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Abstract

This paper shows that monetary policy and prudential policies interact. U.S. banks issue more commercial and industrial loans to emerging market borrowers when U.S. monetary policy eases. The effect is less pronounced for banks that are more constrained through the U.S. bank stress tests, reflected in a lower minimum capital ratio in the severely adverse scenario. This suggests that monetary policy spillovers depend on banks' capital constraints. In particular, during a period of quantitative easing when liquidity is abundant, banks are more flexible, and the scope for adjusting lending is larger when they have a bigger capital buffer. We conjecture that bank lending to emerging markets during the zero-lower bound period would have been even higher had the United States not introduced stress tests for their banks.

JEL-Codes: E440, F310, G150, G210, G230.

Keywords: U.S. bank lending, stress tests, emerging markets, monetary policy spillovers.

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1 Introduction

U.S. banks are active around the globe and lend to a variety of borrowers in foreign countries. In the first quarter of 2018, the foreign claims of the largest U.S. banks stood at $3.8 trillion and covered claims in 139 countries.[1] Bank lending is affected by monetary policy and prudential regulation, which, broadly speaking, puts constraints on bank leverage and risk taking. Because of U.S. banks' international activities and their key role as providers of credit, especially to globally active firms, U.S. monetary policy and U.S. prudential regulation might therefore not only affect domestic credit conditions as intended but also credit conditions in foreign countries.

Over the past several years, an increasing number of papers has studied the role of U.S. monetary policy for global credit conditions (Miranda-Agrippino and Rey (2015), Braeuning and Ivashina (2017), McCauley et al. (2015)), the spillovers of monetary policy from one country to another through the banking sector (Morais et al. (2015), Demirguc-Kunt et al. (2017), Lee et al. (2015), Temesvary et al. (2018)), and the cross-border effects of national macroprudential regulation (Buch and Goldberg (2017), Danisewicz et al. (2015), Berrospide et al. (2017)). This paper contributes to this literature by exploiting U.S. loan-level data to study U.S. banks' role in the transmission of U.S. monetary policy across borders and potential effects of prudential regulation in the United States for this transmission.

The data used in the paper come from regulatory filings (Y-14 reports), which banks participating in U.S. stress testing need to file on a quarterly basis. The data provide information on individual commercial and industrial (C&I) loans above $1 million that these banks issue, including the name, industry and country of the borrower, the loan volume, and the probability of default that the bank assigns to the loan. From these data, we construct the monthly volume of new C&I loans by bank and counterparty. We then study how changes in monetary policy affect bank lending to borrowers in foreign countries, with a focus on emerging markets. The sample runs from 2012 to 2017. Our preferred measure of changes in U.S. monetary policy is the monthly change in the Federal Funds rate, which is replaced by the monthly change in the shadow rate from Wu and Xia (2016) during the zero-lower-bound

[1] Sum of 74 U.S. banks' claims on foreign countries calculated based on data from the FFIEC009 reports.

period. As an alternative measure, we also employ monthly U.S. monetary policy shocks provided by the International Banking Research Network and derived from a structural VAR following Gertler and Karadi (2015), which confirms our key results.

In line with the literature, we find that U.S. monetary policy has spillover effects on emerging market economies. Specifically U.S. banks increase their issuance of corporate and industrial loans to emerging market borrowers when U.S. monetary policy eases. Effects on loan issuance to advanced foreign economies are not significant. A 15-basis-point decrease in the Fed Fund rate/shadow rate (corresponding to one standard deviation) increases loan issuances by 10 percent. Of note, the effects of monetary policy changes on emerging market lending are only present during the zero-lower bound period, while relevant coefficients are not significant for the post-2015 period. Including lagged values of monetary policy changes reveals that effects unfold over several months. A 15-basis-point reduction in the Fed Funds rate/shadow rate increases lending to EMEs by 8.6 percent three months out, by 12 percent two months out, and by 10 percent one month out. Consistent with the findings in Braeuning and Ivashina (2017), banks increase their lending in particular to riskier countries, where the ease of doing business is lower. Ceteris paribus, the increase in lending is also larger for emerging market economies with greater financial development as measured by the ratio of private credit to GDP.

The particular interest of this paper lies in the role that prudential regulation might play for the transmission of monetary policy across borders. To this end, we complement our dataset with information from the Federal Reserve's annual Comprehensive Capital Analysis and Review (CCAR). CCAR is an annual exercise that subjects the largest U.S. Bank Holding Companies (BHCs) to supervisory-run stress tests. Using supervisory models, supervisors project each bank's capital ratios under baseline, severe, and severely adverse scenarios. A bank fails the test when its Tier1 capital ratio falls below a minimum required threshold over the forecast horizon.[2] In this case, the bank is not able to go through with its original capital plans. Through this mechanism, in addition to other costs that banks may incur when failing CCAR (for example, reputational costs), the stress tests impact bank

[2]The threshold decreased from 5 percent to 4.5 percent in 2016.

lending and risk taking.

Indeed, Acharya et al. (2018) and Cortes et al. (2018) find that banks reduced their credit supply because of the stress tests. We therefore hypothesize that CCAR might have had an effect on the transmission of U.S. monetary policy across borders.[3] Suppose a bank is capital constrained. Then monetary policy easing should have no effect on bank lending, because additional loans would increase the bank's risk-weighted assets and lead to a violation of its regulatory capital constraint (Kashyap and Stein (1994), Peek and Rosengren (1995b), Peek and Rosengren (1995a),Van den Heuvel et al. (2002)). In line with this hypothesis, we find that banks with lower minimum capital ratios in CCAR increased their lending to emerging market borrowers less than banks with better CCAR results in response to an easing of monetary policy. Consistent with the theory, we do not find asymmetric responses across banks to monetary tightening. Differences across banks are quantitatively meaningful. While a bank with a 2.2 percent CCAR buffer increases its loan issuance to emerging markets by 10 percent, a bank with a buffer of 30 basis points hardly responds.

Perhaps surprisingly, there is no evidence for greater risk taking by U.S. banks as they expand their lending in emerging markets. While the share of loans that go to EMEs increases when monetary policy eases, this effect is offset by a decline in the weighted-average probability of default of C&I loans issued to emerging market borrowers. As a result, the average-weighted probability of banks' total C&I loan portfolio is not affected by monetary policy changes.

We demonstrate the robustness of our results through several exercises. Most importantly, we control for a series of bank-level variables in the regressions as well as their interactions with the Fed Funds rate/shadow rate to assure that our findings are not generated by correlation between a bank's CCAR buffer and other bank characteristics. In a horse race between the Tier1 capital ratio and the CCAR buffer, the latter clearly wins in explaining heterogeneity across banks. Banks' CCAR buffers thus capture information regarding banks' capital constraints that goes beyond what can be learned from the reported regulatory ratios.

[3] In this context, see also Bassett and Berrospide (2017) and Calem et al. (2016).

We also include banks' retail deposit ratios and their ratios of liquid assets to total assets in the regressions, with broadly similar results. Of note, we find that banks with a higher share of liquid assets and a higher share of deposits tend to increase their lending to emerging markets more when monetary policy eases. Kashyap and Stein (2000) argue that a bank's liquidity position determines the strength with which it transmits monetary policy. When the central bank decreases the amount of reserves in the system, banks with more liquid assets should be able to more easily replace the lost reserves. As a result, their lending should respond less to monetary policy changes. Our contrasting results can be explained by two factors. First, the traditional bank lending channel is unlikely to apply to large banks, which our sample comprises. Furthermore, the mechanism should not be operative during a period of quantitative easing when liquidity is abundant for banks.[4]

Several current papers and research efforts seek to explore whether and how emerging market economies can insulate themselves from the global financial cycle, and, more specifically, from foreign monetary spillovers. This paper shows that the strength of the transmission of monetary policy is affected by prudential regulation in the country that causes the spillovers. This is because banks can transmit monetary easing less (to foreign countries) when they are capital constrained.[5] We conjecture that credit conditions in emerging markets would have been even easier during the period of U.S. quantitative easing had the Federal Reserve not introduced annual stress tests and instructed U.S. banks to increase their capital buffers.

2 Background

This section discusses the main data sources and provides background information on C&I lending by U.S. banks to foreign borrowers and on the U.S. stress tests.

[4]For an overview of the role of banks in the transmission of monetary policy, see Peek and Rosengren (2013). Temesvary et al. (2018) find that the cross-border lending of U.S. banks with a larger capital buffer and a higher ratio of deposits to assets are less sensitive to U.S. monetary policy in line with Kashyap and Stein (2000). The authors' dataset includes smaller banks as more (smaller) banks report the FFIEC009 than the FR-Y14. In addition, their sample covers a longer time period from 2002 to 2016.

[5]In the domestic context, Gambacorta and Shin (2018) argue that higher bank capital can promote the effectiveness of monetary policy.

2.1 Data sources

U.S. loan-level data Loan-level data for large U.S. banks come from the so-called FR Y-14 quarterly reports available at the Federal Reserve.[6] 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, for as long as these loans remain on the banks' balance sheets.[7] The data start in 2011:Q3, and the sample used in the paper runs through 2017:Q4. The data provide information on committed and utilized exposures, the date when the loan was originated, the probability of default and/or the internal rating that the bank assigns to the loan, the industry of the borrower, and the country in which the borrower is located. From these data, we construct monthly bank-level loan originations by counterparty.[8] We work with bank-country-level data but also group countries into Advanced Foreign Economies (AFEs), which exclude the United States, and Emerging Market Economies (EMEs).[9]

Stress test results The Federal Reserve publishes the results of its Comprehensive Capital Analysis and Review (CCAR) exercises annually, from which we extract banks' minimum capital ratios over the forecast horizon of the severely adverse scenario.[10] Using the banks' 9th-quarter projected minimum capital ratios under stress, we subtract 5 percentage points (or 4.5 percentage points beginning in 2016) to obtain each bank's projected "CCAR buffer".[11] Since the results of the 2011 stress test remain largely undisclosed, we collect information starting with the 2012 CCAR. Since the CCAR results are annual, while the C&I lending data are monthly, we carry the stress test ratios forward from the date of the results release for each month until the date when the subsequent CCAR results were published.[12]

[6] https://www.federalreserve.gov/apps/reportforms/reportdetail.aspx.

[7] These data have been used in Bidder et al. (2017), Brown et al. (2017), and Niepmann and Schmidt-Eisenlohr (2017), for example.

[8] 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.

[9] For the list of countries that are considered AFEs and EMEs, respectively, see the data appendix.

[10] See https://www.federalreserve.gov/supervisionreg/ccar-by-year.htm

[11] In 2016, the required minimum capital ratio threshold was lowered from 5 percent to 4.5 percent.

[12] Choosing a different timing where results of a CCAR round apply from the moment the respective macro scenarios are released produces very similar results.

U.S. monetary policy variables As our preferred measure of monetary policy changes, we compute the monthly change in the effective Fed Funds rate. For the zero-lower-bound period, we replace the rate with the shadow rate computed by Wu and Xia (2016). To show the robustness of the results to alternative measures of monetary policy changes, we draw on monetary policy shocks provided by the International Banking Research Network, which are derived from a structural VAR following methodology in Gertler and Karadi (2015). The top panel of figure 1 shows the evolution of the Fed Funds rate and the shadow rate. The bottom panel displays monthly changes in the Fed Fund rates together with monthly monetary policy shocks.

Other data Information on bank balance sheets is from quarterly FR Y-9C reports. Macro and financial control variables are from a variety of sources detailed in the data appendix.

2.2 U.S. banks' C&I lending to foreign countries

In the first quarter of 2018, the 35 U.S. banks in our sample issued $169 billion of new commercial and industrial (C&I) loans, nearly 90 percent of which were issued in USD. About 65 percent of all C&I loans were made to domestic borrowers, a share that has remained relatively stable since the beginning of the data collection. Around 15 percent of all loans went to borrowers in advanced foreign economies and another 15 percent to borrowers in emerging economies, with the remainder going to borrowers in an uncategorized group of countries including offshore banking centers. Among foreign loans, the largest recipients of new loans were China (8 percent), Spain (7 percent), the Cayman Islands, Great Britain, and India, with the latter 3 countries receiving around 6 percent each. Table 1 presents the sectoral breakdown of loan originations by region in 2018:Q1. In total, about 25 percent of total C&I loans were made to borrowers in the financial industry, nearly half of which went to foreign borrowers. Another 25 percent went to borrowers in the service industry, 14 percent to those in the manufacturing industry, and 13 percent to those in the trade industry. U.S. banks issued loans to borrowers in 103 countries (excluding the United States). Figure 2 presents quarterly new loan issuance over time for 16 banks that are continuously in the sample, showing 3-month moving averages.[13]

Table 2 provides information on the significance of U.S. banks in various countries. Here, U.S. banks' total exposures to country c were divided by credit to the non-financial sector in country c provided by banks from the BIS credit series. The resulting ratios were averaged over the sample period.[14] U.S. banks are especially significant for credit in Mexico with a ratio of 16 percent, mainly because Citigroup operates a large subsidiary there. Several offshore financial centers, for example Luxembourg, also show high ratios because U.S. banks lend relatively large amounts to the financial sector in these countries compared to the size of the domestic non-financial sector. Other emerging markets where U.S. banks are significant lenders are Colombia, Argentina, Chile, Turkey, and India (2-3 percent).

2.3 Stress tests in the United States

The Federal Reserve runs annual stress tests to assess the resilience of the largest U.S. banks. The effort consists of two parts: Dodd-Frank Act Stress testing (DFAST) and the Comprehensive Capital Analysis and Review (CCAR). Although the two exercises are very similar in terms of data, assumptions, and models, they differ in regard to assumed banks' capital plans. While DFAST assumes that capital distributions are kept at current levels, CCAR evaluates banks' capital adequacy taking into account banks' proposed capital plans over a 9-quarter horizon. The stress tests consist of both company-run stress tests as well as stress tests run by the supervisors. For CCAR, banks have to maintain a minimum Tier1 capital ratio of 5 percent (or 4.5 percent beginning in 2016) across all scenarios in the supervisory stress test to be allowed to distribute capital as planned. The stress tests consist of three scenarios: a baseline scenario, an adverse scenario, and a severely adverse scenario, which typically leads to the largest losses for Bank Holding Companies (BHCs). The stress tests started with a set of only the largest BHCs with assets of more than $100 billion, but

[13]The drop in loan issuance that occurs in 2014 does not have a clear driver although developments within a single bank are responsible for part of the drop. We show in the robustness section that our results go through when we drop the year 2014 from the sample.

[14]U.S. banks' exposures include borrowers in all industries, while credit to the non-financial sector excludes loans to the financial industry. We decided to include financial borrowers in the numerator because funding provided by U.S. banks to foreign financial borrowers might ultimately end up as credit to the non-financial sector, especially in emerging markets.

the panel was expanded to include all BHCs with assets over $50 billion in 2012.

Figure 3 shows the average CCAR buffer of banks in our sample by year as well as the range of buffers among banks included in the respective CCAR exercise. Several banks failed to maintain capital ratios in the supervisory stress test above the required threshold in the early years of CCAR. The average buffer was relatively constant from 2013-2017, before it declined again in 2018.

3 Empirical Specification

Baseline specification We start by estimating the average effect of a change in monetary policy on new loan originations by U.S. banks to firms in emerging economies. To this end, we estimate the following regression equation:

$$ln(Y_{bt}) = \beta_1 \Delta MP_t + BX_t + \delta_b + \epsilon_{bt}. \tag{1}$$

$ln(Y_{bt})$ is the log dollar value of new originations of bank b in month t, where the value corresponds to the utilized amount (as opposed to the committed amount/credit line that can be larger).[15] ΔMP_t captures the monthly change in the Fed Funds rate or Wu-Xia shadow rate. X_t is a vector of macro controls, specifically the growth rate of the VIX, the log of the VIX, the change in the excess bond premium, the change in the term spread, the change in the unemployment rate, and the change in the broad dollar index. δ_b is a bank fixed effect. We expect β_1 to be negative, that is, banks should reduce lending when monetary policy tightens. Standard errors are clustered by month.

Emerging market economies vs. advanced foreign economies In a next step, we estimate whether the transmission of monetary policy through bank lending differs by destination market. In particular, we test whether effects are stronger for EMEs than for AFEs.

$$ln(Y_{btr}) = \beta_1 \Delta MP_t + \beta_2 \Delta MP_t \times I_{EME} + BX_t + \delta_{br} + (\delta_t) + \epsilon_{btr}, \tag{2}$$

[15]Results are very similar when committed exposure amount is the dependent variable.

where $ln(Y_{btr})$ is the log value of new loans issued by bank b in month t to region r, with $r \in \{AFE, EME\}$. I_{EME} is an indicator variable that takes the value of one when the loans go to EMEs and zero when loans go to AFEs. δ_{br} is a bank-region fixed effect and δ_t is a time fixed effect. The main coefficient of interest is β_2. If the response of loan issuance to monetary policy is stronger for EMEs than for AFEs, β_2 will be negative. Standard errors are clustered by month.

Heterogeneity across EMEs We are also interested in how destination country characteristics affect the transmission of monetary policy to emerging markets. To this purpose, we run the following regression:

$$ln(Y_{btc}) = \beta_1 \Delta MP_t + \beta_2 \Delta MP_t \times XC_{ct} + B\ X_t + C\ XC_{ct} + \delta_{br} + (\delta_t) + \epsilon_{btr}, \quad (3)$$

where XC_{ct} is a vector of the country level variables, consisting of the interest rate spread, private credit over GDP, rule of law and business climate.[16] The coefficient of interest is β_2, which informs us whether monetary transmission is stronger or weaker to countries with a high value of the respective country-level variable.

The effect of stress test buffers on monetary policy transmission Our main specification estimates how annual stress test results affect the strength of U.S. monetary policy spillovers to EMEs:

$$ln(Y_{b(c)t}) = \beta_1 \Delta MP_t + \beta_2 buffer_{bt} + \beta_3 \Delta MP_t \times buffer_{bt} + BX_t + \delta_{b(c)} + (\delta_{ct}) + \epsilon_{b(c)t}, \quad (4)$$

where $buffer_{bt}$ is the distance of a bank's minimum Tier1 capital ratio in the CCAR severely adverse scenario from the applicable required minimum threshold. β_3 is indicative of the role that capital constraints through stress tests play for the transmission of U.S. monetary policy to emerging markets. $\beta_3 < 0$ would imply that cross-border lending to EMEs is more responsive to changes in monetary policy for U.S. banks that are less constrained through CCAR. We expect β_2 to be positive, as a better-capitalized bank likely originates more loans. We run regressions that include CCAR buffer interactions both at the aggregate

[16] All measures are taken from World Bank databases. For further details, see the data appendix.

bank level (summing over all EMEs) as well as at the more disaggregated bank-country level. Regressions at the aggregate level include bank-fixed effects, while regressions at the disaggregate level include bank-country and country-time fixed effects.

Information on the final datasets After extracting information from various datasets and merging the information, we are left with a sample that runs from 2012m1 to 2017m12. It includes 27 BHCs that lend to emerging market borrowers. The sample period starts a bit later, in 2012m3, when information on banks' CCAR buffers is included in the regressions. This is because the results of the 2012 CCAR, the first round of the stress tests that we have information for, were released in March 2012. In addition, the number of banks included in the sample declines to 13 banks. For these banks, we observe CCAR results throughout the sample period. The sample includes 35 emerging market economies.

4 Results

This section presents the main empirical results. First, we document that easing of monetary policy in the United States during the QE period led banks to increase their lending to emerging markets. We then explore how country characteristics affected the strength of transmission across emerging markets. Next, we present the main results, investigating the interaction between CCAR stress tests and the transmission of monetary policy to emerging markets. Finally, we show evidence regarding the role of monetary policy changes for the riskiness of banks' C&I portfolios.

4.1 Monetary policy spillovers to emerging markets

Easier monetary policy increases loan issuance Table 3 presents the baseline results regarding the spillovers of monetary policy to emerging markets through U.S. banks. Column (1) shows the results of estimating equation (1). The coefficient associated with the change in monetary policy (Fed Funds rate or shadow rate) is negative and highly significant; U.S. banks reduce their lending to EMEs when U.S. monetary policy tightens. Column (2) shows results from a bank-region level regression, which follows equation (2), where regions are

EMEs or AFEs. The regression includes an interaction term between ΔMP_t and an EME indicator, which is highly significant and negative. The direct effect of changes in monetary policy is no longer significant. Hence, spillovers of U.S. monetary policy are present for EMEs but not for AFEs. Column (3) shows that the coefficient on the interaction term is robust to the inclusion of time fixed effects. The coefficient in column (1) implies that a 15-basis-point increase in the Federal Funds rate/shadow rate leads to a 9.8 percent reduction in loan issuance to borrowers in emerging markets.

Strong monetary policy transmission to EMEs during QE but not after liftoff The sample period covers the period of quantitative easing (QE) in the United States as well as the period after QE when rates were raised. In columns (4) and (5) of table 3, the sample is split into these two periods. Interestingly, all effects we uncover unfold during the QE period. As column (4) shows, the effects of U.S. monetary policy changes on bank lending to EMEs during the QE period were strong. Surprisingly, there is no evidence for such an effect after monetary policy liftoff as column (5) indicates.

Monetary policy and destination country characteristics In a next step, we study whether the effect of U.S. monetary policy changes on bank lending to EMEs is heterogeneous across countries. Results are presented in table 4. Specifically, we study whether effects differ across countries based on a country's interest rate spread, financial development, rule of law, and its business climate. Interaction terms between various country characteristics and ΔMP are not significant when included individually in the regression (columns (1) through (4)). However, when all country variables and interactions terms are included jointly in column (5), some coefficients are significant at standard levels. These regression results suggests that U.S. banks increase their lending in response to easier monetary policy in particular to emerging markets that are more financially developed and have a lower ease of doing business index.

4.2 The effect of stress tests on spillovers

CCAR buffer interactions The role of the CCAR stress tests for the transmission of monetary policy to EMEs by U.S. banks is explored in table 5. Column (1) shows the results for lending to EMEs; column (2) is for lending to AFEs. In column (1), the coefficient associated with the interaction term between ΔMP and banks' CCAR stress test buffers is negative and highly significant. Therefore, lending to EMEs is more responsive to changes of monetary policy for banks that are better capitalized under the CCAR severely adverse scenario. Furthermore, the baseline effect of a higher stress test buffer is positive. That is, banks that are better capitalized under the severely adverse scenario, on average, lend more to firms in emerging markets. Column (2) shows that the same is not true for lending to AFEs. Here, neither the interaction term nor the baseline effect of the CCAR buffer are significant.

While the results in columns (1) and (2) are for data that is aggregated by region (EME vs. AFE), columns (3) and (4) are based on bank-country-level data that includes individual EMEs. In column (3), we control for time and bank-country fixed effects. In column (4), time-fixed effects are replaced by country-time fixed effects. Again, we find a negative and highly statistically significant interaction term, indicating that capital constraints imposed on banks through CCAR affect banks' responses to changes in monetary policy.

The magnitude of the estimated coefficients reveals economically meaningful differences across banks. Using the coefficient from column (1), a bank with a CCAR buffer of 2.2 percent reduces its lending to EMEs by 9.6 percent in response to an increase in the Fed Fund rate/shadow rate by 15 basis points. In contrast, for a bank with a CCAR buffer of 30 basis points, the level of lending to EMEs is basically unchanged when U.S. monetary policy changes.

The direct effect of stress tests on U.S. banks' lending to emerging market appears to be positive, as indicated by the positive coefficient on the buffer variable throughout table 5. Column (4) controls for country-time and bank-country fixed effects so that only variation in banks' CCAR buffers over time is used to identify the effect. In this case, the buffer coefficient is significant at the 10-percent level and implies that a 1-percent higher buffer implies 8 percent higher loan volumes.

Easing vs. tightening To shed more light on the mechanism through which CCAR buffers affect bank lending to EMEs, we explore whether the effects of monetary easing and tightening are symmetric. In table 6, we estimate the response of bank lending to EMEs separately for positive and negative changes in the Fed Funds rate/shadow rate. Columns (1) through (3) use the aggregated data that reflect individual banks' lending to all EMEs. Columns (4) through (6) present regressions run on the bank-country-level data that include only EMEs as counterparties. Column (1) shows that bank lending to EMEs responds to monetary easing but not to monetary tightening. The point estimate of β_1 in column (1) implies that a 15-basis-point reduction in the Fed Funds rate/shadow rate results in a 13-percent increase in C&I loan issuance by U.S. banks.

Column (2) and Column (3) include interaction terms between banks' CCAR buffers and positive and negative changes of ΔMP_t. These columns do not reveal strong differences in the effect of CCAR buffers for banks' responses to monetary policy changes between monetary easing and monetary tightening. However, once we run regressions on the bank-country-level data, where demand effects can be controlled for most convincingly through country-time fixed effects (column (3)), the interaction term is only significant for negative changes in interest rates, that is, monetary policy easing. This suggests that responses of banks with varying CCAR buffers to changes in monetary policy differ mainly for episodes of monetary policy easing. In this case, banks with larger CCAR buffers expand lending to EMEs more than banks with smaller CCAR buffers. These results are consistent with the idea that monetary policy easing can only unfold its effects when banks have excess capital (Kashyap and Stein (1994), Peek and Rosengren (1995b), Peek and Rosengren (1995a),Van den Heuvel et al. (2002)). In our context of monetary policy transmission to EMEs, the results imply that spillovers of monetary easing are smaller when banks are more capital constrained.

Bank-level control variables Banks' CCAR buffers could be correlated with other bank characteristics. To address this concern, we run regressions that include additional bank-level variables. Table 7 presents the results. In column (1), we control for a bank's ratio of unused committed exposures to total committed exposures 3 months prior, and we also interact this variable with the change in monetary policy ΔMP_t.[17] When credit utilization by firms is low, banks may have a greater scope to issue new loans. In line with this rationale, the coefficient of the unused commitment ratio is positive, implying that banks with a higher unutilized commitment ratio in the previous quarter lend more this quarter. The interaction term is not significant at standard levels. In column (2), we control for the share of loans to EME borrowers that were reported in the previous quarter but leave the bank's balance sheet this quarter. The interaction term between this variable, which is denoted by Portfolio Attrition Share, and ΔMP is also included.[18] Banks that see a large share of loans mature might lend more. Column (2) supports this hypothesis, displaying a positive and significant coefficient associated with the portfolio attrition share. The interaction term is not significant. Of note, the inclusion of these bank-level variables does not affect the significance of our key coefficient of interest, which remains negative and significant at standard significance levels.

Columns (3) through (5) control, one-by-one, for the following variables: a bank's Tier1 capital ratio, its share of retail deposits in total deposits, and its share of liquid assets (equal to cash plus securities) in total assets. These variables are all lagged by three months and interacted with ΔMP_t. In column (6), we include a bank's average ratio of non-interest-income to net interest income as a proxy for the bank's business model, as well as its interaction with ΔMP_t. The coefficients associated with the CCAR buffer interaction term remain significant throughout with the exception of column (5), which includes a bank's lagged liquid asset ratio as well as its interaction with ΔMP_t. However, the size of our main coefficient is little changed. The liquid asset ratio is highly correlated with the CCAR buffer (correlation coefficient of 0.78), which creates a collinearity problem. Of note, the coefficient of the liquid asset ratio interaction is negative when the CCAR buffer and the CCAR buffer interaction are omitted.[19] This suggests that lending to EMEs is more responsive to monetary policy changes for banks with more liquid assets. This is opposite of what has been

[17] The ratio is computed in each quarter by country and only for committed exposures that were reported in the previous quarter.

[18] Portfolio attrition occurs because loans mature, are sold, or are written off.

[19] This is also true for the retail deposit ratio and a deposit ratio, defined as total deposit over total assets.

found by Kashyap and Stein (2000). However, the channel described in the aforementioned paper works through reserve requirements and is expected to be inactive when reserves are abundant as was the case during our sample period. It is also unclear that the channel should be operative for large banks, such as those that participate in CCAR, which likely have easy access to ample unsecured funding. Interestingly, our main coefficient of interest hardly changes when the Tier1 capital ratio is included in the regressions. This suggests that the CCAR buffers do not merely reflect banks' regulatory capital ratios, but that the CCAR buffers capture unique information about the capital constraints banks face through the annual stress testing exercise.

4.3 Monetary policy and bank risk-taking

In the previous sections, we documented that banks expanded their lending to EMEs in response to monetary easing in the United States. In this section, we study whether monetary policy had an effect on banks' risk-taking. Table 8 presents regression results where the dependent variable is the weighted-average probability of default of all new loans issued in month t. A loan's probability of default reflects the issuing bank's best estimate of the probability that the borrower will default within the next 12 months. In column (1), the effect of monetary policy changes on the average probability of default of banks' EME portfolios is estimated. The positive and highly significant coefficient implies that U.S. monetary easing makes banks lend, on average, to less risky borrowers within EMEs. This finding is quite surprising, as one might have expected easing under QE to increase risk-taking, for example, because banks may "reach for yield' in a low interest-rate environment. Column (2) sheds some additional light on this question. It shows the effect of monetary policy changes on the weighted-average probability of default of the full C&I loan portfolio of a bank. Now, the coefficient is much smaller and no longer statistically significant. That is, there is no evidence that monetary easing changes the overall riskiness of a banks' C&I loan portfolio.[20]

The fact that the overall riskiness does not change can be explained by two countervail-

[20] We also ran regressions that included an interaction between changes in U.S. monetary policy and banks' CCAR buffers. Because the coefficient associated with the interaction term was never significant, we decided not to report these additional results.

ing forces. On the one hand, there is a shift towards more EME lending (as shown more explicitly in the next section in table 11) which raises the average probability of default of the portfolio as EME borrowers tend to be riskier.[21] On the other hand, as column (1) shows, lending within the EME portfolio goes to relatively safer borrowers.[22] Overall these two compositional effects exactly wash out generating the result reported in column (2).[23]

5 Additional Results and Robustness

In this section, we provide several supplementary results and explore the robustness of our key findings to alternative regression specifications. We start with including lags of changes in monetary policy in the regressions. Next, we employ monetary policy shocks derived from a VAR as an alternative measure of U.S. monetary policy changes. Furthermore, we show that banks' overall C&I loan portfolios become heavier in loans to emerging market economies when monetary policy eases while average credit risk does not change. Finally, we show that our results on the importance of CCAR for the transmission of monetary policy through U.S. banks are upheld when we exclude observations with the largest and smallest CCAR buffers from the sample.

Persistent effects of monetary policy changes Monetary policy can have effects beyond the one-month period we have considered so far. To test for persistent effects, regressions in table 9 include contemporaneous monetary policy changes as well as three lags of the variable. According to the estimated coefficients shown in column (1), a 15-basis-point reduction in the Fed Funds rate/shadow rate increases lending to EMEs by 8.6 percent 3 months out, by 12 percent two months out, by 10 percent one month out, and by 5 percent

[21]The average weighted-average probability of default of the domestic new loan portfolio across banks and quarters is 0.9 percent with a standard deviation of 0.008, while the average weighted-average probability of the EME new loan portfolio is 1 percent with a standard deviation of 0.15.

[22]This interpretation relies on the assumption that banks' reported probabilities of default and internal ratings are valid. Plosser and Santos (2018) raises doubts about banks' internal risk estimates.

[23]Banks only report the probability of default of borrowers from 2014:Q4 onward. To obtain the probabilities of default for earlier quarters, we estimate mappings between banks' internal credit ratings, which are available throughout the sample period, and the assigned probability of default and apply the appropriate probabilities of default to each ratings bucket when the probability of default is not available. The mapping of ratings into probabilities of default is remarkably stable within banks over time, which makes us confident that the applied method is appropriate.

contemporaneously. Columns (2) and (3) present regression results when the EME indicator and the CCAR buffers are interacted with lagged changes of monetary policy. The lagged interactions are often significant at standard significance levels.

U.S. monetary policy shocks U.S. monetary policy is likely exogenous to U.S. bank lending to EMEs. Nevertheless, we check the robustness of our results to an alternative measure of monetary policy changes provided by the International Banking Research Network. This alternative measure is constructed by using high-frequency identification methods to back out structural monetary policy shocks from a VAR over a long sample following Gertler and Karadi (2015). Table 10 replicates the key regressions of this paper where the change in the Fed Funds rate/shadow rate is replaced with U.S. monetary policy shocks. Column (1) corresponds to column (1) of table 3 and shows that U.S. monetary policy shocks decrease U.S. banks' loan issuance to emerging market borrowers. According to the estimated coefficient of -1.15, a one-standard deviation shock to U.S. monetary policy (14 basis points) results in a 9.6-percent decline of loan issuance to emerging market borrowers by U.S. banks. The quantitative results implied by our regressions using monetary policy shocks are essentially identical to those implied by our earlier regressions that exploited changes in the Fed Funds rate/shadow rate.

In line with table 9, effects of U.S. monetary policy changes are persistent and unfold several months after the shock occurred as column (2) of table 10 highlights, which includes lagged U.S. monetary policy shocks. Column (3) tests for differences between the response of lending in EMEs versus AFEs. While the coefficient on the interaction term between the monetary policy shock and the EME indicator is not significant in column (3), it becomes significant when more lags of the monetary policy shocks are included and interacted with the EME dummy in column (4). Column (5) corresponds to column (1) of table 5. As before, the interaction term between the CCAR buffer and the monetary policy variable is negative and highly significant. Also interactions terms with lagged monetary policy shocks are statistically significant in column (6).[24]

[24] We also used changes in the 2-year Treasury yield as an alternative measure of changes in U.S. monetary policy. Results remain largely unchanged.

Share of EME loan issuance in total C&I loan issuance We showed earlier that loan issuance to AFEs does not expand as much as loan issuance to EMEs in response to U.S. monetary easing. Table 11 shows that lending to EMEs also expanded relative to overall lending. Specifically, the table presents the results of regressions that employ as the dependent variable the share of loans issued to EMEs in total loan issuance by bank and month. The regressions show that the share of loans that go to EME borrowers falls when U.S. monetary policy tightens and decreases more strongly for banks with higher CCAR buffers.

Excluding observations with extreme CCAR buffers and specific years As a final exercise, we explore whether results could be driven by extreme observations. First, we exclude observations with extreme CCAR buffers, defined as those in the 1st and 99th percentile of the buffer distribution. Second, we exclude the year 2014 when aggregate loan issuance to EMEs fell notably (figure 2). Table 12 shows that our main results are robust to excluding these observations.

6 Conclusions

Emerging markets saw an inflow of capital when monetary policy eased in advanced economies after the Global Financial Crisis. This paper shows that U.S. banks contributed to easier financial conditions in emerging markets during the period of U.S. quantitative easing. The banks increased their C&I lending to emerging markets in response to U.S. monetary easing, more than their lending to domestic borrowers and borrowers in other advanced economies. Lending expanded in particular to borrowers in more financially developed emerging markets and in countries with a lower ease of doing business index.

An important question is what emerging markets can do to limit spillovers of foreign monetary policy to domestic financial conditions. Various macro-prudential tools as well as capital controls have been discussed as potential effective tools. This paper explores whether prudential regulation in the transmitting country can limit spillovers. The United States introduced comprehensive stress tests of large banking groups in 2011, which forced several banks to build capital over time. These stress tests did not only have consequences for banks' domestic lending decisions as shown previously (Acharya et al. (2018), Cortes et al. (2018)) but also for their loan issuance to foreign borrowers. Specifically, banks that were more constrained through the CCAR exercise because they exhibited a lower minimum Tier1 capital ratio in the severely adverse scenario expanded their lending to emerging markets less than banks that more easily passed the stress tests. These results imply that the effects of monetary policy easing depend on banks' capital positions as argued, for example, in Kashyap and Stein (1994). Our findings also suggest that domestic regulators can affect the degree to which domestic monetary policy is transmitted to foreign countries through domestic financial institutions.

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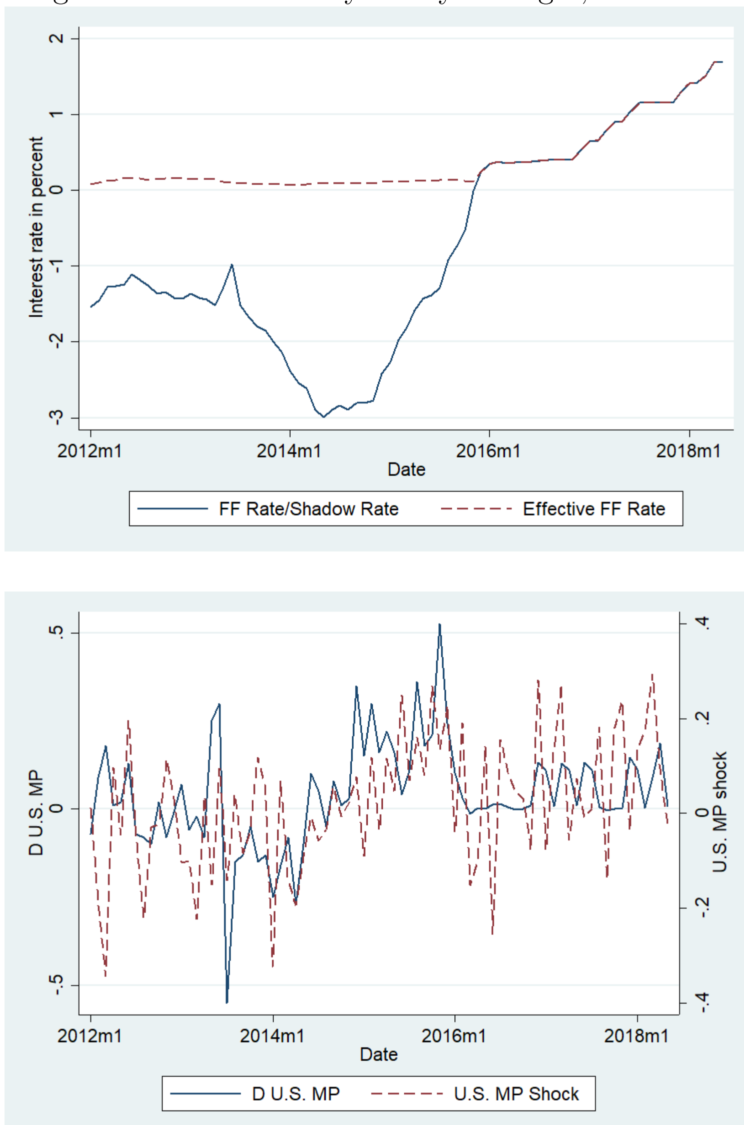
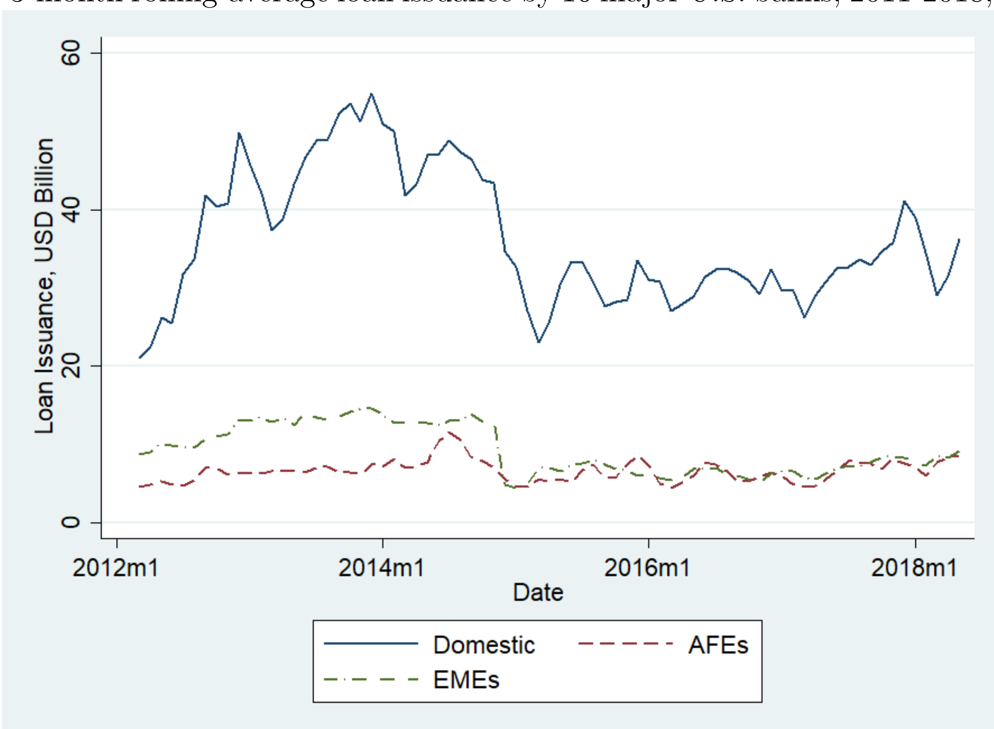
Figures

Figure 1: U.S. Monetary Policy Changes, 2011-2018



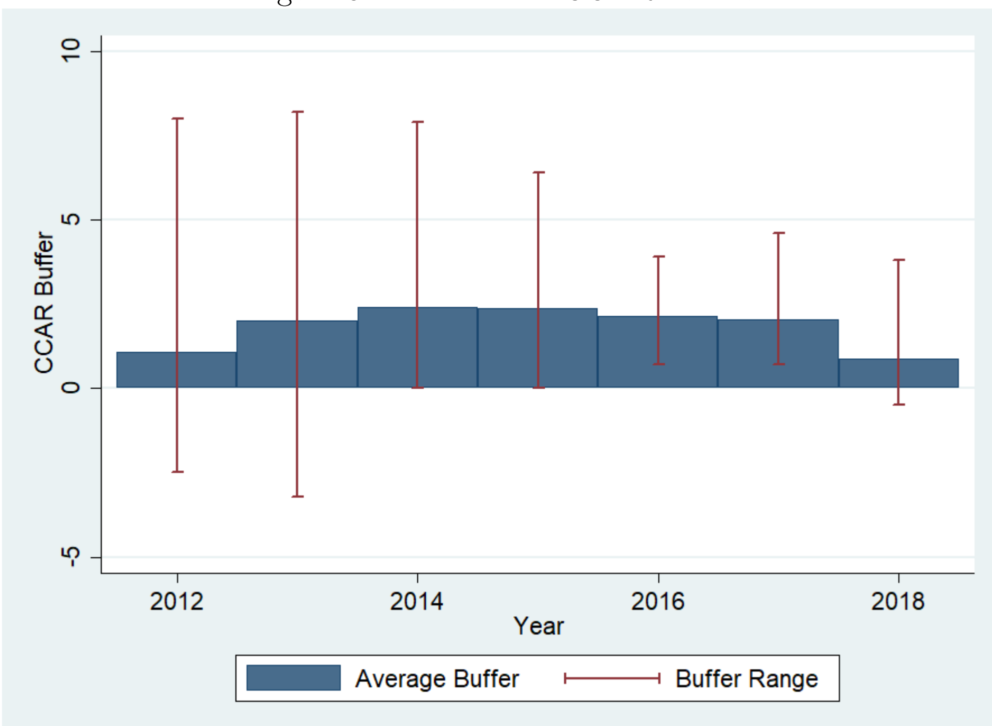
Note: The top panel shows the monthly Effective Federal Runds rate (dotted line) and the monetary policy variable employed in this paper (solid line), which is equal to the shadow rate computed by Wu and Xia (2016) during the zero-lower-bound period and equal to the Federal Funds rate otherwise. In the bottom panel, the solid line depicts monthly changes in ΔMP, the monetary policy variable used in this paper. It is equal to the shadow rate computed by Wu and Xia (2016) during the zero-lower-bound period and equal to the Federal Funds rate otherwise. The dashed line corresponds to monthly U.S. monetary policy shocks provided by the International Banking Research Network derived from a structural VAR model based on the methodology in Gertler and Karadi (2015).

Figure 2: 3-month rolling-average loan issuance by 16 major U.S. banks, 2011-2018, by region



Note: The figure shows the monthly volume of new loans issued by 16 major U.S. banks over time that are in our sample continuously. Monthly loan issuance was averaged over three months. New loans are split by counterparty country. EME stands for emerging market economies. AFE stands for advanced foreign economies.

Figure 3: Evolution of CCAR buffers



Note: The bars in the figure show by year the average CCAR buffer, defined as the differences between a bank's minimum Tier1 capital ratios in the CCAR severely adverse scenario and the required minimum threshold of either 4.5 or 5 percent. The vertical lines indicate the range of CCAR buffers across banks.

Tables

Table 1: Sectoral composition of U.S. banks' loan originations in 2018:Q1 by region, in percent

	Domestic	AFE	EME	Residual
Finance	21.30	23.28	35.50	47.10
Manufacturing	13.0	18.99	17.49	3.73
Services	29.02	23.16	9.10	19.47
Trade	16.27	5.89	10.61	2.91
Other	20.38	28.67	27.30	26.78

Note: This table reports the share of new loan originations by U.S. banks in 2018:Q1 that are extended to a specific sector for different borrower regions. AFE stands for advanced foreign economies and EME stands for emerging market economies. Residual are all countries that are not AFEs, EMEs or the U.S.

Table 2: Significance of U.S. banks in borrower countries

	U.S. banks' share in private non-financial credit, in percent
Luxembourg	18
Mexico	14
Ireland	6
Colombia	2.9
Singapore	2.8
Argentina	2.6
Hong Kong	2.6
Chile	2.4
Turkey	2.1
India	2

Note: This table shows the average share of U.S. banks' exposures in total credit provided by banks to the domestic non-financial sector by borrower country. The data for the denominator come from the BIS credit series. Country ratios have been averaged over the sample period. Displayed are the 10 borrower countries with the largest ratios.

Table 3: Monetary policy spillovers: Baseline results

	(1)	(2)	(3)	(4) Before Liftoff	(5) After Liftoff
D MP	-1.056***	-0.326		-1.052**	0.304
	(0.361)	(0.224)		(0.401)	(0.967)
D MP X EME		-0.686**	-0.694**		
		(0.303)	(0.299)		
Growth Vix	-0.0606	0.0637		0.504	-0.722
	(0.463)	(0.306)		(0.477)	(0.463)
Log(VIX)	0.651*	0.00269		-0.112	-0.000577
	(0.339)	(0.236)		(0.585)	(0.259)
D Excess BP	0.217	0.0470		-0.523	0.232
	(0.414)	(0.235)		(0.392)	(0.216)
D Term Spread	0.926*	0.762**		0.783	-0.121
	(0.494)	(0.305)		(0.541)	(0.321)
D Unempl. Outl.	-0.813	1.317*		-1.369	-1.054
	(1.278)	(0.710)		(1.235)	(2.600)
D Dollar	-0.0544	-0.00861		-0.0726	-0.0155
	(0.0625)	(0.0399)		(0.0737)	(0.0520)
Bank FE	Yes	No	No	No	No
Bank-Region FE	No	Yes	Yes	Yes	Yes
time	No	No	Yes	No	No
Observations	903	2172	2345	567	334
R^2	0.715	0.703	0.720	0.782	0.817

Note: This table presents the baseline results. The dependent variable corresponds to the log new utilized exposures of bank b in month t in emerging markets in column (1). Columns (2) and (3) employ the log new utilized exposures of bank b in month t in region $c \in \{EME, AFE\}$ as the dependent variable. The results shown in column (4) are based on a sample that includes only observations during the U.S. quantitative easing period. The sample that underlies column (5) runs from December 2015 to December 2017. Standard errors are clustered by time and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 4: The role of country characteristics within EMEs

	(1)	(2)	(3)	(4)	(5)
D MP	-0.0800	-0.0294	-0.141	-1.052	
	(0.149)	(0.212)	(0.120)	(0.684)	
D MP X Int. Rate Spread	-0.0245				-0.0206
	(0.0189)				(0.0168)
Int. Rate Spread	-0.0232**				-0.0163*
	(0.00916)				(0.00878)
D MP X Priv. Credit/GDP		-0.00172			-0.00791***
		(0.00219)			(0.00252)
Priv. Credit/GDP		-0.00320*			-0.00300
		(0.00170)			(0.00281)
D MP X Rule of Law			0.178		0.158
			(0.147)		(0.209)
Rule of Law			-0.831***		-0.197
			(0.213)		(0.217)
D MP X Business Climate				0.0138	0.0301**
				(0.0101)	(0.0142)
Business Climate				-0.0327***	-0.00771
				(0.00771)	(0.00860)
Time FE	No	No	No	No	Yes
Bank-Cntry FE	Yes	Yes	Yes	Yes	Yes
Observations	6724	6724	6372	6670	6319
R^2	0.462	0.462	0.465	0.461	0.496

Note: This table explores in how far country characteristics can explain the degree to which U.S. bank lending to these countries responds to monetary policy changes. The dependent variable corresponds to the log new utilized exposures of bank b in month t to emerging market c. *Int. Rate Spread* is the annual difference between a country's average lending rate and average deposit rate. *Priv. Credit/GDP* stands for total credit to the private sector divided by a country's GDP, a measure that is often used as a proxy for a country's financial development. *Rule of Law* is the degree to which all people and institutions are subject to and accountable to law that is fairly applied and enforced. *Business Climate* reflects the ease with which firm can do business in a country. Higher values of these variables reflect stronger rule of law and a better business climate, respectively. Standard errors are clustered at the country-time level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 5: The role of CCAR for the transmission of U.S. monetary policy to EMEs

	Agg. Data		Data by Country	
	(1) EME	(2) AFE	(3) EME	(4) EME
D MP	0.0446	0.0717		
	(0.483)	(0.425)		
D MP X Buffer	-0.525***	-0.0215	-0.148**	-0.172*
	(0.172)	(0.214)	(0.0676)	(0.0896)
Buffer	0.146***	0.0423	0.0524	0.0806*
	(0.0483)	(0.0390)	(0.0375)	(0.0477)
Gr. VIX	0.0787	0.0226		
	(0.439)	(0.328)		
Log(VIX)	0.294	-0.684***		
	(0.330)	(0.237)		
D Excess BP	0.288	0.00430		
	(0.311)	(0.213)		
D Term Spread	1.024**	0.534*		
	(0.403)	(0.274)		
D Unempl. Outl.	-0.850	2.660**		
	(1.357)	(1.159)		
D Dollar	0.0294	0.0320		
	(0.0544)	(0.0353)		
Bank FE	Yes	Yes	No	No
Time FE	No	No	Yes	No
Country-Time FE	No	No	No	Yes
Bank-Country FE	No	No	Yes	Yes
Observations	572	819	5221	4550
R^2	0.712	0.715	0.485	0.635

Note: This table presents the baseline results for the role of CCAR stress tests for the response of bank lending to changes in monetary policy. In columns (1) and (2), the dependent variable corresponds to the log new utilized exposures of bank b in month t in emerging markets. In columns (3) and (4), regressions are run on bank-country level dataset that only includes emerging markets as counterparties. Standard errors are clustered at the bank-time level and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 6: Differential effects of monetary policy easing versus tightening

	Agg. Data			Data by Country		
	(1)	(2)	(3)	(4)	(5)	(6)
D MP X Easing	-1.887**	-0.207		0.0530		
	(0.924)	(0.873)		(0.309)		
D MP X Tighten.	-0.444	0.362		-0.0646		
	(0.575)	(0.746)		(0.338)		
D MP X Easing X Buffer		-0.732*	-0.509**		-0.321***	-0.278**
		(0.384)	(0.229)		(0.107)	(0.125)
D MP X Tighten. X Buffer		-0.377	-0.547**		0.0632	-0.0423
		(0.288)	(0.249)		(0.155)	(0.204)
Buffer		0.101*	0.264***		0.0292	0.0664
		(0.0530)	(0.0491)		(0.0402)	(0.0495)
Bank FE	Yes	Yes	Yes	No	No	No
Time FE	No	No	Yes	No	Yes	No
Country-Time FE	No	No	No	No	No	Yes
Bank-Country FE	No	No	No	Yes	Yes	Yes
Observations	608	608	608	5221	5221	4550
R^2	0.701	0.710	0.777	0.449	0.485	0.635

Note: This table shows that monetary easing and tightening affect U.S. bank lending to emerging markets differentially. Columns (1) through (3) are based on data that is aggregated across emerging markets so that the dependent variable varies by bank and month. Columns (4) through (6) employ more disaggregated data that vary by bank, month, and emerging market. The effect of positive and negative changes in monetary policy on bank lending is estimated separately. Standard errors are clustered by time in column (1) and (4) and by bank X time in the remaining columns. Standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 7: Controlling for several bank-level characteristics

	(1)	(2)	(3)	(4)	(5)	(6)
D MP X Buffer	-0.506***	-0.304**	-0.360**	-0.381**	-0.352	-0.335**
	(0.183)	(0.154)	(0.162)	(0.153)	(0.245)	(0.147)
Buffer	0.270***	0.230***	0.214***	0.162***	0.218***	0.234***
	(0.0437)	(0.0434)	(0.0482)	(0.0447)	(0.0526)	(0.0428)
L3 Unused Exp. Share	1.815**		0.0463	0.0245	-0.0393	0.0322
	(0.864)		(0.671)	(0.670)	(0.657)	(0.664)
D MP X L3 Unused Exp. Share	2.813					
	(3.521)					
Portf. Attr. Share		2.516***	2.446***	1.894***	2.533***	2.469***
		(0.263)	(0.265)	(0.278)	(0.269)	(0.262)
D MP X Portf. Attr. Share		-1.326				
		(1.492)				
D MP X L3 T1 Ratio			0.139			
			(0.212)			
L3 T1 Ratio			0.0511			
			(0.0714)			
D MP X L3 Ret. Dep. Share				-2.762		
				(1.802)		
L3 Ret. Dep. Share				10.35***		
				(2.719)		
D MP X L3 Liqu. Ass.					0.394	
					(3.748)	
L3 Liqu. Assets					1.669	
					(2.509)	
D MP X Avg. Non-interest Inc.						-0.00570
						(0.0113)
Bank FE	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes
Observations	518	512	512	512	512	512
R^2	0.757	0.804	0.804	0.813	0.803	0.803

Note: This table shows that the results regarding the effect of stress test on the degree to which banks' emerging market lending responds to monetary policy changes are robust to the inclusion of various bank-level variables. The dependent variable corresponds to the log new utilized exposures of bank b in month t in emerging markets. *Unused Exp. Share* stands for the share of unused commitments to total commitments taking into account all loans that were on the bank's balance sheet in the previous quarter. *Portf. Attr. Share* corresponds to the share of loans last quarter that are not reported anymore the next quarter. *T1 Ratio* stands for a bank's Tier1 capital ratio. *Ret. Dep. Share* reflects a bank's share of retail deposits in total deposits. *Liqu. Ass.* corresponds to a bank's share of liquid assets (cash+securities) in total assets. *Non-interest Inc.* reflects a bank's ratio of non-interest income to net interest income. Standard errors are clustered by bank X time and are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 8: Weighted-average probability of default

	(1) EME Portfolio	(2) Entire Portfolio
D MP	0.00807***	0.00142
	(0.00243)	(0.00112)
Growth Vix	0.00158	0.00137
	(0.00313)	(0.00118)
Log(VIX)	-0.00510**	-0.000746
	(0.00229)	(0.00137)
D Excess BP	-0.00287	0.00117
	(0.00198)	(0.000704)
D Term Spread	-0.000488	0.000330
	(0.00280)	(0.000947)
D Unempl. Outl.	0.0171	0.00411
	(0.0105)	(0.00362)
D Dollar	-0.000183	-0.000126
	(0.000381)	(0.000128)
Bank FE	Yes	Yes
Observations	903	903
R^2	0.282	0.624

Note: This table explores banks' risk taking in C&I lending as a function of changes in monetary policy. The dependent variable in column (1) is a bank's weighted average probability of defaults of its new loans to emerging market borrowers. Column (2) has as the dependent variable the weighted-average probability of new loans of its entire C& portfolio, which includes loans to U.S. and AFE borrowers. Standard errors are clustered by time are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 9: Including lagged changes in monetary policy

	(1)	(2)	(3)
D MP	-0.406	0.268	0.807*
	(0.415)	(0.318)	(0.488)
L.D MP	-1.212**	-0.541	-1.140**
	(0.468)	(0.395)	(0.524)
L2.D MP	-1.589***	-0.648**	-0.369
	(0.318)	(0.262)	(0.627)
L3.D MP	-0.858**	-0.0949	-0.861
	(0.349)	(0.251)	(0.574)
D MP X EME		-0.741*	
		(0.413)	
L.D MP X EME		-0.415	
		(0.576)	
L2.D MP X EME		-0.843*	
		(0.444)	
L3.D MP X EME		-0.637*	
		(0.371)	
D MP X Buffer			-0.395***
			(0.135)
L.D MP X Buffer			-0.0397
			(0.135)
L2.D MP X Buffer			-0.457***
			(0.170)
L3.D MP X Buffer			0.0521
			(0.165)
Buffer			0.135***
			(0.0509)
Growth Vix	-0.437	-0.250	-0.201
	(0.485)	(0.327)	(0.429)
D Excess BP	0.477	0.346	0.557
	(0.608)	(0.287)	(0.350)
D Term Spread	1.256**	0.784**	1.223***
	(0.530)	(0.342)	(0.392)
D Unempl. Outl.	-0.720	1.474*	-0.234
	(1.336)	(0.779)	(1.319)
Log(VIX)	1.428***	0.340	1.122***
	(0.359)	(0.295)	(0.364)
D Dollar	-0.0583	-0.0115	-0.0579
	(0.0734)	(0.0433)	(0.0547)
Bank FE	Yes	No	Yes
Bank-Region FE	No	Yes	No
Observations	565	1305	424
R^2	0.671	0.696	0.673

Note: This table explores whether monetary policy changes unfold their effects on bank lending with a lag. In all columns the contemporaneous monetary policy change is included as well as three lags of this variable. In columns (1) and (3), the dependent variable is the log new utilized exposures of bank b in month t in emerging markets. In column (2), the dependent variable is the log new utilized exposures of bank b in month t and region $r \in \{EME, AFE\}$. Standard errors are clustered by time in columns (1) and (2) and by bank X time in column (3). Standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 10: U.S. monetary policy shocks

	(1)	(2)	(3)	(4)	(5)	(6)
MP Shock	-1.148***	-1.183*	-0.640**		-0.145	
	(0.405)	(0.615)	(0.314)		(0.635)	
L.MP Shock		-1.454***				
		(0.536)				
L2.MP Shock		-1.936***				
		(0.547)				
L3.MP Shock		-1.328***				
		(0.476)				
MP Shock X EME			-0.447	-1.310***		
			(0.407)	(0.467)		
L.MP Shock X EME				-1.487***		
				(0.470)		
L2.MP Shock X EME				-0.930**		
				(0.450)		
L3.MP Shock X EME				-0.854*		
				(0.486)		
MP Shock X Buffer					-0.693***	-0.617***
					(0.185)	(0.171)
L.MP Shock X Buffer						-0.251*
						(0.149)
L2.MP Shock X Buffer						-0.217
						(0.134)
L3.MP Shock X Buffer						-0.269*
						(0.155)
Buffer					0.129***	0.227***
					(0.0491)	(0.0510)
Growth Vix	-0.157	-0.252	0.0103		-0.00169	
	(0.466)	(0.470)	(0.307)		(0.433)	
D Excess BP	0.665*	0.447	0.372		0.988***	
	(0.384)	(0.492)	(0.228)		(0.342)	
D Term Spread	0.913*	1.041**	0.737**		1.011**	
	(0.483)	(0.451)	(0.309)		(0.400)	
D Unempl. Outl.	0.232	-0.153	1.995***		0.596	
	(1.134)	(2.170)	(0.646)		(1.294)	
Log(VIX)	0.582*	0.845***	-0.0519		0.132	
	(0.347)	(0.319)	(0.232)		(0.329)	
D Dollar	-0.0776	-0.0656	-0.0200		0.00961	
	(0.0562)	(0.0670)	(0.0350)		(0.0521)	
Bank FE	Yes	Yes	No	No	Yes	Yes
Bank-Region FE	No	No	Yes	Yes	No	No
Time FE	No	No	No	Yes	No	Yes
Observations	903	565	2172	1431	572	453
R^2	0.714	0.669	0.703	0.735	0.714	0.756

Note: In this table, changes in the Fed Funds rate/shadow rate are replaced by monetary policy shocks identified from a structural VAR following Gertler and Karadi (2015). In columns (1), (2), (5) and (6), the dependent variable is the log new utilized exposures of bank b in month t in emerging markets. In columns (3) and (4), the dependent variable is the log new utilized exposures of bank b in month t and region $r \in \{EME, AFE\}$. Standard errors are clustered by time in columns (1) through (4) and by bank X time in column (5) and (6). Standard errors are in parentheses. *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 11: EME share in total C&I loan issuance

	(1)	(2)	(3)
D MP	-0.115**	0.0307	
	(0.0440)	(0.0579)	
D MP X Buffer		-0.0834***	-0.0984***
		(0.0266)	(0.0272)
Buffer		-0.00143	0.0188**
		(0.00643)	(0.00748)
Growth Vix	-0.0192	-0.0175	
	(0.0411)	(0.0443)	
D Excess BP	-0.0259	-0.00260	
	(0.0465)	(0.0507)	
D Term Spread	0.0373	0.0605	
	(0.0434)	(0.0472)	
D Unempl. Outl.	-0.351*	-0.487***	
	(0.191)	(0.181)	
Log(VIX)	0.0799**	0.0668**	
	(0.0314)	(0.0308)	
D Dollar	0.00310	0.00342	
	(0.00551)	(0.00603)	
Bank FE	Yes	Yes	Yes
Time FE	No	No	Yes
Observations	936	788	843
R^2	0.591	0.631	0.721

Note: This table shows that the key results hold when the dependent variable log new utilized exposures is replaced by the share of new exposures in emerging markets in total new exposures. The underlying dataset varies by bank and month. Standard errors are clustered by time in column (2) and by bank X time in columns (2) and (3). *, ** and *** denote significance at the 10%, 5% and 1% level.

Table 12: Excluding specific observations

	(1)	(2)	(3)	(4)	(5)	(6)
D MP	-0.964**	-0.348	0.274	-1.262***	-0.392	-0.392
	(0.410)	(0.218)	(0.486)	(0.469)	(0.242)	(0.563)
D MP X EME		-0.497*			-0.842**	
		(0.295)			(0.390)	
D MP X Buffer			-0.679***			-0.381*
			(0.176)			(0.196)
Buffer			0.146***			0.133**
			(0.0532)			(0.0533)
Growth Vix	0.0581	0.111	-0.0228	-0.0334	0.0305	0.0674
	(0.484)	(0.289)	(0.439)	(0.559)	(0.343)	(0.499)
D Excess BP	0.332	0.0489	0.396	0.209	0.0593	0.264
	(0.425)	(0.217)	(0.306)	(0.421)	(0.229)	(0.307)
D Term Spread	0.866*	0.708**	0.900**	0.983*	0.834**	1.037**
	(0.497)	(0.277)	(0.409)	(0.539)	(0.319)	(0.428)
D Unempl. Outl.	-0.504	1.735**	-0.740	-0.600	1.650*	-0.618
	(1.650)	(0.752)	(1.464)	(1.579)	(0.828)	(1.488)
Log(VIX)	0.0187	-0.311	0.196	0.841**	0.161	0.515
	(0.377)	(0.234)	(0.330)	(0.359)	(0.228)	(0.342)
D Dollar	0.0353	0.0275	0.0358	-0.0783	-0.0281	0.000122
	(0.0704)	(0.0400)	(0.0545)	(0.0680)	(0.0396)	(0.0575)
Bank FE	Yes	No	Yes	Yes	No	Yes
Bank-Region FE	No	Yes	No	No	Yes	No
Observations	548	1817	548	743	1777	470
R^2	0.701	0.705	0.710	0.721	0.704	0.717

Note: This tables explores the robustness of key results to the exclusion of specific observations. In columnes (1) through (3), observations in the 1st and 99th percentile of the CCAR buffer distribution are excluded. In columns (4) through (6), the year 2014 is dropped. Standard errors are clustered by time in columns (1), (2), (4) and (5) and by bank X time in columns (3) and (6). Regressions in columns (1), (3), (4) and (6) use the log new utilized exposures of bank b in month t in emerging markets as the dependent variable. In columns (2) and (4), the dependent variable is the same but data vary by region where $r \in \{EME, AFE\}$. *, ** and *** denote significance at the 10%, 5% and 1% level.

Data Appendix

Country Groupings

Borrower regions are defined as follows:

- EME: Argentina, Bulgaria, Brazil, Chile, China, Colombia, Czech Republic, Hong Kong, Croatia, Hungary, Indonesia, Israel, India, South Korea, Kuwait, Lebanon, Mongolia, Malta, Mexico, Malaysia, Nigeria, Peru, Philippines, Poland, Romania, Serbia, Russia, Saudi Arabia, Singapore, Thailand, Turkey, Ukraine, Uruguay, Vietnam, South Africa
- AFE: Austria, Australia, Belgium, Canada, Switzerland, Germany, Denmark, Estonia, Spain, Finland, France, United Kingdom, Greece, Ireland, Iceland, Italy, Japan, Luxembourg, Latvia, Netherlands, Norway, New Zealand, Portugal, Sweden, Slovenia, Slovakia, Taiwan)
- Domestic: United States
- Residual: all other

Definition of Control Variables

Variables derived from Y-9c reports:

- Retail deposit share: (Total Deposits-Wholesale Deposits)/Total Assets; ((BHDM6631+BHDM6636+BHFN6631+BHFN6636)-(BHDMA243 or BHDMHK06)-(BHDMA164 or BHDMHK31)-BHFNA245-(BHDMA242 or BHDMHK32))/BHCK2170
- Liquid asset ratio: Cash+Securities/Total Assets; (BHCK0081+BHCK0395+BHCK0397+BHCK1773+BHCK1754)/BHCK2170
- Tier1 capital ratio: BHCA7206 or BHCW7206 or BHCK7206
- Non-interest income ratio: BHCK4079/BHCK4074

- Leave share: The share of loans that were reported in quarter $q-1$ but are not reported anymore in quarter q

- Unused commitments ratio: The share of unused commitments over total commitments of loans that were reported in quarter q and quarter $q-1$

Macro, financial, and country variables:

- VIX: Monthly CBOE Volatility Index from Haver.

- Excess Bond Premium: Monthly information, 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.

- Term Spread: Monthly spread between the 10-year and 3-month treasury rates from Haver.

- Unemployment Outlook: Quarterly means of the 4-quarter ahead unemployment rate forecast from the Survey of Professional Forecasters.

- Broad Dollar Index: Monthly trade-weighted dollar indix computed and published by the Federal Reserve.

- Interest rate spread: Yearly lending rate minus deposit rate in percent from the IMF International Financial Statistics.

- Rule of law: Yearly information from the World Bank's World Governance Indicators.

- Private Credit/GDP: Yearly information from the IMF International Financial Statistics.

- Business Climate: Ease of Doing Business Indicator Composite Index from the World Bank.

- Credit to the non-financial sector provided by banks: BIS.