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Corporate credit growth determinants in Ukraine: bank lending survey data application

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Abstract

This study investigates the determinants of corporate lending in Ukraine with a focus on distinguishing between supply and demand factors. I use a two-step process to build a credit standards index (CSI) based on disaggregated data from the Ukrainian bank lending survey (BLS). This paper describes factors that are significant for corporate lending development in Ukraine. It contributes to the existing literature by developing a measure of corporate loan supply and analyzing its ability to explain corporate credit growth in Ukraine by using bank-level BLS data. First, I employ a panel ordered logit model to transform categorical data into a continuous index that measures the likelihood of credit standards tightening. Second, I examine how this index affects new corporate lending in both national and foreign currencies. I find that the credit standard index is influenced by exchange rate movements (with depreciations leading to tighter standards), bank liquidity, and bank competition. I also demonstrate that the CSI has a negative impact on corporate loans in national currency, with a more pronounced effect for smaller banks

Keywords: supply and demand of corporate lending, bank lending survey data

JEL: G22, E44, C33

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1. Introduction

This study examines the determinants of corporate lending in Ukraine. It focuses on two main **research questions**: (i) What bank-level and macro factors influence proxy banks' decisions to change their lending standards for corporations? (ii) What are the effects of the factors determining corporate lending in Ukraine, and specifically, what is the impact of corporate lending standards as a loan supply factor? To answer both questions, I use a two-step process to distinguish between the supply and demand factors of corporate lending.

In the first step, I use a panel-ordered logit model to transform categorical survey data into a continuous credit standards index (CSI). In my set-up, a higher index value indicates an increased likelihood of tightening corporate lending standards. I find that faster economic growth, higher liquidity, and bank competition lead to looser credit standards for Ukrainian businesses, whereas exchange rate depreciation and elevated interest rates lead to stricter bank requirements for borrowers.

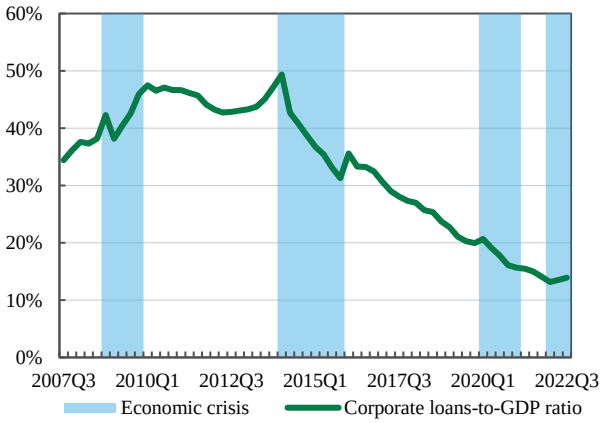
Second, I explore the influence of CSI on new corporate lending while controlling for economic activity, interbank interest rates, deposit growth, liquidity, and the share of non-performing loans (NPLs). I demonstrate that tighter lending standards have a negative impact on new corporate lending in the national currency and that it takes approximately six months for this effect to start manifesting. Small banks experience more pronounced effects than large banks. Moreover, small banks significantly affect national and foreign currency loans. I also ascertain the effect of economic activity on total assets, depending on the share of government securities, government bonds, and deposit certificates. I find that GDP growth is positively correlated with both national and foreign currency corporate lending, whereas new NPLs are negatively correlated with new corporate lending.

The remainder of this paper is organized as follows. In the following section, I provide a short description of the corporate lending market in Ukraine. In Section 3, I survey the related literature. Sections 4 and 5 delineate the bank lending survey data and methodology for this research, respectively. Section 6 presents the results and section 7 concludes the study.

2. Corporate lending in Ukraine

The corporate lending penetration in Ukraine has been low for many years (see Figure 1). It raises the question whether the reasons for slow lending lie within demand or supply factors; in particular, whether corporations have suppressed the demand for loans or banks have reduced their willingness to lend. There are several preconditions for the latter, primarily the numerous episodes of crisis in Ukraine that decreased banks' risk appetites and led to the tightening of credit risk assessment approaches.

Figure 1. Corporate loans to GDP ratio



Prior to 2014, corporate lending was reasonably active but mainly driven by flawed practices and improper motives. Banks lent extensively to related parties or companies owned by politically influential people who usually have a low operating income. Sometimes, there was no intention to repay the loans. Eventually, when the crisis hit, these loans became non-performing loans (NPLs).

The Crimea Peninsula annexation by Russia and following war in the Donbas region caused an economic crisis in 2014. Businesses located in the occupied territories were directly hit. External shocks triggered the turmoil and accumulated systemic imbalances during the previous years exploded into a financial crisis, thus reinforcing the disruption. Consequently, the share of NPLs in the total portfolio increased significantly from 16.3% in 2014 to 52.2% in 2018.

The 2014–2015 crisis was a turning point. Since then, the National Bank of Ukraine (NBU) has considerably improved its supervision and regulations based on international standards, including prudential requirements for credit risk assessments. Thus, banks were required to revise credit standards, primarily for corporate loans, and tighten them significantly to improve loan quality. An unfavorable macro environment suppresses corporate demand for lending. Therefore, loans to GDP ratio gradually decreased from a peak of 50% in 2014 to approximately 14% in 2022 (Figure 1).

The Ukrainian lending market faced new crises in 2020 and 2022, the latter being triggered by a full-scale Russian invasion. Frequent crises in Ukraine influence both supply and demand. This study offers insights into the factors that are significant for corporate lending development in Ukraine.

3. Related literature

A challenge related to modelling the loan supply is that many of its drivers such as internal bank loan policies are non-observable. Qualitative data from bank lending surveys can help extract information on these unobservable variables (Lown and Morgan 2006; Bassett et al. 2014a).

This study contributes to the existing literature by using bank-level lending survey (BLS) data to develop a measure of corporate loan supply and analyze its ability to explain corporate credit growth in Ukraine. Well-established literature analyzes credit growth factors using BLS data but most researchers use aggregated information (Lown and Morgan 2006). Usually, BLS data is confidential and not available for the public use on disaggregated level. Previous studies have used qualitative data from surveys to separate the supply and demand factors of lending, for instance, in the Euro area (de Bondt et al. 2010; Ciccarelli, Maddaloni, and Peydró 2015; Ciccarelli, Maddaloni, and Peydro 2013) and the US (Bassett et al. 2014a). However, only a handful of studies have employed bank-level BLS. Wosko (2015) used panel data from the Senior Loan Officers Opinion Survey to model corporate, mortgage, and consumer loan growth in Poland. Pintaric (2016) used bank-level data to develop a credit growth model for Croatia and found that demand and credit standards have statistically significant effects on the growth of specific loan types.

Hempell and Kok (2010) employed a cross-country panel based on a confidential dataset from the Eurosystem's bank lending survey and found that bank lending activity was generally influenced by the ability and willingness of banks to provide loans, especially during the financial crisis. There is also evidence that supply side constraints have a detrimental effect on loan growth, even after adjusting for demand-side effects. Altavilla et al. (2019) derived a measure of loan supply shocks from proprietary bank-level data on credit criteria from the euro area. Using a Bayesian vector autoregressive model, they found that tighter credit standards, internal bank regulations, and loan approval standards result in a prolonged decline in the amount of credit.

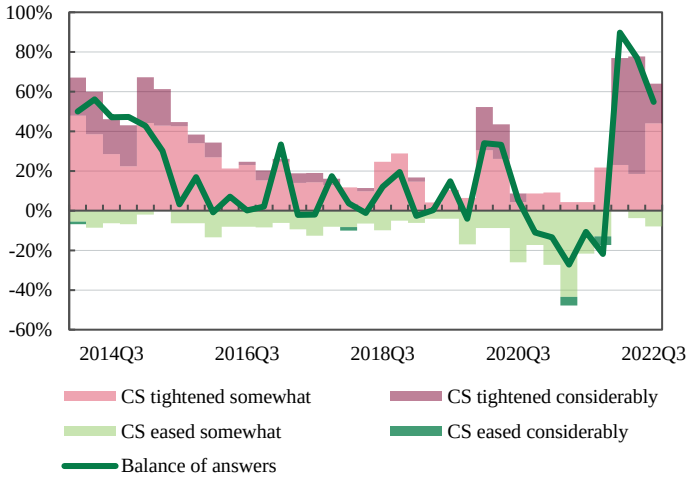
This study contributes to the literature also by exploring the imbalances in the Ukrainian banking system. Banks with liquidity surpluses tend to invest in government securities. I demonstrate that banks with a high share of government securities are susceptible to crowding out effects, which result in reduced corporate lending and a potential hindrance to economic growth. The crowding-out effect of lending through government debt has also been discussed extensively in a series of recent studies. For instance, Pinardon-Touati (2022) argued that due to constraints on bank credit supply and segmentation across banks, an increase in local government lending can lead to a reduction in aggregate corporate credit and disproportionately affect firms' borrowing from the same bank, potentially leading to an inefficient allocation of resources and lower overall output. This phenomenon has been widely studied from different perspectives in China (Huang, Pagano, and Panizza 2020) and Mexico (Morais et al. 2021).

4. Bank lending survey data description

The NBU has been conducting a quarterly bank lending survey (BLS) since 2011. The survey aims to help the central bank and other stakeholders better understand lending market conditions and trends from the bank's perspective. It provides general assessments and forecasts of changes in lending standards and conditions for the corporate sector and households as well as fluctuations in lending demand.

The main question of interest for the research extracted from BLS is on lending standards: "How did **the standards for approval of corporate loan** applications change within the past quarter?" Figure 2 illustrates that according to the BLS responses, banks tightened their corporate credit standards in 2014–2015, 2020, and 2022 (all periods of the economic crisis).

Figure 2. Distribution of BLS answers for the question: "How did the standards for approval of corporate loan applications change within the past quarter?"

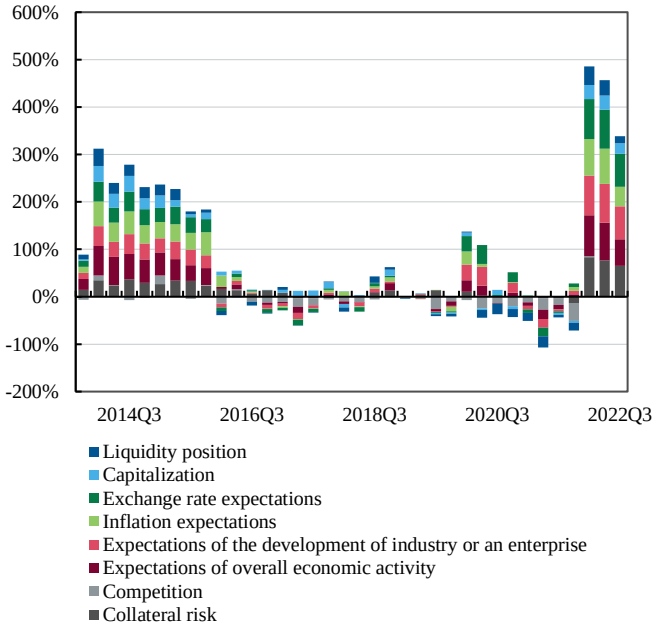


Note: Background share of the answers in total (100%). The balance of answers[1] is weighted by the banks' net assets. A positive balance indicates a tightening of standards for the approval of loan applications.

Economic, exchange rate, and inflation expectations pushed banks to less favorable corporate lending conditions during the crises (Figure 3). In normal times, better liquidity positions and competition encourage banks to loosen their standards. I find proxies to quantitatively assess the factors that explain the decisions of banks to change their credit standards.

[1] Balance of answers = 0.5*CS tightened considerably + 0.25*CS tightened somewhat + 0*CS remained unchanged - 0.25* CS eased somewhat - 0.5*CS eased considerably.

Figure 3. Factors influencing banks' decisions to change credit standards for corporates according to BLS



Only solvent banks provided BLS answers. Reliable quarterly data are available from the 4th quarter of 2013 until the 3rd quarter of 2022. During 2015–2016, there was a decrease in the number of banks and since 2020, the number of surveyed banks has dropped significantly. However, this reduction in respondents did not affect the representativeness of the data: surveyed institutions have always represented more than 90% of net assets. The panel data are unbalanced and include 56 banks and 1249 observations.

5. Methodology

I use a two-step process similar to that described by Wośko (2015). First, categorical data from the BLS are transformed into a continuous CSI, which is a proxy for the supply of corporate loans. Second, I use the CSI to explain the evolution of new corporate lending.

In the **first step**, I use BLS answers to the change in corporate credit standards as a dependent variable. The answers are five categories: "tightened considerably," "tightened somewhat," "remained unchanged," "eased somewhat" and "eased considerably." Fewer banks indicated that their lending standards eased or tightened considerably, thus, I combine the five categories into three: "eased," "unchanged," and "tightened." It allows for an increase in the number of observations in each remaining category and simplified the estimation. As these answers are categorically ordered data, I use an ordered logit panel model, which explains the likelihood of a bank moving from one category to another.

The dependent variable takes values {1,0,-1} which represents the answers "tightened," "unchanged," and "eased" respectively.

The *model* for the first step is as follows::

$$z_{i,t} = \sum_q \mathrm{B}^q X_{i,t}^q, \quad (1)$$

Where $z_{i,t} = \log(\frac{P_{i,t}}{1-P_{i,t}})$ is a logit transformation of the probability that bank i during quarter t decides to tighten its corporate standards, $X_{i,t}^q$ is the q[th] control variable and B^q is the respective coefficient. I use the following set of controls: regulatory capital adequacy ratio,[2] short-term liquidity ratio (ratio of assets to liabilities with maturity of less than one year), real GDP growth, exchange rate change (positive values mean depreciation), interbank loan interest rates, and a dummy indicating whether BLS competition has led to tighter or looser credit standards. The fitted values from Model (1) are transformed into CSI.

The fitted values from the ordered logit model are not limited and can take any real number.Higher fit values indicate an increased probability of tightening credit standards. The Model also estimates the cut-off points, allowing for the classification of the fitted values into categories. As there are three categories, the model produced two cutting points. For easier interpretation, the fitted values are rescaled to range from 0 to 100 using min-max normalization. I further use these rescaled fitted values as the CSI.

In the **second step**, I use the CSI as a measure of the supply side of corporate lending while controlling for macro variables and bank characteristics. I start with a baseline model, which I then augment with a series of interactions between the variables. All interactions are demeaned so that the main effects can be interpreted at the mean of the interacted variable.

The dependent variable in the second step represents corporate lending. In Ukraine, gross loans cannot be used because the share of NPLs is high owing to previous crises, and gross loan stock is significantly driven by NPL workouts. Net loans are a better proxy but depend on provisions that vary based on macro conditions. Hence, I select the volumes of new corporate loans for all models. I estimate separate models for national and foreign currency loans. To control for

[2] Descriptions of all the variables are provided in Appendix A

inflation and devaluation, I take the volumes of corporate loans provided during the quarter in national and foreign currencies and adjust them to the cumulative change in inflation since 2007 and the exchange rate since 2014, when it became floating.[3]

The baseline model for the second step is the following panel fixed effects regression:

$$\log(\text{loans}_{i,t}) = control\ variables + \beta_7 \text{CSI}_{i,t-2} + \epsilon_{i,t} + constant + IF, \quad (2)$$

where $\text{loans}_{t,i}$ are adjusted volumes of new corporate loans in bank i in period t. Control variables are the short-term liquidity ratio, real GDP growth, new deposit interest rates, new corporate loan interest rates, total deposit growth, share of NPL in the loan portfolio, and bank fixed effects (IF). The variable $\text{CSI}_{i,t-2}$ is the normalized CSI from the first-step model. An exploratory analysis suggested using the second lag of CSI.

Usually, smaller banks tend to be more flexible than larger banks, which allows them to have looser credit standards and to approve loan applications faster. Therefore, I assume that the effect of a change in credit standards could vary depending on bank size. *The first augmented* model includes the interaction of CSI with bank size.

$$\log(\text{loans}_{i,t}) = control\ variables + \beta_7 \text{i}_{i,t-2} + \beta_8 \text{size}_{i,t} + \beta_9 \text{z}_{i,t-4} * size_{i,t} + \epsilon_{i,t} + constant + IF, \quad (3)$$

where $\text{size}_{i,t}$ is the share of net assets of bank i in the total net assets during period t.

Following the crisis in 2014–2015, corporate lending penetration was low, thus resulting in increased banks liquidity. In Ukraine, banks invest excess liquidity in government bonds and deposit certificates because of their low credit risk and attractive interest yields. Additionally, frequent crisis episodes have increased the government's demand for supplementary financial resources, prompting banks to accumulate government security portfolios. An adverse macro environment creates preconditions for the crowding-out effect; therefore, I test whether and how this effect influences corporate lending during normal and bad times. Consequently, in the *second augmented* model, I explore the effect of real GDP growth interaction on the share of government securities, controlling for periods of positive and negative real GDP growth:

$$\log(\text{loans}_{i,t}) = control\ variables + \beta_7 \text{i}_{i,t-2} + \beta_8 \text{share\_gov}_{i,t} + \beta_9 d_{i,t} * \text{share\_gov}_{i,t} * GR_t + \epsilon_{i,t} + constant + IF, \quad (4)$$

where $\text{share\_gov}_{i,t}$ is the share of government bonds and deposit certificates in the total assets, GR_t is real GDP growth, and $d_{i,t}$ is a dummy variable controlling for the periods of positive and negative real GDP growth (1 if real GDP growth>0, and 0 otherwise).

[3] The exchange rate was fixed before 2014 in Ukraine.

6. Results

6.1. First step

The results of the first step indicate that all the control variables, except for the capital adequacy ratio, are significant (Table 1). Faster economic growth and higher liquidity lead to easing credit standards, whereas elevated interbank loans interest rates and exchange rate depreciation stimulate tightening. According to the odds ratios, an additional percentage point in the interbank loan interest rate increases the probability of moving from easing credit standards to remaining unchanged or from remaining unchanged to tightening by 4.3%. An exchange rate depreciation of 1% increases the probability of such a move by 2.9%. By contrast, an increase of 1% in the short-term liquidity ratio increases the probability of banks losing credit standards by 0.7%. If real GDP increases by 1%, the probability increases by 3.2%. Additionally, bank competition leads to looser credit standards. If the bank indicates in the BLS that bank competition eases credit standards, then it will be in a category that loses standards, with a probability of 93.3%[4].

Table 1. Results of the ordered logit model in the first stage

Variables	**Ordered logit**	**Odds ratio**	**Pooled OLS**
	(1)	(2)	(3)
Interbank loans interest rates	0.042*	1.043*	0.012**
	(0.017)	(0.017)	(0.004)
Capital adequacy ratio$_{t-1}$	-0.003	0.997	-0.000
	(0.003)	(0.003)	(0.001)
Short term liquidity ratio$_{t-1}$	-0.007**	0.993**	-0.001*
	(0.003)	(0.003)	(0.001)
Real GDP growth$_{t-1}$	-0.032***	0.968***	-0.006**
	(0.010)	(0.009)	(0.002)
Exchange rate growth	0.029***	1.029***	0.007***
	(0.006)	(0.007)	(0.002)
Dummy competition led to CS tightening	0.593	1.809	0.128
	(0.349)	(0.631)	(0.082)
Dummy competition led to CS easing	-2.701***	0.067***	-0.607***
	(0.226)	(0.015)	(0.045)
Constant			-0.006**
			(0.002)
Cutting point$_1$	-0.399	-0.399	
	(0.802)	(0.802)	
Cutting point$_2$	3.587***	3.587***	
	(0.796)	(0.796)	
Sigma	0.271*	0.271*	
	(0.119)	(0.119)	
Observations	1174	1174	1174

Note: standard errors in parentheses; clustered on time.
*p<0.05; ** p<0.01; *** p<0.001

To analyze the change in credit standards for the system I aggregate the fitted values from the ordered logit model in the first step (Table 1, column 1). Aggregation (Figure 4) is conducted by averaging the fitted values and weighting them by each bank's net assets. The weighted average has a good ability to replicate aggregate BLS answers but now it has clear drivers. Aggregate indicator signals that banks in Ukraine tightened their lending standards during episodes of the economic crisis during 2014-2015 and 2022. The model suggests that banks generally did not ease their lending standards during most periods. Overall, the aggregated

[4] I also obtained the following cutting points: k1= -0.4 and k2 = 3.6. Assume that p is fitted values. If p<-0.4, then the bank eased its corporate lending standards, if -0.4<p<3.6, then it left standards unchanged, and if p>3.6, then the bank tightened its standards.

fitted values provide insight into the trends and patterns of lending standards in Ukraine over different periods, thus shedding light on the adjustments made by banks in response to economic conditions and external shocks.

Figure 4. Aggregated fitted values from the 1st stage Model weighted by the banks' assets and balance of answers regarding the question on corporate lending standards

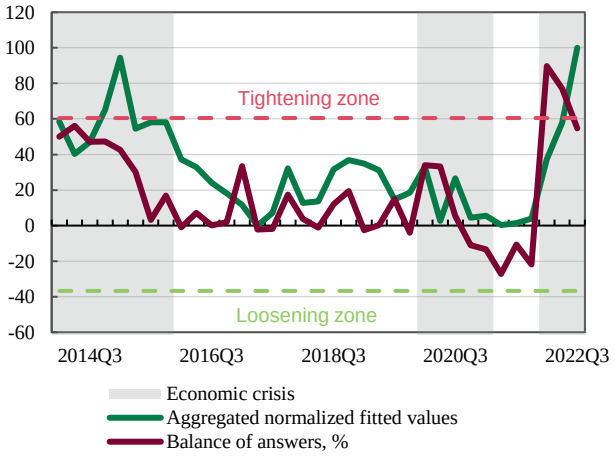


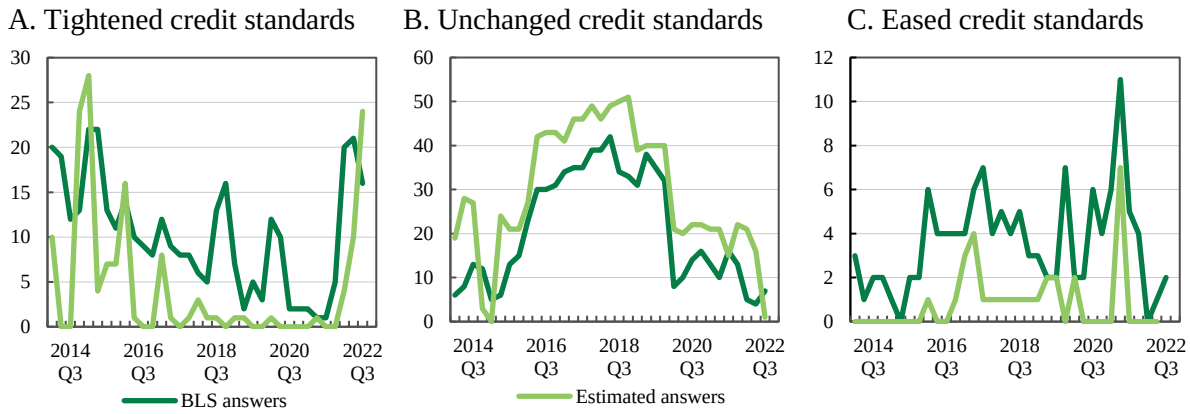
Table 2 reveals that the accuracy of the model is 63.3%. The model has a poor ability to categorize banks that have eased or tightened their lending standards. I assume that this problem may be due to uneven distribution of the BLS answers between categories. However, even if the model cannot clearly distinguish the change of the credit standards, I suggest using survey responses as dummies puts certain limitations. For instance, respondents signal only direction of credit standards change but there is no scale. Therefore, model is still useful since it can quantify the supply of the corporate loans.

Table 2. Accuracy of the 1st stage model

	Eased	**Unchanged**	**Tightened**	**Total**
	(1)	(2)	(3)	(4)
BLS answers	127	754	368	1249
BLS answers, % of total	10.2%	60.4%	29.5%	
Accuracy rate (% of right answers predicted by the model)	11.8%	89.3%	27.7%	63.3%

Using the fitted values from the model and estimated cut-off points, I determine the decision to change credit standards for each bank and every quarter. The results are compared with actual BLS answers (Figure 5). I conclude that the estimated answers follow the main trends of the actual BLS answers.

Figure 5. Number of banks that make respective decisions on credit standards according to the estimated Model results and actual BLS answers



6.2. Second step

Table 3 presents the results of the analysis based on corporate lending in national currency (columns 1–4) and foreign currency (columns 5–8). Columns (1) and (5) present the baseline models without CSI. Columns 2 and 6 use the answers from the BLS as dummy variables instead of the CSI. I use two dummies—one that takes the value of 1 for banks that eased their credit standards and the other that takes the value of 1 for banks that tightened their credit standards. Columns 3 and 7 present the CSI obtained in the first step. Finally, columns 4 and 8 contain both the CSI and the residuals obtained in step 1 (the residuals are orthogonal to the index). The residuals are computed from the OLS model in column 3 of Table 1.

The modeling results highlight several key relationships. Real GDP growth positively correlates with new corporate lending, thereby suggesting that higher GDP growth is associated with increased lending in both national and foreign currencies. For example, a 1% increase in real GDP is associated with a 1% increase in new corporate lending in the national currency and a 3% increase in the foreign currency. Conversely, higher NPL levels negatively affect new corporate lending. For instance, a 1% increase in the share of NPLs is linked to an approximately 0.2% decrease in national corporate lending and a 0.3% decrease in foreign currency lending.

Table 3. Results of baseline models

	National currency				Foreign currency			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
ΔDeposit interest rates	-0.017	-0.016	-0.010	-0.010	-0.035	-0.032	-0.032	-0.032
	(0.014)	(0.014)	(0.013)	(0.013)	(0.023)	(0.025)	(0.023)	(0.023)
ΔCorresponding currency loans interest rates	-0.021	-0.023	-0.021	-0.021	-0.107*	-0.112*	-0.066	-0.066
	(0.011)	(0.013)	(0.011)	(0.011)	(0.045)	(0.048)	(0.038)	(0.038)
Log(NPL)	-0.21***	-0.22***	-0.24***	-0.24***	-0.29***	-0.29***	-0.32***	-0.32***
	(0.032)	(0.032)	(0.030)	(0.030)	(0.050)	(0.051)	(0.058)	(0.059)
Short term liquidity ratio	0.002	0.001	0.001	0.001	0.004	0.003	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Real GDP growth	0.02***	0.01***	0.01***	0.01***	0.03***	0.02**	0.03***	0.03***
	(0.003)	(0.004)	(0.004)	(0.004)	(0.007)	(0.007)	(0.008)	(0.009)
Deposits growth	-0.000	-0.000	0.000	0.000	0.002	0.002	0.002	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.002)	(0.002)
CSI_{t-2}			-0.007***	-0.007***			-0.007	-0.007
			(0.002)	(0.002)			(0.004)	(0.004)
BLS dummy indicating CS $tightening_{t-1}$		-0.082				-0.281*		
		(0.077)				(0.114)		
BLS dummy indicating CS $easening_{t-1}$		0.162**				0.048		
		(0.061)				(0.108)		
OLS residuals from 1^{st} $step_{t-2}$				0.004				0.000
				(0.054)				(0.111)
Constant	-1.12***	-2.31***	-0.79***	-0.79***	-2.9***	-3.97***	-2.54***	-2.54***
	(0.083)	(0.536)	(0.112)	(0.111)	(0.140)	(0.497)	(0.252)	(0.250)
Bank fixed effects	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Observations	*956*	*956*	*905*	*905*	*927*	*927*	*878*	*878*

Note: Standard errors in parentheses; clustered on time
*p<0.05; ** p<0.01; *** p<0.001

The effect of CSI is significant only for national currency loans. Specifically, an additional unit increase in CSI decreases the volume of new corporate loans in the national currency by 0.7% starting to be material from the second quarter. Using dummy variables from the BLS, I find that when banks indicate a decision to tighten their credit standards in the BLS, it leads to a 28.1% decrease in new corporate loans in foreign currency. However, when banks decide to ease their credit standards, new corporate loans in the national currency increase by 16.2%. Since dummies are limited by two numbers and do not have magnitude, those effects has very wide 95% confidence intervals and cannot be used in practice. To check for endogeneity, I include residuals from the first-step OLS model (Table 1, column 3) in the CSI model. These residuals are orthogonal to the CSI. Thus, the insignificant coefficient of the residuals (Table 2, columns 4 and 8) indicates that only the credit standard component mediated by the variables included in the first step matters for new corporate lending.

Table 4 presents the results of the augmented models for new corporate lending in national (columns 1 and 2) and foreign currencies (columns 3 and 4). In columns 1 and 3, the model includes an interaction term between the CSI and bank size. Columns 2 and 4 show the models with the interaction between real GDP growth and the share of government securities.

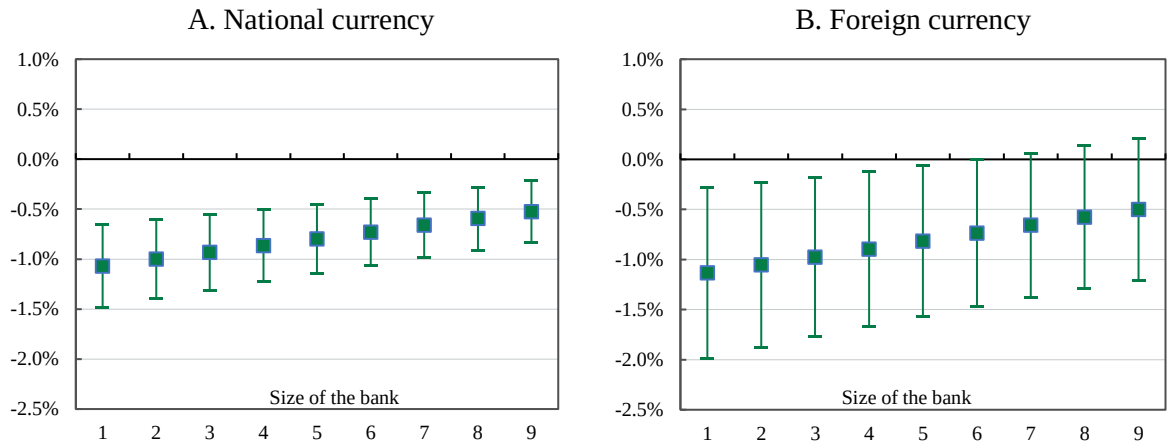
Table 4. Results of benchmark models

	National currency		Foreign currency	
	(1)	(2)	(3)	(4)
ΔDeposit interest rates	-0.005	-0.008	-0.028	-0.027
	(0.013)	(0.012)	(0.023)	(0.022)
ΔCorresponding currency loans interest rates	-0.021	-0.021	-0.066	-0.068
	(0.011)	(0.011)	(0.038)	(0.037)
Log(NPL)	-0.242***	-0.249***	-0.308***	-0.331***
	(0.029)	(0.033)	(0.056)	(0.059)
Short term liquidity ratio	0.001	0.001	0.003	0.003
	(0.002)	(0.002)	(0.002)	(0.002)
Real GDP growth	0.016***	0.014**	0.032***	0.030***
	(0.004)	(0.004)	(0.008)	(0.008)
Deposits growth	0.000	0.001	0.002	0.002
	(0.001)	(0.001)	(0.002)	(0.002)
CSI_{t-2}	-0.008***	-0.007***	-0.008*	-0.007
	(0.002)	(0.002)	(0.004)	(0.004)
Size of the bank	-0.097***		-0.085*	
	(0.017)		(0.033)	
CSI_{t-2}# size of the bank	0.001***		0.001*	
	(0.000)		(0.000)	
Share of gov. securities		-0.005		-0.003
		(0.007)		(0.008)
Real GDP growth<0# share of gov. securities		-0.001***		-0.001**
		(0.000)		(0.000)
Real GDP growth>0# share of gov. securities		-0.000		0.002
		(0.001)		(0.002)
Constant	-0.675***	-0.789***	-2.421***	-2.557***
	(0.106)	(0.114)	(0.242)	(0.260)
Individual fixed effects	*Yes*	*Yes*	*Yes*	*Yes*
Observations	*905*	*905*	*878*	*878*

Note: Standard errors in parentheses; clustered on time
*p<0.05; ** p<0.01; *** p<0.001

The results in Table 4 corroborate those in Table 3 and indicate that all the interaction terms included in the benchmark models are significant. Additionally, given the significant negative dependence between credit standard tightening and new corporate lending, I find that bank size matters, with the effect for credit standards change being stronger for small banks. For small banks, the CSI has a negative impact on corporate loans in both national (Figure 6A) and foreign currencies (Figure 6B). An additional 1% increase in bank size enhances the CSI effect by 0.08% for foreign currency loans and 0.07% for national currency loans.

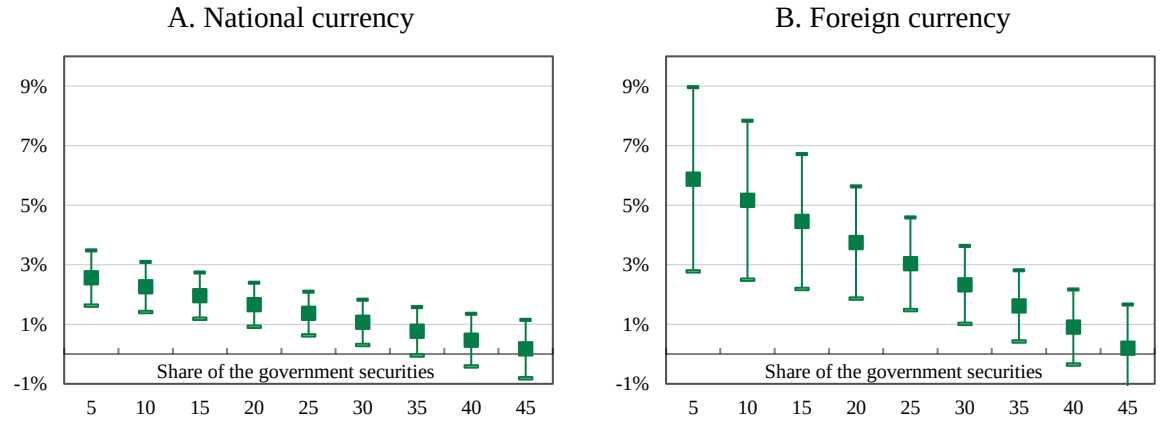
Figure 6. Marginal effects of credit standards tightening on new corporate lending depending on the size of the bank (measured as banks' share in total net assets, %)



Note: whiskers indicate a 95% confidence interval.

From Table 4, we can conclude that the real GDP growth interaction with the share of government securities is significant only during periods of negative real GDP growth. The positive correlation between GDP growth and new corporate lending is weaker for banks with a higher share of government securities in their assets (see Figure 7). During an economic decline, interest rates for risk-free assets increase. Therefore, a high share of government securities in the portfolio provides banks with increased interest income and protects their ability to loan corporations.

Figure 7. Marginal effects of real GDP growth on new corporate lending depending on the share of government securities (government bonds and deposit certificates) in total assets



Note: whiskers indicate a 95% confidence interval.

7. Conclusion

This study examined the determinants of Ukrainian banks' new corporate lending practices. The use of unbalanced panel data from the 4th quarter of 2013 to the 3rd quarter of 2022 shows that positive real GDP growth, bank competition, and higher liquidity lead to looser credit standards, whereas higher interest rates and exchange rate depreciation to stricter. Tightening credit standards decrease national currency corporate lending in half a year, and smaller banks experience a stronger effect in comparison with larger banks. A higher share of NPL reduces loans in both national and foreign currencies. Real GDP growth positively correlates with new corporate loans in both national and foreign currencies. The effect of negative economic activity on loans in both national and foreign currencies is weaker for banks with a higher share of government securities.

Usually supply factors of corporate lending are latent and unobservable. The study helps to quantify the supply for business loans. Moreover, in this paper I explored factors determining corporate lending development in Ukraine.

I suggest current study has still a potential to reveal more results by using other methodologies. Papers on credit growth determinants also implement time series models applying aggregated data. However, availability of the data on the bank-level allows to use, for instance, local projection method giving comparable results.

Appendices

Appendix A. Summary statistics

Variable	Description	Data structure	Obs	Mean	Std.	Min	Max
Capital adequacy	Capital adequacy ratio, %	Bank-level	1,249	28.2	31.1	1.3	416.1
Liquidity	Short-term liquidity ratio, %	Bank-level	1,249	100.6	36.1	46.1	358.9
Inflation	CPI change, y-o-y, %	Macro	1,249	14.6	12.4	0.5	57.7
Exchange rate	Average exchange rate, UAH/USD	Macro	1,249	24.9	5.2	8.0	36.6
Economic activity	Real GDP growth, y-o-y, %	Macro	1,249	-1.9	10.5	-46.5	7.8
Interbank Interest rates	Average quarterly interest rates on new interbank loans, %	Macro	1,249	13.7	4.4	5.4	23.3
Real corporate loans in foreign currency	Adjusted on exchange new corporate loans in foreign currency, bln. UAH	Bank-level	1,249	0.8	2.5	0.0	26.3
Real corporate loans in national currency	Adjusted on inflation new corporate loans in national currency, bln. UAH	Bank-level	1,249	2.2	4.8	0.0	38.6
Deposit interest rates	Quarterly averaged new deposits interest rates, %	Bank-level	1,249	9.9	3.6	0.0	22.0
National currency loans interest rates	Quarterly averaged new national currency loans interest rates, %	Bank-level	1,249	19.3	4.5	5.4	48.0
Foreign currency loans interest rates	Quarterly averaged new foreign currency loans interest rates, %	Bank-level	1,249	10.0	5.5	1.1	48.0
NPL level	Share of the non-performing loans in total portfolio, %	Bank-level	1,249	26.4	38.7	0.0	862.1
Deposits	Total deposits growth, %	Bank-level	1,249	22.1	45.9	-78.1	660.5
Share of government securities	Share of government bonds and deposit certificates in total assets, %	Bank-level	1,249	16.2	13.6	0.0	76.6
Size of the banks	Share of the net assets in total, %	Bank-level	1,249	2.8	5.0	0.0	27.3

*Note: The NBU ended the transition from a short-term liquidity ratio to more complex indicators (net stable funding ratio and liquidity coverage ratio (NSFR)) in 2022 and stopped calculating the short-term liquidity ratio. Therefore, I approximated the short-term liquidity ratio to the change in the NSFR during 2022.

References

Altavilla, Carlo, Matthieu Darracq Pariès, and Giulio Nicoletti. 2019. "Loan Supply, Credit Markets and the Euro Area Financial Crisis." *Journal of Banking & Finance* 109 (December): 105658. https://doi.org/10.1016/j.jbankfin.2019.105658.

Bassett, William F., Mary Beth Chosak, John C. Driscoll, and Egon Zakrajšek. 2014a. "Changes in Bank Lending Standards and the Macroeconomy." *Journal of Monetary Economics* 62 (March): 23–40. https://doi.org/10.1016/j.jmoneco.2013.12.005.

Bondt, Gabe de, Angela Maddaloni, Jose-Luis Peydro, and Silvia Scopel. 2010. "The Euro Area Bank Lending Survey Matters: Empirical Evidence for Credit and Output Growth." *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1551879.

Ciccarelli, Matteo, Angela Maddaloni, and Jose-Luis Peydro. 2013. "Heterogeneous Transmission Mechanism: Monetary Policy and Financial Fragility in the Euro Area." *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2233313.

Ciccarelli, Matteo, Angela Maddaloni, and José-Luis Peydró. 2015. "Trusting the Bankers: A New Look at the Credit Channel of Monetary Policy." *Review of Economic Dynamics* 18 (4): 979–1002. https://doi.org/10.1016/j.red.2014.11.002.

Hempell, Hannah Sabine, and Christoffer Kok. 2010. "The Impact of Supply Constraints on Bank Lending in the Euro Area - Crisis Induced Crunching?" *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.1698040.

Huang, Yi, Marco Pagano, and Ugo Panizza. 2020. "Local Crowding-Out in China." *The Journal of Finance* 75 (6): 2855–98. https://doi.org/10.1111/jofi.12966.

Lown, Cara, and Donald P. Morgan. 2006. "The Credit Cycle and the Business Cycle: New Findings Using the Loan Officer Opinion Survey." *Journal of Money, Credit and Banking* 38 (6): 1575–97.

Morais, Bernardo, Javier Perez-Estrada, José Luis Peydró, and Claudia Ruiz-Ortega. 2021. "Expansionary Austerity: Reallocating Credit Amid Fiscal Consolidation." *CEPR Discussion Papers*, CEPR Discussion Papers, September. https://ideas.repec.org//p/cpr/ceprdp/16511.html.

Pinardon-Touati, Noemie. 2022. 'The Crowding Out Effect of Local Government Debt: Micro- and Macro-Estimates', February. https://npinardontouati.github.io/files/JMP_PinardonTouati.pdf.

Pintaric, Martin. 2016. "What Is the Effect of Credit Standards and Credit Demand on Loan Growth? Evidence from the Croatian Bank Lending Survey." *Comparative Economic Studies* 58 (3): 335–58. https://doi.org/10.1057/s41294-016-0004-2.

Wosko, Zuzanna. 2015. "Modelling Credit Growth in Commercial Banks with the Use of Data From Senior Loan Officers Opinion Survey." *SSRN Electronic Journal*. https://doi.org/10.2139/ssrn.2671197.