Term Spread	0.127	-1.887	-3.776	-0.261	0.00144**	0.0477	0.00833**	0.00407***	-0.0166
	(0.158)	(2.078)	(2.963)	(2.795)	(0.000620)	(0.0362)	(0.00341)	(0.000204)	(0.0121)
D Unempl. Outl.	1.364	9.520	-0.386	14.34*	0.000758	0.177*	-0.0204***	-0.0287***	0.115***
	(1.063)	(9.647)	(16.19)	(7.558)	(0.00387)	(0.101)	(0.00634)	(0.000737)	(0.0239)
Sh. Tight (prev.)		0.920***	0.952***	0.770***					
		(0.0804)	(0.0860)	(0.157)					
Constant	0.0349	-0.738	-0.460	-2.380	0.000328	0.201***	0.00507***	0.000495***	-0.00260
	(0.0532)	(0.895)	(1.224)	(1.500)	(0.000272)	(0.0128)	(0.000676)	(0.0000367)	(0.00224)
Observations	25	92	58	34	25	66	168	224270	223627
R^2	0.293	0.789	0.810	0.831	0.359	0.263	0.396	0.033	0.029

Note: This table shows that the emerging markets dollar index is the main driver of our results, especially post-GFC. The table repeats all baseline regressions, but regressions now include the changes in two different dollar indices, one index summarizing bilateral dollar exchange rates vis-a-vis emerging markets (EME), the other one vis-a-vis advanced foreign economies (AFE). The following dependent variables are in each of the respective columns: (1) log change in U.S. banks' aggregate loan originations; (2) net percentage of U.S. banks that reported tightening credit standards for C&I loans; (3) same as in (2) but sample includes quarters only pre-GFC; (4) same as in (2) but sample includes only quarters post GFC; (5) change in the weighted average probability of default of new loans; (6) the share of banks that mentioned secondary market liquidity of loans as a reason for easing credit standards; (7) monthly change in the U.S. Leverage Loan 100 Index; (8) monthly change in the price of a loan sold on the secondary market; (9) monthly change in the bid-ask spread of a loan sold on the secondary market. Standard errors are in parentheses. Clustering is as in the baseline specifications. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 22: Net flows into U.S. bank loan mutual funds, EME vs. AFE dollar index

	(1)	(2)	(3)
	Net Flows	Net Flows	Net Flows
D Dollar EME	-0.00759***	-0.00667**	-0.00656***
	(0.00276)	(0.00265)	(0.00221)
D Dollar AFE	0.00146	0.00207	0.00139
	(0.00342)	(0.00330)	(0.00260)
Lag Av. Perf.		0.00616**	0.00142
		(0.00274)	(0.00289)
D Log Vix			0.0175
			(0.0232)
D Excess BP			0.0274*
			(0.0149)
D Fed Funds R.			-0.0463***
			(0.0161)
D Term Spread			0.103***
			(0.0176)
D Unempl. Outl.			-0.0487*
			(0.0266)
Constant	0.0153***	0.0122***	0.0164***
	(0.00328)	(0.00337)	(0.00309)
Observations	106	106	106
R^2	0.095	0.127	0.418

Note: This table shows regressions of net inflows into U.S. domiciled, U.S. dollar denominated funds that invest in U.S. bank loans on the emerging markets dollar index and the advanced foreign economies dollar index. Regressions are parallel to those shown in table 11. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

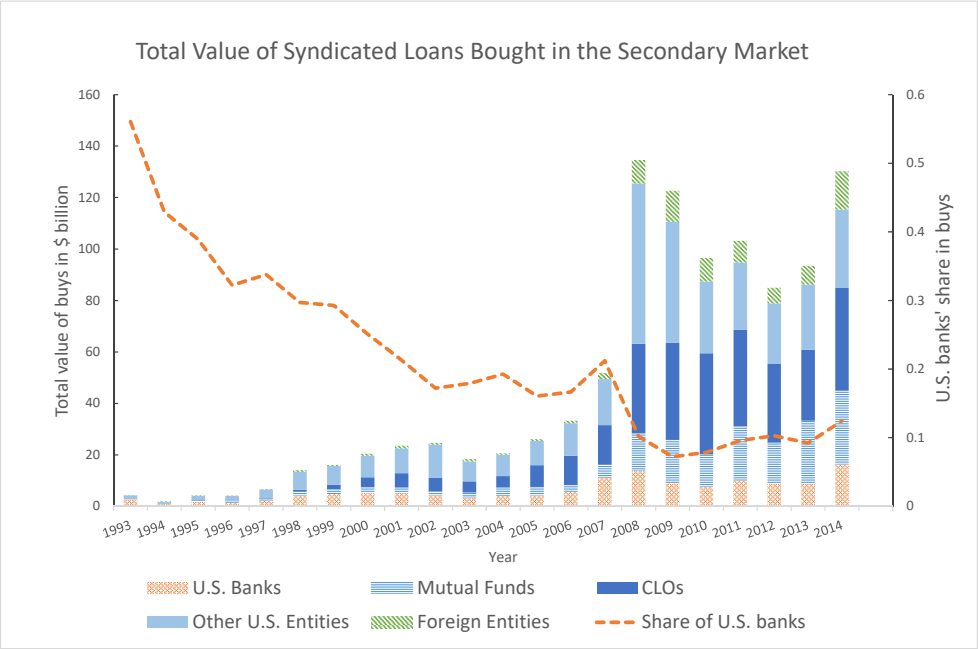
Table 23: U.S. corporate bond yields and the dollar

	(1) Baseline	(2) EME/AFE	(3) EME/AFE
D Dollar	-0.0229		
	(0.0175)		
D Dollar EME		-0.0404***	
		(0.0140)	
D Dollar AFE		0.00951	
		(0.0176)	
Rat. X D Dollar	0.0126**		
	(0.00616)		
Rat. X D Dollar EME		0.0100**	0.0101**
		(0.00490)	(0.00417)
Rat. X D Dollar AFE		0.00423	0.00408
		(0.00624)	(0.00541)
Rat. X D Log Vix	0.295***	0.283***	0.282***
	(0.0640)	(0.0616)	(0.0541)
Rat. X D Excess BP	0.158***	0.156***	0.156***
	(0.0428)	(0.0429)	(0.0357)
Rat. X D Fed Funds R.	-0.0370	-0.0384	-0.0393
	(0.0572)	(0.0576)	(0.0499)
Rat. X D Term Spread	-0.0969**	-0.0944**	-0.0942***
	(0.0413)	(0.0415)	(0.0353)
Rat. X D Unempl. Outl.	0.373**	0.373**	0.370***
	(0.164)	(0.163)	(0.142)
D Log Vix	-0.470***	-0.393**	
	(0.180)	(0.173)	
D Excess BP	-0.437***	-0.428***	
	(0.121)	(0.121)	
D Fed Funds R.	0.576***	0.585***	
	(0.158)	(0.159)	
D Term Spread	0.892***	0.878***	
	(0.116)	(0.117)	
D Unempl. Outl.	-0.783*	-0.791*	
	(0.465)	(0.464)	
Rating-Maturity FE	Yes	Yes	Yes
Time FE	No	No	Yes
Observations	3683	3683	3683
R^2	0.185	0.187	0.374

Note: This table shows that yields on the risky category of U.S. corporate bonds also responds to dollar movements. Yields rise when the dollar appreciates. The sample consists of monthly 5- and 10-year U.S. corporate bond yield indices for different rating buckets. Column (1) includes an interaction term between the change in the broad dollar index and a categorial variable that reflects the risk rating of the different bond indices. Higher values of the ratings variable correspond to a worse rating. Column (2) shows results when the dollar index is broken into an EME and and AFE dollar index. Column (3) is the same as column (2) but includes time-fixed effects. Standard errors clustered by rating $\times$ time are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

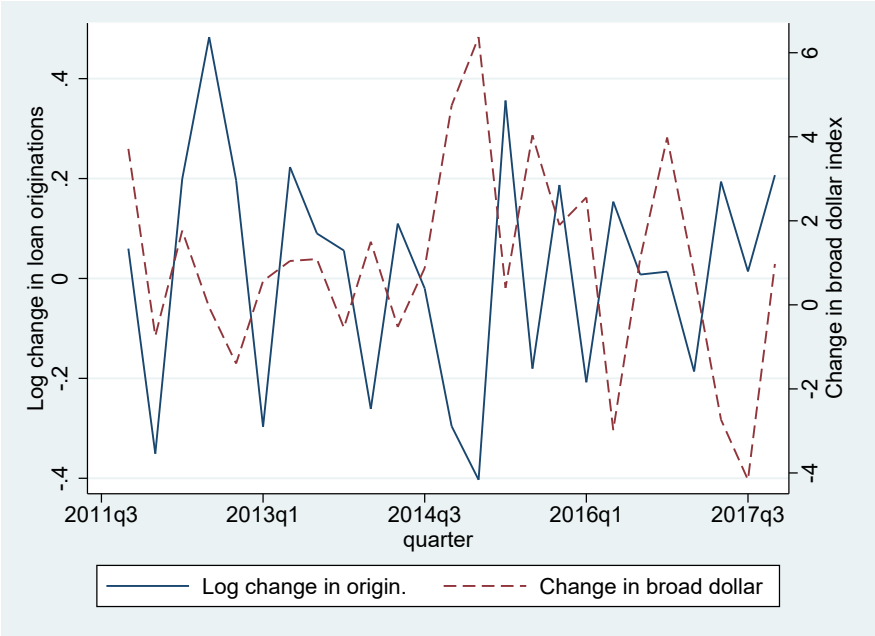
Figures

Figure 1: Total value of syndicated loans bought and buyer composition in SNC



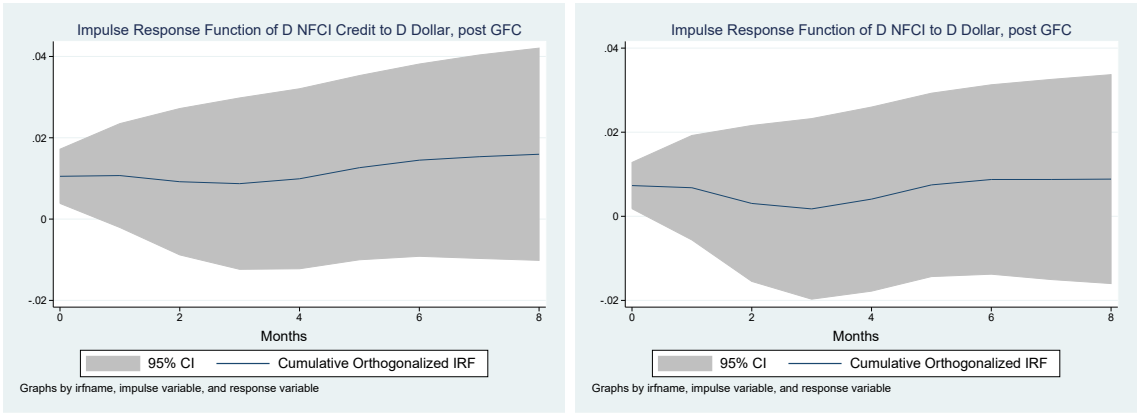
Note: The figure shows the total yearly value of syndicated loans bought by U.S. banks, CLOs, mutual funds, other U.S. entities, and foreign entities in the secondary market (y-axis to the left) derived from Shared National Credit data in Irani et al. (2018). The dashed line in the figure represents the share of loans bought by U.S. banks (y-axis on the right).

Figure 2: U.S. banks' loan originations and the dollar



Note: The figures shows the quarterly log change in the total value of loan originations of 16 major U.S. banks as well as the quarterly change in the broad dollar index, a trade-weighted index of the dollar exchange rate vis-a-vis major U.S. trading parters, from 2011 to 2017. Information on U.S. banks' loan originations is from the Y-14 reports U.S. banks file with the Federal Reserve.

Figure 3: The U.S. National Financial Conditions Index (NFCI) and the Dollar

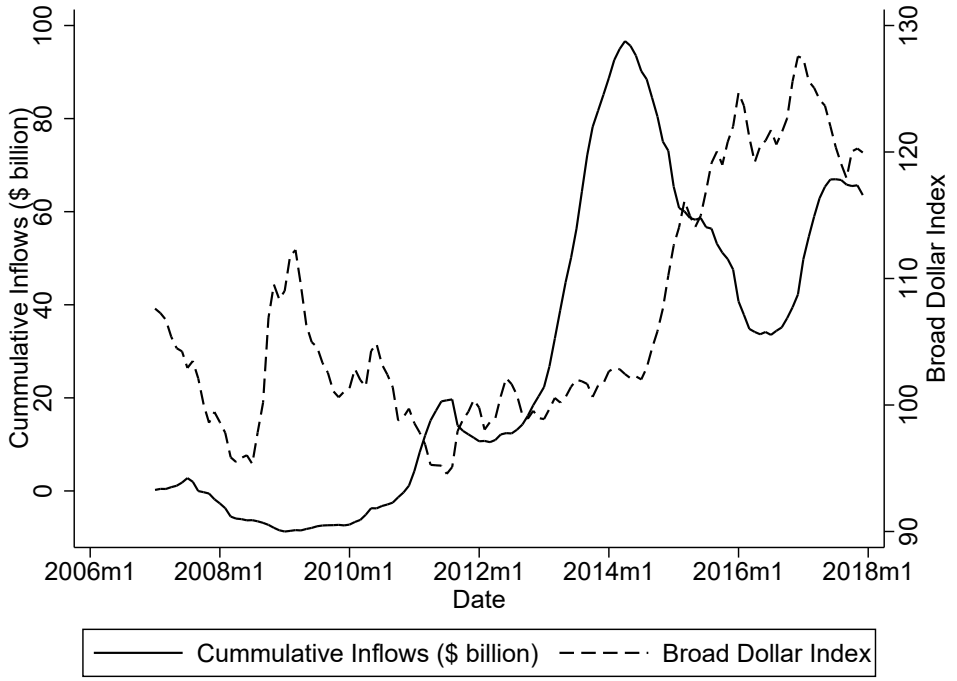


Note: The left (right) panel of the figure shows the impulse response function of the National Financial Conditions Subindex (National Financial Conditions Index) to a one-standard-deviation increase in the monthly change of the broad dollar index obtained from a vector autoregression (VAR). In the VAR, the following variables explain the monthly change in the credit index in the following order: the change in the fed funds rate, the change in the term spread, the change in the excess bond premium, the log difference of the VIX, the log difference of the CPI, the log difference of industrial output, the log difference of nonfarm employment, and the change in the dollar. The VAR includes two lags of all endogenous variables.

Figure 4: Secondary market liquidity as a SLOOS reason and secondary market prices

Note: This figure shows the three-quarter moving-average share of banks that said in the SLOOS that they eased credit standards because of "improved liquidity in the secondary market for these loans" together with the three-quarter moving-average S&P/LSTA U.S. Leverage Loan 100 Index, which reflects the performance of the largest facilities in the U.S. leveraged loan market from 2002 to 2017.

Figure 5: U.S. mutual funds investing in corporate loans and the dollar



Note: This figure shows the monthly net inflows into U.S. domiciled, U.S. dollar denominated mutual funds that invest in bank loans exclusively in the United States together with the monthly broad dollar index from mid-2006 to 2017. Data on these mutual funds is from EFPR. Weekly data was summed within a month and aggregated over all funds in the data.

Appendix A: Robustness Tables

Table 24: C&I credit standards and the dollar, pre and post crisis

	No crisis, pre-2008		No crisis, post-2008	
	(1)	(2)	(3)	(4)
D Dollar	1.324**	1.229**	1.258***	0.785*
	(0.655)	(0.603)	(0.403)	(0.395)
Sh. Tight (prev.)	0.878***	0.954***	0.641***	0.950***
	(0.0989)	(0.0887)	(0.0903)	(0.138)
D Log Vix		21.30*		14.66***
		(12.11)		(4.580)
D Excess BP		0.0791		0.744
		(6.625)		(4.092)
D Fed Funds R.		7.901*		-2.680
		(4.562)		(3.427)
D Term Spread		-2.164		1.429
		(3.051)		(3.232)
D Unempl. Outl.		0.934		22.00***
		(15.67)		(7.880)
Constant	-0.324	-1.285	-3.324***	-0.893
	(1.139)	(1.270)	(0.980)	(1.497)
Observations	58	58	34	34
R^2	0.730	0.799	0.638	0.789
Adjusted R^2	0.720	0.771	0.615	0.732

Note: This table shows results of sample splits for SLOOS regressions. Columns (1) and (2) are based on a sample that only includes the pre-GFC period. Columns (3) and (4) only include quarters after the GFC. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 25: Credit standards of other types of loans

	C&I Small		Comm. Real Est.	
	(1)	(2)	(3)	(4)
D Dollar	0.869**	0.606**	1.089*	1.009**
	(0.366)	(0.266)	(0.612)	(0.481)
D Log Vix		22.15***		25.49**
		(5.397)		(12.03)
D Excess BP		1.396		-2.063
		(3.307)		(5.453)
D Fed Funds R.		1.898		7.533*
		(2.016)		(4.081)
D Term Spread		-1.664		-3.861
		(2.294)		(2.970)
D Unempl. Outl.		15.63		-9.468
		(10.26)		(11.40)
Sh. Tight. CI S (prev)	0.755***	0.863***		
	(0.134)	(0.0969)		
Sh. Tight. Comm. RE (prev)			0.841***	0.908***
			(0.0800)	(0.0638)
Constant	-0.798	-0.948	0.415	-0.774
	(0.957)	(0.796)	(1.045)	(1.097)
Observations	74	74	62	62
R^2	0.568	0.707	0.663	0.749
Adjusted R^2	0.556	0.676	0.651	0.717

Note: This table shows that also credit standards for other types of loans are also correlated with the dollar. In columns (1) and (2), the net percentage of firms that reported tightening credit standards for C&I loans to small firms is the dependent variable. In columns (3) and (4), it is the net percentage of firms that reported tightening credit standards for commercial real estate loans. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 26: Secondary market regressions, quarterly frequency

	Agg. Price		Price		Bid-Ask	
	(1)	(2)	(3)	(4)	(5)	(6)
D Dollar	-0.00346***	-0.00151**	-0.00259***	-0.00143***	0.0156***	0.00737**
	(0.00128)	(0.000710)	(0.000846)	(0.000427)	(0.00465)	(0.00309)
D Log Vix		-0.0259**		-0.00767		0.181***
		(0.0102)		(0.00516)		(0.0450)
D Excess BP		-0.0285***		-0.0145***		0.0325
		(0.00910)		(0.00462)		(0.0293)
D Fed Funds R.		0.000394		-0.0000937		0.00182
		(0.00643)		(0.00381)		(0.0330)
D Term Spread		0.00646		0.00579**		-0.0355
		(0.00405)		(0.00242)		(0.0213)
D Unempl. Outl.		-0.0453*		-0.0535***		0.233***
		(0.0239)		(0.0121)		(0.0710)
Constant	0.0143***	0.0128***	0.00219	0.00164	-0.0155	-0.0124*
	(0.00257)	(0.00171)	(0.00176)	(0.00102)	(0.0104)	(0.00684)
Observations	56	56	72588	72588	72947	72947
R^2	0.146	0.715	0.020	0.087	0.023	0.091
Adjusted R^2	0.130	0.680	0.020	0.086	0.023	0.090

Note: This table presents regressions of changes in secondary market loan prices and liquidity on changes in the broad dollar at a quarterly frequency. The table is parallel to table 8, which presents regressions performed on monthly data. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 27: Robustness with additional controls: loan originations

	(1)	(2)	(3)	(4)	(5)
	D Util. Exp.	D Util. Exp.	D Util. Exp.	D Util. Exp.	D Util. Exp.
D Dollar	-0.0454*	-0.0497	-0.0445*	-0.0363	-0.0494*
	(0.0223)	(0.0327)	(0.0238)	(0.0290)	(0.0261)
D Log Vix	-0.0463	-0.998	-0.0437	0.107	0.0551
	(0.434)	(0.614)	(0.476)	(0.529)	(0.421)
D Excess BP	0.0304	-0.121	0.0587	0.0152	0.0144
	(0.175)	(0.235)	(0.178)	(0.199)	(0.188)
D Term Spread	0.130	0.119	0.171	0.0515	0.185
	(0.146)	(0.195)	(0.244)	(0.212)	(0.161)
D Unempl. Outl.	1.396	1.113	1.479	1.238	0.917
	(0.987)	(1.129)	(1.236)	(1.118)	(0.922)
D Fed Funds R.	0.0700	0.116	0.0763	0.111	0.0146
	(0.143)	(0.163)	(0.160)	(0.174)	(0.149)
D VRP US		0.00824			
		(0.00475)			
D Treas. Basis 3y		-0.00315			
		(0.0114)			
D World Rec. Prob.		0.630			
		(1.145)			
D 3m Rate Outlook			0.205		
			(0.658)		
D Term Spread Outlook			0.240		
			(0.776)		
D 4q Real GDP				-0.490	
				(8.106)	
D 4q Unempl. Rate				-0.0816	
				(0.202)	
D Oil Price				0.00717	
				(0.0107)	
Real GDP Outlook					-48.81*
					(24.35)
Constant	0.0376	0.0577	0.0395	-0.0103	0.0573
	(0.0526)	(0.0602)	(0.0585)	(0.160)	(0.0564)
Observations	25	25	25	25	25
R^2	0.294	0.380	0.298	0.310	0.391
Adjusted R^2	0.059	0.008	-0.053	-0.104	0.141

Note: This table shows the robustness of key results to the inclusion of additional macro and financial control variables. The dependent variable is the log change in U.S. banks' quarterly loan originations. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 28: Robustness with additional controls: credit standards

	(1) Sh. Tight.	(2) Sh. Tight.	(3) Sh. Tight.	(4) Sh. Tight.	(5) Sh. Tight.	(6) Sh. Tight.
D Dollar	0.918**	0.890**	0.890**	1.299***	0.918**	1.225**
	(0.398)	(0.436)	(0.416)	(0.489)	(0.399)	(0.546)
Sh. Tight (prev.)	0.914***	0.996***	0.904***	0.940***	0.911***	1.008***
	(0.0814)	(0.0610)	(0.0854)	(0.0800)	(0.0828)	(0.0620)
D Log Vix	15.70***	13.14*	16.29***	17.69***	15.81***	16.32
	(5.451)	(7.466)	(5.432)	(6.122)	(5.584)	(9.850)
D Excess BP	2.966	-0.781	3.248	1.946	2.958	-1.036
	(3.512)	(3.632)	(3.519)	(3.625)	(3.578)	(3.572)
D Term Spread	-1.559	-0.385	-1.428	-2.588	-1.847	-0.161
	(2.041)	(2.613)	(3.090)	(2.148)	(2.315)	(3.204)
D Unempl. Outl.	9.052	23.13***	5.696	10.14	11.64	11.50
	(9.504)	(8.419)	(10.31)	(9.767)	(8.499)	(12.84)
D Fed Funds R.	3.051	-0.184	3.014	3.035	2.911	0.195
	(2.627)	(1.940)	(3.125)	(2.786)	(2.484)	(2.278)
D VRP US		-0.0199				-0.0431
		(0.0526)				(0.0605)
D Treas. Basis 3y		0.306*				0.317*
		(0.167)				(0.183)
D World Rec. Prob.		6.548				10.32
		(9.279)				(9.998)
D 3m Rate Outlook			-7.753			-4.455
			(6.309)			(7.679)
D Term Spread Outlook			-3.882			-0.137
			(8.323)			(10.15)
D 4q Real GDP				-41.44		-54.69
				(75.34)		(90.61)
D 4q Unempl. Rate				-0.848		-0.803
				(1.575)		(1.631)
D Oil Price				0.294**		0.213
				(0.135)		(0.134)
Real GDP Outlook					235.0	-751.5*
					(561.5)	(392.1)
Constant	-1.046	-0.167	-1.128	-0.521	-1.096	0.571
	(0.960)	(0.933)	(0.993)	(2.020)	(1.005)	(2.509)
Observations	92	59	91	92	92	59
R^2	0.787	0.908	0.790	0.798	0.787	0.922
Adjusted R^2	0.769	0.889	0.766	0.773	0.767	0.892

Note: This table shows the robustness of key results to the inclusion of additional macro and financial control variables. The dependent variable is the net percentage of U.S. banks that said that they tightened credit standards for C&I loans to large and medium enterprises. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 29: Robustness with additional controls: riskiness of new loans

	(1)	(2)	(3)	(4)	(5)
	D PD	D PD	D PD	D PD	D PD
D Dollar	-0.000357***	-0.000297**	-0.000365***	-0.000544**	-0.000338***
	(0.000111)	(0.000125)	(0.000103)	(0.000187)	(0.000101)
D Log Vix	0.00113	0.00806	0.000674	-0.00213	0.000646
	(0.00156)	(0.00608)	(0.00168)	(0.00278)	(0.00139)
D Excess BP	-0.00107	0.000565	-0.00138	-0.00142	-0.000989
	(0.00123)	(0.00116)	(0.00143)	(0.00166)	(0.00140)
D Term Spread	0.00125*	0.00114	0.000697	0.00316*	0.000982
	(0.000661)	(0.00104)	(0.00135)	(0.00152)	(0.000585)
D Unempl. Outl.	-0.00108	-0.000173	-0.000380	0.000470	0.00123
	(0.00404)	(0.00445)	(0.00412)	(0.00416)	(0.00385)
D Fed Funds R.	0.00121**	0.000957	0.00103	0.00164	0.00148**
	(0.000532)	(0.000707)	(0.000663)	(0.00105)	(0.000566)
D VRP US		-0.0000573			
		(0.0000487)			
D Treas. Basis 3y		0.0000408			
		(0.000105)			
D World Rec. Prob.		-0.0128*			
		(0.00715)			
D 3m Rate Outlook			0.000942		
			(0.00404)		
D Term Spread Outlook			-0.00234		
			(0.00627)		
D 4q Real GDP				-0.0236	
				(0.0586)	
D 4q Unempl. Rate				-0.00131	
				(0.00136)	
D Oil Price				-0.000107	
				(0.0000933)	
Real GDP Outlook					0.235**
					(0.0886)
Constant	0.000239	0.0000726	0.000169	-0.000372	0.000144
	(0.000281)	(0.000306)	(0.000238)	(0.000866)	(0.000287)
Observations	25	25	25	25	25
R^2	0.308	0.466	0.347	0.492	0.363
Adjusted R^2	0.077	0.146	0.020	0.187	0.100

Note: This table shows the robustness of key results to the inclusion of additional macro and financial control variables. The dependent variable is the change in the weighted average probability of default of new loans issued by U.S. banks. Robust standard errors are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 30: Robustness with additional controls: reasons for easing, secondary market prices and liquidity

	(1)	(2)	(3)	(4)	(5)	(6)	(7)
	Share Sec. Liqu.	Agg. Price	Agg. Price	Price	Price	Bid-Ask	Bid-Ask
D Dollar	-0.0123**	-0.00138	-0.00294***	-0.00125***	-0.00118***	0.00688**	0.00687***
	(0.00591)	(0.000897)	(0.000868)	(0.000456)	(0.000255)	(0.00267)	(0.00226)
D Log Vix	-0.215*	-0.0612***	-0.0288***	-0.0166	-0.00631	0.255***	0.132***
	(0.121)	(0.0174)	(0.00927)	(0.0117)	(0.00394)	(0.0607)	(0.0292)
D Excess BP	-0.126**	-0.0307***	-0.00727	-0.0167***	-0.000253	0.0527*	0.00694
	(0.0527)	(0.0108)	(0.00655)	(0.00620)	(0.00159)	(0.0300)	(0.00968)
D Fed Funds R.	0.0834*	-0.00197	0.0325***	-0.00302	0.00252	0.0185	0.00537
	(0.0474)	(0.00917)	(0.0109)	(0.00462)	(0.00219)	(0.0386)	(0.0176)
D Term Spread	0.0387	-0.00146	0.0188	0.000239	0.00329*	-0.0318	-0.0161
	(0.0518)	(0.00741)	(0.0121)	(0.00334)	(0.00176)	(0.0315)	(0.0125)
D Unempl. Outl.	0.127	-0.0449*	-0.0278	-0.0210	-0.0113	0.183*	0.0825
	(0.197)	(0.0257)	(0.0302)	(0.0146)	(0.00807)	(0.104)	(0.0510)
D 3m Rate Outlook	-0.0319	-0.0227	0.0206	-0.00525	-0.00758	-0.0263	0.0596
	(0.115)	(0.0218)	(0.0186)	(0.00956)	(0.00589)	(0.0646)	(0.0419)
D Term Spread Outlook	-0.120	-0.0308	0.0198	-0.0231**	-0.00773	-0.0168	0.00947
	(0.139)	(0.0232)	(0.0210)	(0.0104)	(0.00492)	(0.0872)	(0.0345)
D 4q Real GDP	0.619	-0.106	-0.0465	0.112	-0.0310	-1.792**	-0.267
	(1.187)	(0.205)	(0.156)	(0.115)	(0.0451)	(0.821)	(0.243)
D 4q Unempl. Rate	-0.00633	0.00125	0.000733	0.00429**	0.00116**	-0.00469	-0.00441
	(0.0238)	(0.00332)	(0.00135)	(0.00185)	(0.000562)	(0.00889)	(0.00308)
Real GDP Outlook	-3.955	0.907	1.659	0.918	0.719*	-4.769	-3.123
	(6.698)	(1.293)	(1.152)	(0.594)	(0.369)	(3.160)	(2.275)
D VRP US	0.00222***	0.000258*	0.0000118	0.0000831	0.00000382	-0.000903**	-0.000111
	(0.000775)	(0.000138)	(0.0000524)	(0.000100)	(0.0000205)	(0.000377)	(0.000139)
D Treas. Basis 3y	-0.00522*	-0.000205	-0.000574	-0.000259	-0.0000111	0.00277*	-0.000818
	(0.00274)	(0.000296)	(0.000406)	(0.000190)	(0.0000969)	(0.00139)	(0.000697)
D World Rec. Prob.	-0.291	0.0190	-0.0249	0.00503	-0.00499	0.0421	0.0613**
	(0.180)	(0.0387)	(0.0181)	(0.0194)	(0.00405)	(0.0894)	(0.0244)
Constant	0.195***	0.0160***	0.00492	0.00117	0.00152	0.0256	0.00176
	(0.0321)	(0.00532)	(0.00356)	(0.00292)	(0.00115)	(0.0217)	(0.00604)
Observations	59	56	192	69449	215141	69556	214788
R^2	0.460	0.753	0.569	0.098	0.040	0.106	0.033
Adjusted R^2	0.289	0.668	0.535	0.098	0.040	0.106	0.033

Note: This table shows the robustness of key results to the inclusion of additional macro and financial control variables. In column (1), the dependent variable is the share of firms that mentioned secondary market liquidity as a reason for easing credit standards in the SLOOS. In columns (2) and (3), the dependent variable is the log change in the U.S. Leverage Loan 100 Index. Columns (4) and (5) present regressions of the log change in the price of a loan sold on the secondary market on changes in the broad dollar index. Columns (6) and (7) have the monthly log change in the bid-ask spread of a loan sold on the secondary market as the left-hand-side variable. Even columns use quarterly data, while odd columns (except column (1)) use monthly data. Standard errors are clustered in accordance with clustering in the baseline regressions. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 31: Robustness with additional controls, including oil price: reasons for easing, secondary market prices and liquidity

	(1) Share Sec. Liqu.	(2) Agg. Price	(3) Agg. Price	(4) Price	(5) Price	(6) Bid-Ask	(7) Bid-Ask
D Dollar	-0.0153**	-0.000674	-0.000930	-0.000756	-0.000788***	0.00257	0.00274
	(0.00722)	(0.000958)	(0.000930)	(0.000469)	(0.000269)	(0.00266)	(0.00219)
D Log Vix	-0.256*	-0.0515**	-0.0258***	-0.0102	-0.00497	0.199***	0.118***
	(0.148)	(0.0199)	(0.00865)	(0.0119)	(0.00420)	(0.0631)	(0.0309)
D Excess BP	-0.118**	-0.0322***	-0.00842	-0.0177***	-0.000651	0.0615**	0.0112
	(0.0551)	(0.0109)	(0.00608)	(0.00612)	(0.00154)	(0.0297)	(0.00980)
D Fed Funds R.	0.0788	-0.00100	0.0297***	-0.00223	0.00237	0.0115	0.00709
	(0.0482)	(0.00895)	(0.00955)	(0.00442)	(0.00209)	(0.0369)	(0.0161)
D Term Spread	0.0468	-0.00350	0.0113	-0.00134	0.00173	-0.0182	0.000510
	(0.0539)	(0.00763)	(0.00986)	(0.00343)	(0.00199)	(0.0285)	(0.0137)
D Unempl. Outl.	0.102	-0.0393	-0.0204	-0.0170	-0.0100	0.149	0.0692
	(0.199)	(0.0258)	(0.0271)	(0.0145)	(0.00757)	(0.106)	(0.0470)
D 3m Rate Outlook	-0.0547	-0.0169	0.0224	-0.00120	-0.00524	-0.0616	0.0353
	(0.123)	(0.0208)	(0.0185)	(0.00915)	(0.00554)	(0.0637)	(0.0382)
D Term Spread Outlook	-0.140	-0.0254	0.0225	-0.0197*	-0.00615	-0.0459	-0.00703
	(0.143)	(0.0225)	(0.0203)	(0.0102)	(0.00498)	(0.0799)	(0.0344)
D 4q Real GDP	0.728	-0.115	-0.101	0.0920	-0.0434	-1.622**	-0.137
	(1.245)	(0.199)	(0.138)	(0.111)	(0.0451)	(0.781)	(0.243)
D 4q Unempl. Rate	-0.00492	0.00115	0.000316	0.00407**	0.00109**	-0.00278	-0.00367
	(0.0238)	(0.00324)	(0.00128)	(0.00182)	(0.000551)	(0.00907)	(0.00308)
D Oil Price	-0.00163	0.000345	0.00103***	0.000250**	0.000225***	-0.00216***	-0.00236***
	(0.00203)	(0.000225)	(0.000291)	(0.000103)	(0.0000713)	(0.000805)	(0.000678)
Real GDP Outlook	-4.732	1.205	2.342**	1.059*	0.805**	-5.987*	-4.013*
	(6.967)	(1.370)	(1.070)	(0.592)	(0.345)	(3.443)	(2.194)
D VRP US	0.00246**	0.000201	0.00000852	0.0000448	-0.00000450	-0.000571	-0.0000230
	(0.000923)	(0.000149)	(0.0000404)	(0.000101)	(0.0000215)	(0.000365)	(0.000145)
D Treas. Basis 3y	-0.00527*	-0.000159	-0.000413	-0.000246	0.00000304	0.00266**	-0.000967
	(0.00265)	(0.000281)	(0.000399)	(0.000182)	(0.0000962)	(0.00128)	(0.000677)
D World Rec. Prob.	-0.295	0.0220	-0.0235*	0.00575	-0.00339	0.0359	0.0444**
	(0.180)	(0.0388)	(0.0134)	(0.0193)	(0.00385)	(0.0912)	(0.0220)
Constant	0.196***	0.0156***	0.00568*	0.00103	0.00169	0.0267	-0.00000282
	(0.0334)	(0.00535)	(0.00319)	(0.00287)	(0.00113)	(0.0209)	(0.00604)
Observations	59	56	192	69449	215141	69556	214788
R^2	0.467	0.760	0.619	0.099	0.043	0.109	0.037
Adjusted R^2	0.282	0.670	0.586	0.099	0.043	0.109	0.037

Note: This table shows the robustness of key results to the inclusion of additional macro and financial control variables. In column (1), the dependent variable is the share of firms that mentioned secondary market liquidity as a reason for easing credit standards in the SLOOS. In columns (2) and (3), the dependent variable is the log change in the U.S. Leverage Loan 100 Index. Columns (4) and (5) present regressions of the log change in the price of a loan sold on the secondary market on changes in the broad dollar index. Columns (6) and (7) have the monthly log change in the bid-ask spread of a loan sold on the secondary market as the left-hand-side variable. Even columns use quarterly data, while odd columns (except column (1)) use monthly data. Standard errors are clustered in accordance with clustering in the baseline regressions. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Table 32: Robustness with additional controls: secondary market prices and liquidity, interactions

	(1)	(2)	(3)	(4)	(5)	(6)
	D Price	D Price	D Price	D Spread	D Spread	D Spread
D Dollar	-0.0000450		-0.00296**	0.00238		0.0161**
	(0.000221)		(0.00128)	(0.00243)		(0.00785)
Risky X D Dollar	-0.00232***	-0.00204***		0.00113	0.000533	
	(0.000503)	(0.000441)		(0.00235)	(0.00166)	
Risky	-0.000343	-0.000920**		-0.00251	-0.000726	
	(0.000480)	(0.000463)		(0.00205)	(0.00181)	
Sh. US banks X D Dollar			0.00916			-0.0531
			(0.00706)			(0.0427)
Sh. US banks			-0.0308***			0.160***
			(0.00750)			(0.0475)
D Log Vix	-0.00473		-0.00579	0.118***		0.131***
	(0.00416)		(0.00439)	(0.0310)		(0.0310)
D Excess BP	-0.000712		0.000245	0.0112		0.00432
	(0.00153)		(0.00168)	(0.00975)		(0.0102)
D Fed Funds R.	0.00193		0.00383*	0.00670		0.0154
	(0.00207)		(0.00219)	(0.0160)		(0.0178)
D Term Spread	0.00169		0.00262	0.000431		-0.00287
	(0.00196)		(0.00192)	(0.0138)		(0.0134)
D Unempl. Outl.	-0.0106		-0.00926	0.0688		0.0666
	(0.00752)		(0.00699)	(0.0468)		(0.0470)
D 3m Rate Outlook	-0.00562		-0.00628	0.0353		0.0421
	(0.00557)		(0.00541)	(0.0381)		(0.0343)
D Term Spread Outlook	-0.00665		-0.00876	-0.00640		-0.00180
	(0.00504)		(0.00545)	(0.0343)		(0.0362)
D 4q Real GDP	-0.0334		0.00365	-0.139		-0.401
	(0.0430)		(0.0509)	(0.241)		(0.260)
D 4q Unempl. Rate	0.00119**		0.00142**	-0.00337		-0.00709**
	(0.000539)		(0.000604)	(0.00301)		(0.00335)
D Oil Price	0.000222***		0.000122	-0.00235***		-0.00170**
	(0.0000684)		(0.0000804)	(0.000680)		(0.000701)
Real GDP Outlook	0.797**		0.727**	-4.023*		-3.547*
	(0.350)		(0.316)	(2.185)		(2.110)
D VRP US	-0.00000296		-0.00000169	-0.0000247		0.00000908
	(0.0000205)		(0.0000198)	(0.000145)		(0.000124)
D Treas. Basis 3y	0.0000676		0.000138	-0.000997		-0.00230***
	(0.000100)		(0.000114)	(0.000666)		(0.000844)
D World Rec. Prob.	-0.00327		-0.00285	0.0448**		0.0286
	(0.00385)		(0.00342)	(0.0220)		(0.0190)
c1	0		0	0		0
	(.)		(.)	(.)		(.)
Constant	0.00157		0.00533***	0.00109		-0.0162**
	(0.00103)		(0.00134)	(0.00625)		(0.00689)
Time FE	No	Yes	No	No	Yes	No
Observations	215141	224256	167885	214788	223620	167615
R^2	0.048	0.098	0.056	0.037	0.078	0.045
Adjusted R^2	0.048	0.097	0.056	0.037	0.078	0.045

Note: This table shows the robustness of key results to the inclusion of additional macro and financial control variables. In columns (1) and (2), the dependent variable is the monthly log change in the price of a loan sold on the secondary market. Columns (3) and (4) have the monthly log change in the bid-ask spread of a loan sold on the secondary market as the left-hand-side variable. Standard errors clustered by time are in parentheses. *, **, and *** denote significance at the 10%, 5%, and 1% level.

Appendix B: Data Appendix

- FR Y-14: Confidential quarterly data available at the Federal Reserve starting in 2011:Q3. Reported by all banks that participate in CCAR/DFAST.
- SLOOS data: Public aggregated responses published quarterly on the Federal Reserve Board's website; confidential bank-level version available at the Federal Reserve; since 1990.
- Loan Syndication and Trading Association Data: Daily information on loans sold on the secondary market, including mean bid and mean ask prices.
- FR Y-9C: Quarterly information on the income and balance sheets of U.S. Bank Holding Companies.
- Survey of Professional Forecasters: Information on expected unemployment rates, real GDP growth, short-term and long-term interest rates as the means of the 4-quarter ahead forecast values.
- Broad dollar index, EME and AFE dollar index: Trade-weighted dollar indices computed and published by the Federal Reserve.
- Trade intensities: Calculated as exports/(production + imports - exports) and imports/(production + imports - exports). Production data are from the Bureau of Economic Analysis. Trade data are from the U.S. Census Bureau.
- Standard macro and financial variables: Quarterly and monthly values from Bloomberg and Haver.
- Excess bond premium: Downloaded from the Federal Reserve's website: https://www.federalreserve.gov/econresdata/notes/feds-notes/2016/updating-the-recession-risk-and-the-excess-bond-premium-20161006.html.
- Convenience yields provided by Wenxin Du: https://sites.google.com/site/wenxindu/data/govt-cip and Du et al. (2018b).

- Variance risk premium provided by Juan-Miguel Londono used in Londono and Zhou (2017).

- World recession probability provided by Pablo-Cuba Borda: https://www.federalreserve.gov/econres/notes/ifdp-notes/monitoring-the-world-economy-a-global-conditions- index-20180615.htm.

- EFPR data: Weekly information on performance, assets under management, and net flows into mutual funds.

- The dollar response to monetary policy shocks: Measured from 15 minutes before to 90 minutes after monetary policy announcements used in Ferrari et al. (2017) and Cieslak and Schrimpf (2019).

- Syndicated loan data computed from Shared National Credit Data: Provided by Ralf Meisenzahl as shown in Irani et al. (2018).

- Additional input variables for the VAR from FRED: Industrial production (https://fred.stlouisfed.org/series/INDPRO), total non-farm employment (https://fred.stlouisfed.org/series/PAYEMS), National Financial Conditions Index (https://fred.stlouisfed.org/series/NFCI) and National Financial Conditions Subindex (https://fred.stlouisfed.org/series/NFCI CREDIT), Consumer Price Index (https://fred.stlouisfed.org/series/CPIAUCSL).

- FFIEC009 exposure data: Confidential quarterly information on the foreign exposures of U.S. banks available at the Federal Reserve.

- CRANE data: Monthly information on money market mutual funds' investments, including interest rates paid.