BANK RISK AND LENDING: THE IMPACT OF OWNERSHIP

by

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Abstract

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Using data on all Ukrainian banks for the period 2003 – 2006 study exemines the effect of ownership on bank risk and lending. The assumprion about the endogeneity of bank lending and bank risk is rejected, while risk-taking and ownership concentration are jointly determined. I find that ownerhsip concentration and business group participation are able to induce bank risk. My findings are in line with Zeitun and Tian (2007) who argue that banks with concentrated ownership take higher risk if large shareholders pursue their own financial interests.

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Chapter 1

INTRODUCTION

There is some evidence that banks may change their ownership structure under financial constraints. Recent financial crisis has caused several collapses of Ukrainian banks, which had lacked the appropriate liquidity and financing. Small, private-owned and communal banks (e.g. bank Kyiv, Odesa-bank) have appeared to be very sensitive to external shocks, while the banks with financial support of capital providers (e. g. SEB-bank), such as foreign parent bank or government, have been passing through the crisis period comparatively easy. For instance, several banks have been refinanced and have turned to receive funds through state ownership, Ukrhazbank, Rodovidbank, bank Kyiv among others. Other financial institutions seek for recapitalization and exert all efforts to change owner in order to get additional financial resources. For example, Prominvestbank has avoided bankruptcy as it had been acquired by a foreign bank (Vnieshekonombank, Russia).

It is reasonable to expect that the performance of a bank is affected by its ownership structure or origin of capital (foreign or domestic, state-owned or private-owned). For instance, Bonin et al. (2004) find that foreign banks are more cost-efficient than domestic banks in transition countries. Moreover, the presence of foreign ownership opens access to cheaper foreign resources and ability to offer these resources in local markets at a cost lower than that of its domestic peers. This makes foreign banks more competitive.

Considering the state-owned vs. privately owned banks, there can be both positive and negative effects of the state ownership. State-owned banks may gain from their status by receiving from central bank loans at lower rate. However, if a bank is enrolled in some government program it can be restricted in terms of its ability to increase revenue and also may lead to higher risk-takin (for example, banks that according to government program give loans to agriculture firms may receive lower profit and take higher risk than those investing in other sectors of economy).

The financial and economic literature pays considerable attention to the problem of how the origin of capital influences bank performance. In particular, Berger et al. (2005) find that the state-owned banks demonstrate poor long-term performance comparing with domestic and foreign banks. Choi and Hasan (2005) test whether the involvement of foreign investors in the ownership structure affects banks' return and risk measures. Their evidence indicates that the extent of the foreign ownership has positive association with the bank return and has negative impact on the bank risk.

Additionally, the performance of banks may be significantly influenced by the ownership concentration and managerial incentives. The peer monitoring theory suggests that banks with higher concentration of ownership may have lower costs of monitoring their managers because managers monitor each other, which imply lower risk (Stiglitz J. E., 1990).

Bank's performance also could depend on its affiliation with business group. For example, in business group the bank may use firms' financial resources to increase its own liquidity (firms hold their money on deposit accounts exclusively

in this bank), or firms can use the bank to get loans with better conditions (lower interest rate, longer maturity etc.).

Academics usually keep their attention on impact of business group affiliation on firm performance, and performance of banks within business group is still underexplored. Baum et al. (2008) examine the effect of political patronage on banks' behavior in Ukraine. They identify that affiliated banks are more likely to have higher capitalization level with a lower value of interest rate margin (imply lower risk taking). Moreover, Perotti and Gelfer (1999) study the impact of business groups on the allocation of capital and argue that bank may use profitable firms as "cash-cows."

In Ukraine the business groups' activity is still obscure because statistics indicate different roles of banks within financial-industrial groups. For example, Finance and Credit bank (affiliated with "Finance and Credit" corporate group) has faced serious liquidity problems during the beginning of crisis in 2008 and was forced to ask for financial support or restructuring, while similar financial embarrassments have been resolved by Privatebank (affiliated with "Private" corporate group) comparatively easily (Epravda, 2009).

This study aims to test the effect of ownership on bank lending and risk. Note, I exclude from our interest state-owned banks because there are only three state banks and their ownership structure was unchanged during the period of the research. Therefore, I keep aside the investigation of the impact of state ownership on the bank risk and lending.

As the existing empirical studies partially neglect the examination of ownership impact on bank risk and lending in transition due to the lack of appropriate data,

the goal of my paper is to fill this gap in the related literature. In this study 2SLS and OLS with fixed effects for panel data approaches are utilized to analyze the influence of ownership on bank risk and lending. The data sample covers a period from 2003 to 2006 (on the yearly basis) and is mainly collected from official sites of the National Bank of Ukraine (NBU), the Ukrainian Association of Banks, and the State Commission on Securities and Stock Market.

Chapter 2 discloses the main theoretical aspects of the impact of ownership on bank risk and lending. First part of chapter 2 highlights the influence of ownership on bank risk, while the second part studies how ownership affects bank lending. Chapter 3 describes the data and present the econometric methodology used in the study. The main results are discussed in chapter 4. Finally, chapter 5 sets up my conclusions.

Chapter 2

LITERATURE REVIEW

The differences in bank risk taking can be influenced by various types of bank ownership. The existing theoretical and empirical studies focus on four main aspects of the effect of ownership on bank performance: (i) the impact of ownership structure[1] (shareholder vs. managerial ownership), (ii) the impact of foreign ownership (foreign vs. domestic banks), and (iii) the influence of affiliation of bank with a business group.

2.1. The Impact of Ownership on Bank Risk

Research of bank performance should always account of risk to avoid misleading conclusions. For example, the evidence of Leightner and Lovell (1997) about unusual level of success of the banking system on the basis of high growth loan rate seems to be dubious. Besides, Hao et al. (1999) argue that banks with faster growth rates of loans are more efficient. Thus, it's possible to deduce about increase in loans generating but not about surge in bank efficiency.

The riskiness of bank performance highly depends on capability of shareholders to monitor their managers. The wide dispersion of ownership leads to free-riding problem[2] between shareholders and this may induce managers to take high risk. Banks increase control over managers' risk-aversion by raising the concentration

[1] The ownership structure is usually analyzed using the value of ownership concentration, which indicates the strength of supervision that bank's shareholders have.
[2] Shareholders have fewer incentives to control managers' behavior.

of ownership, which may reduce the problem. A significant number of empirical works has gone into studding the effect of ownership concentration on bank risk taking. Iannotta et al. (2006) argue that banks with higher ownership concentration have lower asset risk and lower insolvency risk. On the other hand, Laeven (2004) shows that concentrated ownership in banks are associated with higher risk taking, while dispersed ownership can decrease the risks. Thus, the two alternative hypotheses to be tested are:

H1a: "Higher concentration of ownership associated with lower risk taking"
H1b: "Higher concentration of ownership associated with higher risk taking"

Foreign ownership can also influence bank risk profile. For instance, foreign banks can take higher risk because they have less experience and lower number of connections in domestic market. On the other hand, foreign banks may decrease their risk due to access to better techniques of risk diversification and risk management. Laeven (2004) argues that foreign-owned banks on average have lover risk comparing to other banks. Additionally, Bhaumik and Piesse (2008) state that foreign banks take lower risk because they are able to attract more creditworthy clients. A contradicting result has been received by Maechler et al. (2007) who had found that foreign banks are associated with higher risk profile because they have lower capitalization ratio. The lower capitalization may be caused by the access of foreign banks to extra funding from parent institutions. The next hypothesis is:

H2: "Foreign banks take lower risk"

2.2. The Impact of Ownership on Bank Lending

There is a growing piece of literature on the impact of different types of ownership on credit market. As far as I know, there are no empirical studies that investigate the influence of ownership concentration on bank lending. Most of reserchers focus on the influence of foreign and state ownership on bank lending. The literature on the impact of state ownership is not covered here as far as I do not investigate it in this study.

There is widely accepted point of view that foreign banks are more efficient in their credit activity (Barisitz, 2008). For example, in expansion time foreign banks are able to increase their lending because they rely on additional funding from parent institution (Micco and Panizza, 2006). On the other hand, Galindo et al. (2004) suggest that due to access to foreign market capital foreign banks able do not reduce their lending in recession time. However, Detragiache et al. (2008) demonstrate that banks start to give fewer loans after they attract foreign capital. There are evidence also that foreign banks increase access to credits during the recession period (Giannetti and Ongena, 2008). They also tend to lend more to small and medium businesses comparing to domestic banks. Small foreign banks lend less to small businesses comparing to small domestic banks. On the other side, lending to small businesses from large foreign banks is higher than from large domestic banks (Clarke et al., 2005). The next hypothesis to confirm is:

H3: "Foreign banks are lend more than domestic banks"

The performance of banks within business group is still underexplored because academics usually keep their attention on impact of business group affiliation on firm performance. Banks that affiliated with business groups associated with

higher risk taking because companies use such bank in their own financial interests (Laeven, 2004). An interesting finding is also suggested by Baum et al. (2008) who claim that banks, which reside under political patronage, have lower risk taking. These banks are more likely to have higher capitalization level with a lower value of interest rate margin. Finally, there are two last hypotheses:

H4: "Banks affiliated with business groups take higher risk"
H5: "Banks affiliated with business groups lend more"

Chapter 3

DATA AND METHODOLOGY

3.1. Data

The data on the balance sheets and financial statements of all Ukrainian banks are taken from the Ukrainian Association of Banks (AUB) and the National Bank of Ukraine (NBU). The detailed description of bank owners is collected from the State Commission on Securities and Stock Market (SCSSM) official website. Overall number of observations is up to 600 and the sample covers the period from 2003 to 2006.

I have dropped out about 156 observations (disregard banks that do not work, have missing values in observations, etc), hence my sample represents about 3/4 of overal data. To eliminate the influence of outliers, the data are truncated at the top and bottom 1 % level of distribution on annual basis. Moreover, to deflate the variables to base year 2003 I use year-end inflation index (Consumer Price Index).

The banks are distinguished between three groups on the basis of (i) ownership concentration, (ii) presence of foreign owners among shareholders, and (iii) affiliation to business group. The data on foreign ownership are gathered mainly from the particular banks' websites or from the official information provided by NBU and AUB.

Table 1 reports summary statistics of the main variables for the period 2003-2006. Table contains the list of variables of the main interest such as *Interbank Loans*, *Total Loans*, and *Capitalization*. The *Interbank Loans* can be interpreted as an inverse indicator of liquidity risk: the higher the value of the measure, the more positive impact it has on bank stability. High value of *Interbank Loans* suggests that bank has excess of liquidity and as a result it decreases risk taking. Fungacova and Solanko (2008) argue that a bank could have excess in liquid assets because of secondary market is not developed (e.g. market for securities) or bank prefer to trade in government securities rather that give loans (implies less risk-taking). *Capitalization* ratio in turn exhibits the leverage risk (Fungacova and Solanko, 2008). *Total Loans* is calculated as the bank total loans devided by total assets. As we see from the table 1 the share of total loans in total assets in on average 63% and this value does not vary widely.

Table 1 also comprises descriptive statistics for ownership variables such as *Foreign*, *Concentration,* and *Cross-Shareholding*. The proxy for ownership concentration is the percentage share of the major bank owner. Note, that the standard deviation of the variable is very high, indicating considerable heterogeneity in ownership structure. In this work the affiliation to a business group is proxied by the dummy for *Cross-Shareholding*. This variable takes value of 1 if a bank owns a firm and the bank is controlled by a substantial shareholder at the same time; otherwise *Cross-Shareholding* is 0. Moreover, the ownership variables are determined on the beginning of each year.

The list of other bank control variables includes *Size*, *Growth*, *Cash*, *Deposits*, *Regulations, Z-score, Revenue Growth,* and *Interest Margin. Growth* denotes the annual growth of bank total assets. *Cash* is stay for the ratio of bank's cash assets to total assets. *Deposits* are defined as the ratio of long-term deposits to total assets.

Regulations is the deviation from the capital requirement installed by the National Bank of Ukraine. This measure is calculated as the ratio of bank equity to total liabilities minus its standard required (0.3~30 percent). The reported values of Regulations suggest that this variable is widely dispersed demonstrating different risk aversion of bank managers. *Z-score* is the inverse to probability of bank falure; *Revenue Growth* is annual growth of bank revenue, and *Interest Margin* is the Net Interest Revenue over Total Assets.

Table 1 Descriptive statistics

Variable	N	μ	σ	Min	Max
Inerbank Loans	417	3.377	1.605	-2.303	7.298
Total Loans	417	0.631	0.130	0.170	0.903
Growth	417	1.562	0.577	0.453	5.129
Deposits	417	0.403	0.149	0.022	1.290
Cash	417	0.147	0.113	0.000	0.614
Size	455	12.822	1.242	10.382	16.601
Regulations	460	0.055	0.463	-0.232	4.372
Capitalization	460	-1.673	0.547	-2.749	-0.194
Concentration	460	9.735	20.803	0.000	100.000
Foreign	460	0.557	0.497	0.000	1.000
Z-score	460	0.002	0.003	0.000	0.036
Revenue Growth	460	2.546	5.406	0.000	80.567
Cross-Shareholding	460	0.341	0.475	0.000	1.000
Interest Margin	460	0.045	0.021	-0.006	0.141

μ and s stands for mean and standard deviation respectively. Table consists of variables from different regressions.

Interbank Loans are the natural logarithm of gross interbank credits. *Total Loans* is the ratio of bank total loans to total asset. *Size* is the natural logarithm of bank total assets. *Growth* denotes the annual growth of bank total assets. *Cash* is stay for the ratio of bank cash assets to total assets. *Deposit* is the deposits to total assets ratio. *Regulations* is calculated as the ratio of equity to total liabilities minus the standard required value of 0.3. *Capitalization* is the natural logarithm of the bank equity to total assets. *Concentration* represents the percentage share of the largest shareholder. *Foreign* is the dummy that equals 1 if the bank is founded using foreign capital and 0 otherwise. *Z-score* is the bank insolvency risk and calculated as (Marco and Fernandez, 2007): $Z\text{-score}_{it} = [\sigma(ROA_{it})/(ROA_{it}+CAP_{it})]^2$, where ROA is the return on assets (Net Income devided by Total Assest), CAP is bank capitalization (Equity over the Total Assets), and σ(ROA) is stands for standard deviation of ROA. *Revenue Growth* is annual growth of bank revenue. *Cross-Shareholding* is the dummy variable that takes value of 1 if a bank owns a firm and the bank is controlled by a substantial shareholder at the same time, otherwise *Cross-Shareholding* is 0. *Interest Margin* is the Net Interest Revenue over Total Assets.

To compare the effect of ownership I divide sample into subgroups on the bases of ownership concentration, business group affiliation, and foreign ownership (see Tables 2, 3, and 4 respectively). Moreover, I employ Wilcoxon rank-sum test (Mann-Whitney two sample statistics) to check statistically significant differences of the mean values. The tables report that the mean values of *Interbank Loans* are significantly different for ownership concentration and foreign ownership. Thus my preliminary analysis finds the first confirmations for the hypotheses stated above.

Banks with concentrated ownership tend to have higher interbank loans, the inverse measure of liquidity risk (Table 2). There is also evidence that diluted ownership is associated with higher capitalization level in comparison to the case of concentrated ownership structure. An interesting fact is that banks dispersed ownership tends to less violate NBU's capital requirements.

Table 2 Descriptive statistics by ownership structure: ownership concentration

	Concentrated		Not concentrated		Wilcoxon
Variable	μ	σ	μ	σ	z
Inerbank Loans	3.569	1.666	3.115	1.481	-2.179**
Total Loans	0.629	0.123	0.635	0.139	1.291
Size	13.126	1.257	12.639	1.155	-4.560***
Growth	1.384	0.419	1.516	0.684	0.148
Cash	0.145	0.106	0.150	0.122	-0.355
Deposits	0.421	0.147	0.378	0.150	-4.040***
Regulations	-0.053	0.189	0.074	0.443	4.095***
Capitalization	-1.805	0.467	-1.621	0.568	4.190***
Foreign	0.975	0.156	0.000	0.000	-23.420***

Table 2 - Continued

Variable	Concentrated		Not concentrated		Wilcoxon
	μ	σ	μ	σ	z
Cross ownership	0.104	0.306	0.625	0.486	13.622***
Z-score	0.002	0.003	0.002	0.002	2.348**
Revenue Growth	1.891	1.808	3.404	7.884	-0.551
Interest Margin	0.042	0.020	0.048	0.021	-2.087**
	N =241		N=176		

μ and s stands for mean and standard deviation respectively

Interbank Loans are the natural logarithm of gross interbank credits. *Total Loans* is the ratio of bank total loans to total asset. *Size* is the natural logarithm of bank total assets. *Growth* denotes the annual growth of bank total assets. *Cash* is stay for the ratio of bank cash assets to total assets. *Deposit* is the deposits to total assets ratio. *Regulations* is calculated as the ratio of equity to total liabilities minus the standard required value of 0.3. *Capitalization* is the natural logarithm of the bank equity to total assets. *Concentration* represents the percentage share of the largest shareholder. *Foreign* is the dummy that equals 1 if the bank is founded using foreign capital and 0 otherwise. *Z-score* is the bank insolvency risk and calculated as (Marco and Fernandez, 2007): $Z\text{-score}_{it} = [\sigma(ROA_{it})/(ROA_{it}+CAP_{it})]^2$, where ROA is the return on assets (Net Income devided by Total Assest), CAP is bank capitalization (Equity over the Total Assets), and σ(ROA) is stands for standard deviation of ROA. *Revenue Growth* is annual growth of bank revenue. *Cross-Shareholding* is the dummy variable that takes value of 1 if a bank owns a firm and the bank is controlled by a substantial shareholder at the same time, otherwise *Cross-Shareholding* is 0. *Interest Margin* is the Net Interest Revenue over Total Assets

Table 3 provides the comparison of subsamples with and without group affiliation. Note that the mean and variance of leverage risk (capitalization) do not differ across two alternative groups. Banks affiliated with business groups have higher standard deviation of *Regulations*, while the mean of *Regulations* is much lower for their counterparts. It is plausible that a significant difference in ownership concentration is attributed to banks with and without business group affiliation.

Table 3 Descriptive statistics by ownership structure: business group affiliation

Variable	Affiliated		Not affiliated		Wilcoxon
	μ	σ	μ	σ	z
Inerbank Loans	2.825	1.473	3.641	1.600	5.617
Total Loans	0.632	0.146	0.631	0.122	-0.758

Table 3 - Continued

Variable	Affiliated		Not affiliated		Wilcoxon
	μ	σ	μ	σ	z
Size	12.365	0.955	13.186	1.269	7.563***
Growth	1.601	0.784	1.362	0.369	-1.474
Cash	0.129	0.113	0.156	0.112	2.665
Deposits	0.398	0.147	0.405	0.151	2.081***
Regulations	0.122	0.483	-0.057	0.191	-7.124***
Capitalization	-1.518	0.537	-1.828	0.480	-7.083***
Concentration	2.006	8.846	14.199	24.643	13.700***
Foreign	0.185	0.390	0.745	0.437	13.203*
Z-score	0.001	0.002	0.002	0.003	-0.388***
Revenue Growth	3.621	8.786	1.989	1.907	1.670
Interest Margin	0.048	0.021	0.043	0.020	3.057
	N = 135		N = 282		

μ and s stands for mean and standard deviation respectively

Interbank Loans are the natural logarithm of gross interbank credits. *Total Loans* is the ratio of bank total loans to total asset. *Size* is the natural logarithm of bank total assets. *Growth* denotes the annual growth of bank total assets. *Cash* is stay for the ratio of bank cash assets to total assets. *Deposit* is the deposits to total assets ratio. *Regulations* is calculated as the ratio of equity to total liabilities minus the standard required value of 0.3. *Capitalization* is the natural logarithm of the bank equity to total assets. *Concentration* represents the percentage share of the largest shareholder. *Foreign* is the dummy that equals 1 if the bank is founded using foreign capital and 0 otherwise. *Z-score* is the bank insolvency risk and calculated as (Marco and Fernandez, 2007): $Z\text{-score}_{it} = [\sigma(ROA_{it})/(ROA_{it}+CAP_{it})]^2$, where ROA is the return on assets (Net Income devided by Total Assest), CAP is bank capitalization (Equity over the Total Assets), and σ(ROA) is stands for standard deviation of ROA. *Revenue Growth* is annual growth of bank revenue. *Cross-Shareholding* is the dummy variable that takes value of 1 if a bank owns a firm and the bank is controlled by a substantial shareholder at the same time, otherwise *Cross-Shareholding* is 0. *Interest Margin* is the Net Interest Revenue over Total Assets

Table 4 demonstrates that foreign banks may have lower liquidity risk because they on average have higher level of interbank loans than their peers. However, foreign banks have a bit lower capitalization level, which can imply higher risk-taking. Finally, it can be easily seen that foreign banks have higher ownership concentration, while domestic banks are prone to be associated with a business group. However, there is no evidence that the credit activity of domestic and foreign banks differ.

Table 4 Descriptive statistics by ownership structure: foreign vs. domestic banks

	Foreign		Domestic		Wilcoxon
Variable	μ	σ	μ	σ	z
Inerbank Loans	3.509	1.635	3.207	1.553	-1.433***
Total Loans	0.627	0.123	0.637	0.138	1.595
Size	13.068	1.206	12.729	1.253	-3.759***
Growth	1.374	0.414	1.525	0.679	0.667***
Cash	0.142	0.102	0.154	0.126	0.072**
Deposits	0.422	0.148	0.378	0.148	-4.007**
Regulations	-0.051	0.189	0.068	0.438	3.591***
Capitalization	-1.797	0.463	-1.638	0.573	3.682***
Concentration	16.520	24.293	2.159	13.995	-21.186***
Cross-Shareholding	0.106	0.309	0.604	0.490	13.203***
Z-score	0.002	0.003	0.002	0.002	-0.414**
Revenue Growth	1.860	1.778	3.406	7.796	1.868
Interest Margin	0.042	0.020	0.048	0.021	2.789
	N = 235		N = 182		

μ and σ stands for mean and standard deviation respectively

Interbank Loans are the natural logarithm of gross interbank credits. *Total Loans* is the ratio of bank total loans to total asset. *Size* is the natural logarithm of bank total assets. *Growth* denotes the annual growth of bank total assets. *Cash* is stay for the ratio of bank cash assets to total assets. *Deposit* is the deposits to total assets ratio. *Regulations* is calculated as the ratio of equity to total liabilities minus the standard required value of 0.3. *Capitalization* is the natural logarithm of the bank equity to total assets. *Concentration* represents the percentage share of the largest shareholder. *Foreign* is the dummy that equals 1 if the bank is founded using foreign capital and 0 otherwise. *Z-score* is the bank insolvency risk and calculated as (Marco and Fernandez, 2007): $Z\text{-score}_{it} = [\sigma(ROA_{it})/(ROA_{it}+CAP_{it})]^2$, where ROA is the return on assets (Net Income devided by Total Assest), CAP is bank capitalization (Equity over the Total Assets), and σ(ROA) is stands for standard deviation of ROA. *Revenue Growth* is annual growth of bank revenue. *Cross-Shareholding* is the dummy variable that takes value of 1 if a bank owns a firm and the bank is controlled by a substantial shareholder at the same time, otherwise *Cross-Shareholding* is 0. *Interest Margin* is the Net Interest Revenue over Total Assets.

Considering the correlation matrix (Table 7 in Appendix C), one can see that there is significantly high negative correlation between *Interbank Loans*, *Capitalization* and *Total Loans*. It implies that increase in *Total Loans* may reduce

Interbank Loans and *Capitalization*, which mean the increase in bank risk. *Interbank Loans* negatively related with *Regulations* and *Capitalization*, and positively with *Cash*. It also was obvious to expect *Total Loans* to have significant positive correlation with *Deposits* and *Interest Margin*, and negative correlation with bank *Capitalization*. Furthermore, *Capitalization* positively correlated with *Regulations* and negatively with *Size, Growth, Cash, and Deposits.*

3.2 Methodology

This work focuses on the impact of ownership on bank risk and lending. I model *Interbank Loans (Capitalization)* and *Total Loans (Concentration)* as simultaneously determined. To test this hypothisis the two-stage least squares regression analysis for panel data was implemented (Schaffer, 2010). On the first-stage I compute predicted *Total Loans* and *Concentration*, and on the second-stage this predicted values are used in equations for *Interbank Loans* and *Capitalization*.

The second-stage regression in 2SLS includes:

Model 1:

$$\begin{aligned} Interbank\ Loans_{it} = {} & a0 + a1*Total\ Loans_{it} + a2*Size_{it} + a3*Cash_{it} \\ & + a4*Growth_{it} + a5*Concentration_{it} + a6*Foreign_{it} \\ & + a7*Cross\text{-}Shareholding_{it} + \varepsilon_{it} \end{aligned} \quad (1)$$

Model 2:

$$\begin{aligned} Capitalization_{it} = {} & a0 + a1*Concentration_{it} + a2*Regulations_{it} + a3*Z\text{-}score_{it} \\ & + a4*Revenue\ Growth_{it} + a5*Foreign_{it} \\ & + a6*Cross\text{-}Shareholding_{it} + \varepsilon_{it} \end{aligned} \quad (2)$$

I estimate model (1) and (2) and test endogenous variables for underidentification, weak identification, and endogeneity. Moreover, the test for overidentification of instrument is also applied. In case of model 1 the endogeneity was rejected and the OLS model for panel data was applied.

In the model (1) were used the following excluded instrumental variables for *Total Loans*: *Deposits, Regulations,* and *Capitalization*. The model (2) includes three excluded instruments for *Concentration* such as *Size*, *Cash*, and *Interest Margin*.

Based on our hypotheses I expect that in model (1) Cross-Shareholding have negative effect on Interbank Loans, while Foreign should influence dependent variable positively. In the eqation (2) there are expectations that foreign ownership has positive impact on Capitalization. The Cross-Shareholding should have negative effect on the dependent variable. In both models the sign on Concentration coefficient is uncertain because there are evidences in literature that confirm both, positive and negative sign.

Chapter 4

EMPIRICAL FINDINGS

4.1. Bank Lending, Credit Structure and Ownership

Having established the set of hypotheses I first examine the relation between the amount of bank loans and their structure. It is worth to be mentioned that the composition of bank credits is able to affect bank risk. Specifically, the related literature considers interbank loans as an indicator of liquidity risk. Thus, it is interesting to elaborate the link between bank credits and their structure and how ownership influences this relationship.

Interbank Loans (credit structure) and *Total Loans* (bank lending) can be jointly determined. Therefore, the usage of ordinary list squares (OLS) model, applied to a single equation, leads to biased and, hence, inconsistent estimates. To account for possible joint character of bank credits and their structure I implement the two-stage least squares (2SLS) regression analysis. In the model for *Interbank Loans* I control for *Total Loans* by using the predicted Total Loans from the first stage regression in the second stage regression. The estimation results for first and second stages of the model are reported in columns A and B of the Table 5, respectively.

The Table 5 (Appendix A) contains the results of some tests for the first and second stages of the 2SLS model. Angrist-Pischke (AP) first-stage chi-squared and F statistics test for underidentification and weak instruments, respectively. The first test indicates that underidentification is not my case, while AP F rejects

hypothesis on weak instruments. To check the appropriateness of the model I test for endogenous regressors using "endog" option in Stata. Despite the fact that Sargan-Hansen overidentification test confirms validity of our instruments the endogeneity test do not reject the null that endogenous variable can be treated as exogenous. Thus, *Total Loans* cannot be used as endogenous variable. The latter conclusion implies that the amount of credits should be treated as an exogenous regressor for the structure of bank loans.[3] For this reason I run fixed effects regression for panel data (results reported in column C of the Table 5). Note that standard errors are robust to heteroskedasticity and clustering on bank ID. Moreover, variance-inflation factor test (VIF) shows that multicollinearity is not the problem for the list of explanatory variables.

As one can see from the Table 5, all signs on coefficients and significance level of the variables are maintained across the alternative models that reaffirms reliabilities of my outcomes. Total loans have highly significant negative effect on interbank loans, i.e. an increase in bank lending leads to a higher bank liquidity risk (since the share of interbank loans in total loans documents an excess of liquidity).

My results provide evidence to confirm the hypotheses H1b and H4 that highly concentrated ownership as well as the business group affiliation structure associated with higher risk-taking. These outcomes are in line with findings suggested by Laeven (2008) and Marco and Fernandez (2007). Additionally, I would like to point out that the negative effect of business group affiliation on

[3] The endogeneity test mentioned above also rejects the concurrent determination for bank lending and leverage risk (measured by capitalization). As capitalization (risk-taking) is exogenous factor influencing bank loans and taking into account that the result of similar estimations is stated in column (A) of Table 5, I neglect reporting the outcomes of 2SLS for bank lending and leverage risk to avoid duplications/repetition.

interbank loans gives more fodder for future research as it can be a result of an allocation of financial resources within the group.

Note that affecting the structure of bank loans ownership does not have any significant impact on the level of bank lending. This means that the hypotheses about the sensitivities of bank lending to ownership concentration, bank affiliation, and/or bank origin should be relaxed in my case.

4.2 Bank Risk and Ownership

In this section I aim to examine the impact of different ownership variables on bank risk (leverage risk) assuming endogenous nature of ownership structure. The endogeneity test corroborates the simultaneous determination of Capitalization and Concentration, while both Angrist-Pischke (AP) Chi-sq and F statistics allow me to interpret the estimated coefficients received from 2SLS regression. Moreover Sargan-Hansen test suggests that our instrumental variables for Concentration (see Table 6 in Appendix B) are valid and uncorelated with error term. These tests make it reasonable to employ two-stage least squares (2SLS) regression analysis in order to get consistent estimates. With the view of robustness check the Table 6 also shows the results for coefficient estimates from the OLS model for panel data with fixed effects.

First of all, I would like to pay attention to the fact that bank capitalization is very sensitive to the fact whether the bank meets capital requirements constituted by NBU. I assert that the positive deviation from the capital requirement positively influences bank capitalization decreasing bank risk-taking. The results of my estimates reconfirm hypothesis H1b but in term of leverage risk: banks with higher ownership concentration tend to have lower capitalization rate (i.e. higher

risk-taking). The increase in z-score, insolvency risk, also amplifies bank leverage risk. As expected, the coefficient on Foreign in the first stage regression demonstrates that foreign banks usually have considerably higher level of ownership concentration.

Chapter 5

CONCLUSIONS

This study offers new evidence for the dispute over the role of ownership impact on the link between bank risk and lending. I obtain the results using database on all Ukrainian banks over the period of 2003-2006. The great variability in ownership structure assists us in identifying the effect of ownership on bank risk taking. However, I have not found any evidence to confirm the endogeneity between bank lending and bank risk. On the other hand, the risk-taking and ownership concentration are jointly determined. This study argues that the higher ownership concentration and business group affiliation are able to reduce interbank loans that may lead to higher liquidity risk. As the reason for this effect is still quastionable, it should be ellaborated in future work.

After finding the negative impact of ownership concentration on interbank loans, I posit that banks with higher ownerhip concentration tend to behave more risky than their counterparts with dispersed ownership. This effect can be explained by the fact that banks with concentrated ownership take higher risk if large shareholders pursue their own financial interests (Zeitun and Tian, 2007). Taking into account that foreign banks have considerably higher level of ownership concentration, policy concerns regarding the role of banks with foreign ownership for stability of host banking system seem to be very important.

The results of my estimates also corroborate hypothesis that banks with higher ownership concentration are prone to demonstrate lower capitalization rate, which implies higher leverage risk. This outcome is consistent with findings

suggested by Laeven (2004). Kim et al. (2007) state that bank low equiry means high bank risk because capital represents collateral against bank liabilities, which protects bank from insolvency when asset values decline. I also find that leverage risk measured by bank capitalization is very sensitive to the compliance of capital requirements constituted by NBU. However, the higher leverage risk can be attributed with a higher ability to attract external funds. That is why it would be reasonabale for future research to evaluate the acceptable level of leverage risk.

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APPENDIX A

Table 5 Regression results: Interbank Loans

	IV FE		FE
	A	B	C
VARIABLES	Total Loans (1st stage)	Interbank Loans (2nd stage)	Interbank Loans
Total Loans		-2.738*	-3.261***
		(1.454)	(0.809)
Size	-0.026	1.054***	1.046**
	(0.031)	(0.402)	(0.415)
Cash	0.059	1.927**	1.930**
	(0.105)	(0.761)	(0.772)
Growth	-0.021**	0.293	0.288
	(0.009)	(0.179)	(0.185)
Concentration	0.001	-0.007**	-0.007**
	(0.000)	(0.003)	(0.003)
Foreign	-0.011	0.030	0.024
	(0.018)	(0.124)	(0.124)
Cross-Shareholding	0.028	-0.361*	-0.345*
	(0.020)	(0.206)	(0.206)
Deposits	0.227***		
	(0.073)		
Regulations	-0.168***		
	(0.056)		
Capitalization	0.072**		
	(0.031)		
Year-dummy	*Yes*	*Yes*	*Yes*
Observations	*399*	*399*	*417*
R-squared	*0.284*	*0.438*	*0.439*
AP Chi-sq	*20.100****		
AP F	*6.46****		
Hansen J statistic		*2.952*	
Endogeneity test		*0.029*	
*Robust Std. Err. in parentheses *** p<0.01, ** p<0.05, * p<0.1*			

AP Chi-sq is Angrist-Pischke test for underidentification. AP F statistic means Angrist-Pischke test of weak identification. Sargan-Hansen test is the test of overidentifying restrictions. Endogeneity test assume the null hypothesis that the specified endogenous regressors can actually be treated as exogenous.

Interbank Loans are the natural logarithm of gross interbank credits. *Total Loans* is the ratio of bank total loans to total asset. *Size* is the natural logarithm of bank total assets. *Growth* denotes the annual growth of bank total assets. *Cash* is stay for the ratio of bank cash assets to total assets. *Deposit* is the deposits to total assets ratio. *Regulations* is calculated as the ratio of equity to total liabilities minus the standard required value of 0.3. *Capitalization* is the natural logarithm of the bank equity to total assets. *Concentration* represents the percentage share of the largest shareholder. *Foreign* is the dummy that equals 1 if the bank is founded using foreign capital and 0 otherwise. *Cross-Shareholding* is the dummy variable that takes value of 1 if a bank owns a firm and the bank is controlled by a substantial shareholder at the same time, otherwise *Cross-Shareholding* is 0.

APPENDIX B

Table 6 Regression results: Capitalization

	IV FE		FE
	A	B	C
	Concentration	Capitalization	
VARIABLES	(1st stage)	(2nd stage)	Capitalization
Concentration		-0.015*	-0.001
		(0.008)	(0.001)
Regulations	5.334*	0.686***	0.687***
	(3.208)	(0.142)	(0.142)
Z-score	583.164	-42.368***	-52.415***
	(629.503)	(15.682)	(18.155)
Revenue Growth	0.146*	0.006***	0.005***
	(0.086)	(0.002)	(0.002)
Foreign	18.715***	0.247	-0.01
	(5.646)	(0.168)	(0.039)
Cross-Shareholding	-4.003	-0.06	-0.001
	(3.443)	(0.055)	(0.032)
Size	8.279*		
	(4.286)		
Cash	50.284**		
	(21.874)		
Inerest Margin	12.480		
	(60.481)		
Year-dummy	*Yes*	*Yes*	*Yes*
Observations	*434*	*434*	*460*
R-squared	*0.200*	*0.051*	*0.625*
AP Chi-sq	*7.74**		
AP F	*2.5**		
Hansen J statistic		*3.887*	
Endogeneity test		*3.297**	
*Robust Std. Err. in parentheses *** p<0.01, ** p<0.05, * p<0.1*			

AP Chi-sq is Angrist-Pischke test for underidentification. AP F statistic means Angrist-Pischke test of weak identification. Sargan-Hansen test is the test of overidentifying restrictions. Endogeneity test assume the null hypothesis that the specified endogenous regressors can actually be treated as exogenous.

Regulations is calculated as the ratio of equity to total liabilities minus the standard required value of 0.3. *Capitalization* is the natural logarithm of the bank equity to total assets. *Concentration* represents the percentage share of the largest shareholder. *Foreign* is the dummy that equals 1 if the bank is founded using foreign capital and 0 otherwise. *Z-score* is the bank insolvency risk and calculated as (Marco and Fernandez, 2007): $Z\text{-score}_{it} = [\sigma(ROA_{it})/(ROA_{it}+CAP_{it})]^2$, where ROA is the return on assets (Net Income devided by Total Assest), CAP is bank capitalization (Equity over the Total Assets), and σ(ROA) is stands for standard deviation of ROA. *Revenue Growth* is annual growth of bank revenue. *Cross-Shareholding* is the dummy variable that takes value of 1 if a bank owns a firm and the bank is controlled by a substantial shareholder at the same time, otherwise *Cross-Shareholding* is 0. *Interest Margin* is the Net Interest Revenue over Total Assets.

APPENDIX C

Table 7 Correlation matrix

	Interbank Loans	*Total Loans*	*Size*	*Growth*	*Cash*	*Deposits*	*Regulations*	*Capitalization*	*Z-score*	*Revenue Growth*	*Interest Margin*	*Concentration*	*Foreign*	*Cross-Shareholding*
Inerbank Loans	1.000													
Total Loans	-0.153*	1.000												
Size	0.682*	0.141*	1.000											
Growth	0.171*	-0.065	0.139*	1.000										
Cash	0.409*	-0.083*	0.337*	0.200*	1.000									
Deposits	0.042	0.410*	0.209*	0.079*	-0.215*	1.000								
Regulations	-0.357*	-0.099*	-0.538*	-0.110*	-0.285*	-0.458*	1.000							
Capitalization	-0.531*	-0.151*	-0.792*	-0.150*	-0.320*	-0.411*	0.754*	1.000						
Z-score	0.180*	-0.104*	0.194*	-0.019	0.020	-0.074*	-0.169*	-0.257*	1.000					
Revenue Growth	-0.032	-0.085*	-0.057	0.230*	-0.053	-0.008	0.008	0.046	-0.003	1.000				
Interest Margin	-0.264*	0.237*	-0.285*	-0.166*	-0.255*	-0.186*	0.313*	0.351*	0.017	0.032	1.000			
Concentration	0.124*	-0.041	0.237*	-0.027	0.051	0.014	-0.096*	-0.145*	0.056	-0.034	-0.035	1.000		
Foreign	0.063	-0.040	0.162*	-0.111*	-0.042	0.172*	-0.174*	-0.172*	0.011	-0.125*	-0.118*	0.365*	1.000	
Cross-Shareholding	-0.253*	- 0.002	-0.341	0.190*	-0.101*	-0.097*	0.256*	0.315*	-0.066	0.119*	0.094*	-0.299*	-0.552*	1.000

* Correlation coeficient is significant at 10%