On the Factors Driving Bank Lending Standards: Global Evidence from Bank Lending Surveys*

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Abstract

Using a newly available dataset of bank lending surveys for 33 countries, this paper examines the factors driving bank lending standards in a unified empirical framework. We find that the balance sheet, competition, and risk perception factors all significantly influence bank lending standards. In addition, we demonstrate that competition is more relevant for easing of lending standards, while collateral and borrower risk are more relevant for tightening of lending standards.

JEL Classifications: G21; E43; E52

Keywords: Bank lending survey; Bank lending standards; Bank risk-taking

1 Introduction

Financial systems are prone to instability (Minsky, 1977; Figueroa and Leukhina, 2018). The 2008 global financial crisis offered an recent example showing that excessive risk-taking by banks is a main cause of financial turmoil (Acharya and Naqvi, 2012; Diamond and Rajan, 2009). Given the potentially significant economic costs of excessive risk-taking in the banking sector, it is crucial to better understand the factors driving bank risk-taking behavior.

There is by far a large literature on bank risk taking, both theoretical and empirical, covering factors such as interest rates and monetary policy (Delis and Kouretas, 2011; Neuenkirch and Nöckel, 2018; Borio and Zhu, 2012), bank capital and regulation (Salas and Saurina, 2003; Konishi and Yasuda, 2004; Gonzalez, 2005), bank competition (Jiménez et al., 2013; Boyd and De Nicolo, 2005), liquidity (Acharya and Naqvi, 2012; Wagner, 2007; Khan et al., 2017), etc. Different from most studies that focus on exploring the impact of a certain factor on bank risk taking, we systematically examine a set of factors driving bank lending standards using a newly available cross-country dataset of bank lending surveys (BLS), and evaluate the importance of the factors in a unified empirical framework.

The literature has offered numerous bank risk-taking indicators such as the non-performing loans ratio, risk weighted assets ratio, Z-score, and so on (Delis and Kouretas, 2011; Houston et al., 2010; Laeven and Levine, 2009; Mourouzidou-Damtsa et al., 2019). Different from the literature, we focus on the bank lending standards contained in the bank lending surveys. This measure has several advantages: Frist, the bank's credit policy, particularly its lending standard, is conceptually a superior measure of *ex ante* risk-taking behavior. In practice, it is difficult to obtain data on the lending standards applied to a pool of potential borrowers at individual bank level, and even more difficult to get information on

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why banks change their lending standards. The adoptions of bank lending surveys conducted by the central banks across the globe in recent years offer an opportunity to circumvent this data limitation. Lending standards in BLS are direct measures of the bank's willingness to lend and have been used to measure credit supply shocks in the emerging literature (Del Giovane et al., 2011; Ciccarelli et al., 2015; Chen et al., 2021). In an influential paper, Maddaloni and Peydró (2011) use BLS data from the Euro-area and the U.S to measure bank risk-taking and find low short-term interest rates soften lending standards. Second, BLS in many countries provide information not only on the lending standards, but also on the reasons for the changes in lending standards, which makes possible a unified investigation on the drivers of bank lending standards.

Using the BLS data of 33 countries from 2000 to 2022, we demonstrate that balance sheet factors, competition factors, and banks' risk perception factors all significantly drive bank risk-taking as reflected in the lending standards. Moreover, competition becomes more important for the easing of lending standards, which echos a long tradition in the theoretical literature of bank risk-taking (Chan et al., 1986; Keeley, 1990). Meanwhile, concerns about collateral and borrower risk play the main role in the tightening of lending standards.

The remainder of this paper is organized as follows. Section 2 presents the data and empirical methodology. Section 3 summarizes the empirical findings. Section 4 concludes.

2 Data and empirical methodology

Our initial sample covers 44 countries where BLS is available. This dataset is manually collected by Liu and Zhao (2022), which also provide country specific data sources and construction methods. Due to lack of information on factors driving lending standards for some countries, our final sample covers 33 countries from 2000 to 2022 at quarterly frequency. We obtain remaining macroeconomic indicators from standard database such as CEIC, OECD, etc., except for the shadow short rate (SSR), which we obtain from Krippner (2020).[1]

We use the lending standards in BLS as a proxy for bank risk taking.[2] The indicator is measured as the net percentage of banks reporting tightening lending standards compared with the previous quarter in a country.[3] We include all 9 driving factors provided in BLS, namely the capital position (CP), liquidity position (LP), market finance (MF), bank competition (BC), non-bank competition (NC), market competition (MC), economic outlook (EO), borrower risk (BR), and collateral risk (CR).[4] These 9 factors can be divided into three categories: balance sheet factors (CP, LP and MF), competition factors (BC, NC and MC) and banks' risk perception factors (EO, BR and CR). We also control for macroeconomic and monetary policy variables. Detailed definitions of the variables are provided in Table A.1 in Appendix.

Table 1 summarizes the descriptive statistics. The mean values of the three risk perception factors (EO, BR and CR) are all positive, implying a contribution to the tightening of lending standards on average. Conversely, the mean values of competition factors (BC, NC, and MC) are all negative, especially bank competition (−9.84), indicating the pressure from competition is likely to associate with easing of lending

[1]Due to the prevalence of zero lower-bound constraints on short-term policy rates in our sample period, we adopt the shadow short rate as the main measure of monetary policy following Wu and Xia (2016). Krippner (2020) provides an improved measure with better coverage across countries.

[2]Although BLS reports lending standards both for the non-financial corporate sector and household sector, a consensus in the literature is that the former measure is the most informative (Lown and Morgan, 2006; Ciccarelli et al., 2015).

[3]The original responses of a bank participating the survey is 1 for tightening, 0 for no change, and −1 for easing, all relative to the previous quarter. Aggregating all responses results in a net percentage indicator. Note that no individual bank level response is disclosed in the survey, and the central banks conducting the survey only report the aggregate response.

[4]Each factor is measured as follows: when a bank reports that factor X is important for tightening of lending standards, it is rated by 1; when not important, it is rated by 0; and when X is important for easing of lending standards, it is rated by −1. Again, the survey only reports the aggregate measure across banks.

standards.

Table 1: Descriptive statistics

Variable	Symbol	# Obs. N	# countries N_g	Mean	Std.	Min	Max
Lending standards	*Standard*	2,979	44	5.543	20.89	-92.40	100.00
Capital position	CP	1,927	32	5.303	12.74	-34.20	80.00
Liquidity position	LP	1,949	32	-0.264	15.85	-66.20	80.00
Market finance	MF	1,514	24	2.868	14.81	-66.00	87.50
Bank competition	BC	1,671	26	-9.838	16.64	-95.60	60.00
Non-bank competition	NC	1,435	22	-1.079	6.566	-66.67	40.00
Market competition	MC	1,443	21	-1.307	7.449	-40.00	40.90
Economic outlook	EO	2,150	35	11.78	26.86	-85.60	100.00
Borrower risk	BR	2,199	36	14.02	24.68	-91.90	100.00
Collateral risk	CR	1,528	24	9.767	18.17	-72.10	100.00
GDP growth rate	ΔGDP	2,977	44	2.614	5.180	-22.63	53.65
Inflation rate	CPI	2,954	44	2.973	4.946	-6.128	81.10
Shadow short rate	SSR	2,856	44	1.863	5.002	-5.648	74.01
Long-term interest rate	LR	2,675	40	3.586	2.964	-0.542	26.39

Notes: all indicators are measured in percentage points.

We use the following panel regression model to quantify the relationship between bank lending standards and all the factors in a unified manner:

$$Standard_{it} = \sum_j \beta_j Factor_{jit} + \gamma Controls_{it} + \mu_t + \mu_i + \epsilon_{it}, \tag{1}$$

where i and t denote country and quarter. A positive *Standard* suggests that lending standards tightened compared with the previous quarter, with larger values indicating stronger tightening. The explanatory variables of interest are $Factor_{jit}$, which includes CP, LP, MF, BC, NC, MC, EO, BR and CR. A positive and significant coefficient suggests that the factor is important for driving the lending standards. $Controls_{i,t}$ includes the real GDP growth rate, inflation rate, shadow short rate, and long-term interest rate. μ_t and μ_i denote time and country fixed effects. Standard errors are clustered at the country level.

3 Main Results

Table 2 presents our baseline results. Column (1)–(5) reports OLS estimations, and column (6) reports a dynamic panel specification estimated by GMM method. We start with two factors, the economic outlook and borrower risk, in column (1), which results in a sample of 33 countries. We then include more factors into the regression according to sample coverage of factors in column (2)–(4), resulting in a sample of 18 countries with available data for all 9 factors. Overall, the results indicate that all three categories of factors, the risk perception, balance sheet constraint, and competition, contribute considerably in explaining the changes in bank lending standards. Across all the specifications in column (1)–(4), the adjusted (within) R^2 ranges from 69.5% to 74.0%, indicating that the factors provided in the BLS data contain significant explanatory power for the variations in lending standards. Furthermore, after controlling the typical macro variables in column (5), the R^2 only increases marginally from 74% to 75.6%, while the point estimates and significance levels for each factor remain mostly unchanged. Lastly, as a robustness test of the dynamic effect in the dependent variable *Standard*, we include the lagged variable into the regression and use standard GMM method to estimate the regression. Column (6) indicates that there is indeed some mild dynamic effect in *Standard* as evidenced by a significant coefficient on the lagged variable. Yet the magnitude is limited, and more importantly, the estimates and the significance levels of the 9 factors remain largely the same.

To assess the economic significance of the factors, we follow the methodology of Mitton (2022) by calculating the ratio of marginally explained variation of one factor (multiplying the coefficient with the standard deviation of the factor) to the standard deviation of the dependent variable *Standard*. The results suggest that the economic outlook, borrower risk, collateral risk, liquidity position, and bank competition are the top 5 economically important factors for the changes in lending standards.[5]

Identifying the driving factors of banks' easing and tightening of lending standards respectively helps understand better banks' risk-taking behavior. We first present the t-test results for the relative importance of factors in Table 3, conditioning on easing and tightening of lending standards for a given country and quarter.[6] Consistent with the design of the surveys, all factors are regarded as important drivers of lending standards by participating banks. In addition, column (7) reports the differences in mean scores of the factors conditional on easing and tightening of lending standards. The results show a clear pattern of asymmetries across factors, with competition factors (especially BC) being more important in explaining the relaxation of bank lending standards, while risk perception factors (EO, BR and CR) contributing more for the tightening of lending standards. Further, we present the subsample regression results for easing and tightening of lending standards respectively in Table 4. The results are consistent with t-test results. We find that balance sheet factors, particularly liquidity position, play an important role in both easing and tightening of lending standards. The competition factors are significant for lending standards easing, which is consistent with the seminal "competition–fragility" view (Keeley, 1990; Jiménez et al., 2013). Lastly, risk perception factors are more important in explaining standards tightening.[7]

4 Conclusion

This paper studies the bank risk-taking behavior, characterized by its lending standards in particular, and the driving factors, by exploiting the information of a newly available cross country dataset of bank lending surveys. We find robust evidence that balance sheet factors, competition factors and risk perception factors are all significant drivers of bank risk-taking, both statistically and economically. In addition, we find that competition is the main driver for banks to relax lending standards, hence take more risks, while risk-perception factors, particularly borrower and collateral risk, play larger role for the tightening of lending standards. Our study contributes to the understanding of the risk-taking behavior of banks, and also illustrates that there is considerable information content in the bank lending surveys with potentially significant implications for both monetary policy and macro-prudential regulations.

[5]The economic significance of the above top 5 economically important factors is 0.279 (EO), 0.227 (BR), 0.213 (CR), 0.178 (LP), and 0.160 (BC) respectively.

[6]A positive value of the factor means that it contributes to lending standards tightening, while a negative value means the opposite. In order to better compare the relative importance of each factor when lending standards are relaxed/tightened, we take the absolute value of each factor and then conduct the t-test.

[7]The above conclusions are still valid after only using the net percentage indicator and deleting the 2008–2009 sample to eliminate the impact of the financial crisis.

Table 2: Baseline results

	(1) OLS	(2) OLS	(3) OLS	(4) OLS	(5) OLS	(6) GMM
Economic outlook	0.317***	0.238***	0.211***	0.186***	0.217***	0.181***
	(6.08)	(5.29)	(4.33)	(4.00)	(3.44)	(3.22)
Borrower risk	0.344***	0.288***	0.236***	0.254***	0.192***	0.138***
	(7.78)	(7.72)	(5.82)	(6.08)	(3.23)	(2.26)
Capital position		0.150***	0.113***	0.0774*	0.0974*	0.0493
		(4.34)	(3.56)	(1.89)	(2.04)	(0.80)
Liquidity position		0.301***	0.286***	0.227***	0.235***	0.259***
		(6.17)	(5.21)	(6.13)	(5.00)	(5.11)
Bank competition			0.190***	0.205***	0.201***	0.246***
			(4.60)	(4.97)	(4.70)	(3.73)
Collateral risk			0.161**	0.203***	0.245***	0.218***
			(2.80)	(3.84)	(4.44)	(3.75)
Market finance				0.103	0.163**	0.191***
				(1.29)	(2.43)	(3.02)
Non-bank competition				-0.0919	-0.0221	-0.0760
				(-0.66)	(-0.16)	(-0.53)
Market competition				-0.0355	0.0509	0.102
				(-0.46)	(0.64)	(1.18)
ΔGDP					0.175	-0.132
					(0.99)	(-0.50)
CPI					0.0976*	-0.00779
					(1.87)	(-0.09)
SSR					0.0624	0.903
					(0.44)	(1.60)
LR					-0.466**	-1.298*
					(-2.13)	(-1.90)
$Standard_{t-1}$						0.161***
						(4.24)
Country & time f.e.	Yes	Yes	Yes	Yes	Yes	Yes
Sargan p-value						0.518
AR (2) p-value						0.666
N	2038	1680	1380	1213	1082	1068
N_g	33	27	21	18	17	17
adj. R^2	0.695	0.725	0.732	0.740	0.756	

Notes: Standard errors are clustered at the country level, t-value in the parenthesis, and ***, **, * indicate significance levels at 1%, 5%, and 10% respectively.

Table 3: t-test for relative importance of factors

Factor	Easing			tightening			Easing − tightening	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	N	Mean	t-value	N	Mean	t-value	Diff	t-value
Capital position	490	4.673***	16.978	951	11.711***	25.744	-7.038***	-10.601
Liquidity position	503	10.404***	18.922	986	11.202***	24.632	-0.798	-1.067
Market finance	358	6.747***	11.897	731	11.087***	18.817	-4.340***	-4.663
Bank competition	444	21.156***	23.696	790	8.248***	19.431	12.909***	14.726
Non-bank competition	387	4.262***	10.295	635	2.122***	9.492	2.140***	4.955
Market competition	410	4.580***	12.296	644	3.476***	12.185	1.104**	2.375
Economic outlook	645	13.046***	22.348	1028	29.312***	37.692	-16.266***	-14.988
Borrower risk	667	10.228***	21.250	1047	28.725***	37.526	-18.497***	-17.903
Collateral risk	330	6.586***	10.552	771	18.448***	25.413	-11.863***	-10.032

Table 4: Subsample results on easing and tightening of lending standards

	(1) Conditional on easing	(2) Conditional on tightening
Capital position	-0.136	0.0782
	(-0.97)	(1.33)
Liquidity position	0.220***	0.268***
	(3.22)	(5.24)
Market finance	0.185*	0.178*
	(1.89)	(2.09)
Bank competition	0.203***	0.0656
	(5.83)	(0.79)
Non-bank competition	-0.00143	-0.140
	(-0.01)	(-0.93)
Market competition	0.211**	-0.0191
	(2.51)	(-0.16)
Economic outlook	0.0822**	0.242***
	(2.26)	(3.45)
Borrower risk	0.0924	0.113*
	(1.49)	(1.83)
Collateral risk	-0.00688	0.136**
	(-0.10)	(2.83)
DGDP	0.526**	-0.0219
	(2.32)	(-0.09)
CPI	0.559	0.168*
	(0.66)	(1.85)
SSR	1.117*	-1.099***
	(2.06)	(-3.00)
LR	-1.186	-0.271
	(-0.97)	(-0.77)
Country & time f.e.	Yes	Yes
N	219	487
adj. R^2	0.567	0.711

Notes: Standard errors are clustered at the country level, t-value in the parenthesis, and ***, **, * indicate significance levels at 1%, 5%, and 10% respectively.

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Appendix

Table A.1: Variable definitions

Variables	Question in BLS	Method of calculation
Measures of bank risk taking		
Standard	Over the past three months, how have your bank's credit standards as applied to the approval of loans or credit lines to enterprises changed? Please note that we are asking about the change in credit standards, rather than about their level.	(#Tightened − #Eeased)/#Banks ∗ 100; Liu and Zhao (2022)
Measures of driving factors		
CP, LP, MF, BC, NC, MC, EO, BR, CR	Over the past three months, how have the following factors affected your bank's credit standards as applied to the approval of loans or credit lines to enterprises?	(#Contributed to tightening of Standard − #contributed to easing of Standard)/#Banks ∗ 100; Liu and Zhao (2022)
Variables	Definitions	Source
Control Variables		
ΔGDP	Real GDP growth	CEIC, OECD
CPI	Inflation	CEIC
SSR	Shadow short-term interest rate	CEIC, Krippner (2020)
LR	Long-term interest rate, proxied by the 10-year treasury rate	CEIC, Central banks