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1 March 2017

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Abstract:

This article examines the evidences of moral hazard in the risk taking behavior of the 500 banks in Central Europe, the Baltics and Balkan region. We test the evidences of moral hazard in empirical relationships between shareholders, bank managers and regulatory restraints. The results generally support the theoretical arguments, though we cannot find explicit evidences of moral hazard in risk taking behavior of the bank managers of the region. Our findings suggest that the capital requirements and regulatory concerns along with performance efficiency exhibit the strongest impact on the level of risk taking.

Key words: Moral hazard, risk taking, non-performing loans

JEL classification: G32, G21

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This project has received funding from the European Union's Horizon 2020 Research and Innovation Staff Exchange programme under the Marie Sklodowska-Curie grant agreement No. 681228. We also acknowledge support from the Czech Science Foundation (grant15-00036S) and from University of Economic, Prague (institutional support IP100040). The views expressed in the paper are those of the authors and not necessarily those of our institutions. All remaining errors are solely our responsibility.

1 Introduction

In this paper, we examine potential moral hazard problems in the risk taking behavior of the financial institutions. We refer to the theoretical framework of Jeitschko and Jeung (2005) to describe the incentives of the agents and to model their risk preferences. An empirical study is conducted to examine these theoretical standings. Based on the dataset of 500 banks located in 21 countries of the Central Europe, Baltic and Balkan region over the period of 2006-2014, we investigate if the evidences of moral hazard exist in empirical relationships between shareholders, bank managers, from regulatory restraints and ownership structure. Several regression models have been applied to identify and compare risk taking patterns and hereby to draw conclusions on the evidences of the moral hazard.

Theoretical literature stresses the key role of asymmetric information in lending markets (Janda, 2011; Mejstřík et al., 2015). A majority of studies shows that asymmetric information and moral hazard problems can generate market failures such as inefficient provisioning, mispricing of risk and consequently incentivize institutions to take higher risks. The study of the classical principal–agent problem and the conflicts rising from managerial behavior, agency costs and ownership structure is widely investigated in the theory of the firm e.g. Jensen and Meckling, (1976), Laffont and Martimort (2001). However, the empirical evidences are largely divided across various geographies with different banking sector structures. For example, the impacts of domestic, foreign or state ownership on bank performance are studied by Berger et al. (2005), Iannotta et al. (2013). They found that the banks with a large share of state ownership are

associated with inferior long term performance and greater risk taking. Similarly Dong et al. (2014) show that Chinese banks owned by the government tend to exhibit more risk taking strategies than those owned by private investors. Whereas for the Russian banks (Fungáčová and Solanko, 2009) and banks of the Central Eastern Europe (Distinguin et al., 2013), their findings show the opposite effect. The explanation is that state-owned banks may benefit from an implicit government guarantee.

Moral hazard and adverse selection in financial markets could frequently derive from regulations and governmental intervention that result in perverse incentives. Acharya et al. (2015) analyze how the capital requirements can address moral hazard problems in banking associated risk shifting and managerial under-provision of effort in loan monitoring. A number of studies (Antzoulatos and Tsoumas, 2014; Cheng et al., 2016; De Caux et al., 2017; Janda, 2009; Mariathasan et al., 2014) points to the evidences of moral hazard behavior of financial institutions in case of various forms of government support i.e. bailout, guarantees, deposit insurance, etc. They suggest that the governmental guarantees reduce the downside risk associated with financing decisions and thus incentivize the banks to assume risks they would not choose to bear without the expected government support. Duran and Lozano-Vivas (2012), Ngalawa et al. (2016) indicate further that generous deposit insurance schemes seem to incentivize risk shifting to the non-depository creditors. By comparing the different forms of the government support, Janda (2011) concludes that in some situations the credit guarantees and interest rate subsidies are beneficial for borrowers and lenders, e.g. in the Czech Republic they positively affect the export finance (Janda et al., 2013).

The moral hazard hypothesis and banking management incentives are empirically studied by Berger and DeYoung (1997). Their results show that decreases in bank capital ratios generally precede increases in non-performing loans for banks. Evidently, poor capitalized banks may respond to moral hazard incentives by taking increased portfolio risks. Moreover, they suggest a positive relation between non-performing loans and cost efficiency. Similar results were found by Podpiera and Weill (2008) who examine the question of the causality between non-performing loans and cost efficiency whether either of these factors is the determinant of bank failures. Analyzing data of Czech banks between 1994 and 2005, their findings support the evidences of bad management practices as a bad management hypothesis, according to which deteriorations in cost efficiency precede increases in non-performing loans. On example of the Chinese banking industry, Zhang et al. (2016) investigated how non-performing loans are related to moral hazard problems. They used a threshold value for the non-performing loans expecting that there is a potential threshold above which risk-taking of banks increases and the non-performing loans worsen. The find the empirical evidences of moral hazard behavior among the banks with higher portion of problematic loans on the book.

2 Theoretical framework and hypotheses

Jeitschko and Jeung (2005) propose a theoretical framework that describes the risk preference of the agents in situation of various risk-return profiles. It is assumed that capital and deposits are given exogenously to the bank and the choice of risky assets is not influenced by leverage considerations. There are three main incentives that affect bank's asset risk choice. The

first is of the bank manager who makes the risk decisions by assets allocation. He has a private interest in maximizing his benefits and by his choice the assets risk is impacted. The second is of the shareholders who want to maximize the bank's equity value and influence the asset choice through corporate governance structures. And at last, that of the regulators who are interested in minimizing the cost of bank failures and use regulation provisioning to indirectly affect the asset choice (e.g. deposit insurance or government guarantees). Considering all three above incentives of agents in form of separate objective functions, the bank choice of the risk can be represented by the following maximization equation:

$$\alpha \in \arg\max\{\omega V(\alpha^{s}) + \beta E\big(B(\alpha^{m})\big) - \rho OV\,(a^{r})\}; \qquad \omega, \beta, \rho \geq 0 \tag{1}$$

The risk choice α of the bank in the above function is determined by relative weights (ω, β, ρ) put on the bank's equity value (*V*), the expected value of private benefit of managers (*E*(*B*)) and regulatory restraint as option value of deposit insurance (*OV*). The preferred risk choices of shareholders, managers and given regulatory restraint are captured in $\alpha^{s}, \alpha^{m}, \alpha^{r}$ respectively. The option value (OV) of deposit insurance (or of guaranteeing the promised payment) is considered as a put option on the assets and treated as an expected loss to guarantor. The regulatory constraints obviously are not favored by the banks and are therefore expressed with a negative sign. The weight ω is placed on the value of the bank equity to capture the shareholders' influence. The weight β put on the managerial private benefit and ρ is the weight placed on the option value as a regulatory restraint. Thus, the shareholder's agency problems from the underpriced deposit insurance are expressed in ω and ρ , while β refers to

the agency problem associated with management. If there were no agency problem with management then the value of weights would be equal $\omega = \rho$ and $\beta = 0$. The shareholders will always prefer a risk factor $\alpha^s > 0$ to maximize their profits. The deposit insurance provider preference would be $\alpha^r = 0$, unless the higher risk and higher return profile of the bank will require other optimum level $\alpha^r \in [0,1]$. The bank manager's risk choice would be $\alpha^m = 0$, when the private benefits are decreasing proportionally ($B \leq 0$) with reducing risk, otherwise a preference is given to $\alpha^m \in [0,1]$. The theoretical model allows us to derive main hypotheses, which we will test empirically using our data sample: a) if the evidences of moral hazard exist in empirical relationships between shareholders, bank managers, from regulatory restraints and ownership structure; b) if bank managers are induced to the incentives of taking excessive risks causing further deterioration in the financial state or even leading to its insolvency and thus supporting the evidences of moral hazard and rent-seeking behavior (Acharya et al. 2015).

3 Data and Methodology

Our data set consist of 500 financial institutions located in the 21 countries of Central Europe and the Baltic region. The financial data is obtained from the database BankScope and own calculations. The unbalanced data sample is due to the partly not reported financial information for the entire period of 10 years over the period 2006-2014, mostly for the small size banks.

Given that the nature of moral hazard problems does not allow direct observation, we will study their indirect impact which is reflected on microeconomic level in the performance ratios of banking institutions. In

our analysis, we apply and compare the results from several panel data regression models. In line with our hypothesis, first of all we test if the explanatory variables reveal moral hazard behavior of the agents from the theoretical model. Besides, we are interested in finding whether there are empirical evidences of risk-taking patterns existing that can be attributed to the rent-seeking behavior (Acharya et al., 2015). Several regression models and two types of risk metrics are used with the double motivation, to analyze the hypotheses questions on one hand and as a robustness check of the results on the other.

Model 1 $$y_{it} = \beta_0 + \beta_n x_{it-1} + \delta d_{it} + \varepsilon_{it} \quad (2)$$

Model 2 $$\log y_{it} = \beta_0 + \beta_n \log x_{it-1} + \delta d_{it} + \varepsilon_{it} \quad (3)$$

Model 3 $$y_{it} = a_i + \beta x_{it-1} + \delta d_{it} + \varepsilon_{it} \quad (4)$$

Model 4 $$\log y_{it} = a_i + \beta \log x_{it-1} + \delta d_{it} + \varepsilon_{it} \quad (5)$$

Model 1 equation (2) refers to the pooled cross sectioned ordinary least square (OLS) linear regression. In Model 2 equation (3) we apply similar OLS regression, where both independent and dependent variables are log-transformed. By introducing the natural logarithm in the regression model we extend our analysis to accommodate possible non-linearity patterns and to investigate the nonlinear dynamics in relations between the observed variables. Additionally, we consider panel-data with fixed-effects regression, as indicated by the Hausman test. Model 3 equation (4) is a panel data regression model with fixed effects and in Model 4 equation (5) extended with the log-transformed independent and dependent variables. In all models, x is a vector of bank-specific variables (all of them are listed in Appendix 1), d is assigned dummies in the models, i represents the bank

and t is a time period respectively. The countries profile effects and the time-invariant individual effect are captured in a_i and the regular unobserved factor in ε_{it}. The bank specific variables x are lagged with one year period (t-1) to mitigate the endogeneity problems and because of the delayed effect of management reaction that is visible next year financial results. The correlation coefficients among all our variables were found not to exceed 0.50 (except between ROE and ROA). The dependent variable y refers to the risk taking behavior of the financial institutions and is represented by two ratios. The asset risk is captured in the non-performing loan ratio (NPL), which is a ratio of non–performing loans to total portfolio. The overall riskiness of the bank can be measured by the ratio of risk weighted assets to total assets (RWATA) that reflects the riskiness of the business model of the banks in regulatory formulating (Janda and Kravtsov, 2016). The first ratio is suitable for more traditional banks, where lending constitutes the main source of risk, while RWA includes the exposure of the bank to all types of risks mentioned by the regulations (Tanda, 2015). In line with the theoretical framework, our explanatory variables x reflect the incentives of the agents: the shareholders who maximize the equity value and profitability (return on equity); the bank manager's efficiency and monitoring efforts (return on assets, non-interest income to gross income) and regulatory constraints reflected in the capital adequacy and leverage ratios. Two types of dummies capture the regulatory pressure and the governmental background of the banks in the dataset.

The controllable variable total assets (TA) is taken in the form of natural logarithm to control for potential size effects and gains from diversification of business lines. Efficiency ratios are represented by return on assets

(ROA) and ratio of non-interest income to gross income (NITI). As a proxy of bank manager's efficiency, they indicate the efforts in optimizing the resources of the bank. The deteriorations in cost efficiency precede increases in non-performing loans due to the bad management and less monitoring efforts (Berger and DeYoung, 1997; Podpiera and Weill, 2008). The capital adequacy ratio (CAR) and leverage ratio (LR) address the restraints from regulatory requirements on solvency and capital, i.e. the regulatory pressure considerations (Teply and Vejdovec, 2012). For a dummy variable "regulatory pressure" we apply the same approach as Matejašák et al. (2009). The dummy value "*1*" is assigned if the capital ratio of the bank is below the threshold level which is equal to the minimum regulatory requirement CAR (8%) plus one standard deviation of the bank's own capital ratio. Otherwise, the dummy value is *0*. Although the choice of one standard deviation is somehow arbitrary, the rationale for using this measure is that banks build a buffer above the regulatory minimum for precautionary reasons and the amount of this buffer depends on the volatility of capital ratio. Dummy variable "government ownership" takes the value 1 if the share of state ownership is higher than 50% and the opposite value = 0. It addresses the hypothetical incentives for the shareholders to assume higher risks if the potential governmental support is available (Cheng et al., 2016; Mariathasan et al., 2014; Ngalawa et al., 2016).

4 Results

The estimation results of our Models 1-4 are shown in Appendix 1 together with the coefficients of the explanatory variables, robust p -values and the t -statistic for individual significance. The models with OLS and fixed effects

regression produce in general comparable results and in most instances exhibit similar vector of the regression coefficients. Our estimated coefficients have the signs that we expected and generally compatible with the theoretical arguments in the literature. Yet, the non-linearity patterns across the Models 1-4 cannot be explicitly observed for the most variables with significant coefficients. Since we cannot find clear empirical evidences, we reject the hypothesis that the increase in non-performing loans or risks in portfolio structure (RWATA) causes even more risky lending and potentially leading to further deterioration of the loan quality.

As expected, the banks' performance ROE was found to be statistically significant at a level of 5% in all Models 1-4 and negatively related to both risk indicators NPL and RWATA. That is in line with the theoretical framework which explains the shareholder's motivation of maximizing the profit and is consistent with the empirical results of Berger et al. (2005). The indicators of the bank manager's efficiency (ROA, non-interest income to gross income) show a rather mixed picture and different signs in regression coefficients. Overall results are not statistically significant to support the moral hazard among bank managers. It can be explained by structural versatility in the business models and obviously different level of banking governance practices across the banks in our sample. The capital adequacy ratio CAR has a strong impact on the level of credit risk taken by the CEE banks contrary to the leverage ratio. The coefficients of CAR are statistically significant (for risk indicator NPL) at a level of 5% in Models 1-3 with the coefficients from -0.356 to -0.020. In general, these estimates imply that the banks adjust capital ratios and risk to desired levels, this is also confirmed in the empirical study by (Matejašák et al., 2009). The

negative sign of all coefficients are in line with logic of regulatory restraint in the theoretical model. This observation is further reiterated in our empirical evidences by the negative vector of coefficients of regulatory pressure which is represented by the dummy variable (REG). Contrary to the findings of Berger et al. (2005), Dong et al. (2014), Iannotta et al. (2013), who suggest that the banks with a large share of state ownership are associated with inferior long term performance and greater risk taking, our results show a positive relation between government ownership and level of risk taking. For both risk indicators NPL and RWATA in Models 1-2, the dummy (GOV) has a negative sign and statistically significant coefficients. This fact can be justified by several factors: traditionally less risky business models of the state owned banks, different bank governance approach and less pressure from the investor side on the profit maximization. According to our empirical results, the size of the total assets of the bank has not significant impact on the risk profile (NPL) and portfolio risk structure (RWATA), i.e. the diversification and size effects do not play significant role.

5 Conclusion

This study focuses on the examination of the evidences of moral hazard in the risk taking behavior of the 500 banks in the Central Europe, Baltics and Balkan region. We test the evidences of moral hazard in empirical relationships between shareholders, bank managers and from the point of regulatory restraints and ownership structure. The results generally support the theoretical arguments, though we cannot find explicit proof of moral hazard in risk taking behavior of the bank managers of the banks in our dataset. By analyzing and comparing the non-linear relations among risk

variables in several regression models, we don't find sufficient empirical evidences to support it. Therefore, we reject the moral hazard hypothesis that an increase in NPL or risks in portfolio structure (RWATA) raises riskier lending practices potentially causing even further deterioration of the loan quality. Our findings suggest that the capital requirements and regulatory restraints show the strongest impact on the risk taking proving the fact that the bank capital requirements play a prominent role in sustaining financial stability. The performance efficiency of the baking institutions also exhibits substantial statistical evidences and indicates strong impact on the level of risk taking.

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Appendix 1: The regression results

Variables	NPL				RWA/TA			
	Pooled OLS		Fixed effects		Pooled OLS		Fixed effects	
	Model 1	Model 2	Model 3	Model 4	Model 1	Model 2	Model 3	Model 4
ROE	-13.354*	-1.335*	-10.236*	-1.012*	-0.454*	-0.163*	-0.286*	-0.163*
	(-5.73)	*(-2.95)*	*(-2.69)*	*(-2.29)*	*(-5.10)*	*(-2.71)*	*(-1.97)*	*(-2.68)*
ROA	0.139	-0.729*	-0.108	-0.654*	0.0252*	0.072	0.017	0.007
	(1.07)	*(-2.52)*	*(-0.43)*	*(-2.32)*	*(3.29)*	*(1.80)*	*(1.39)*	*(1.81)*
NITI	-0.040*	-0.492*	0.004	-0.804*	0.000	0.042	0.000	0.044
	(-4.58)	*(-2.39)*	*(0.44)*	*(-3.97)*	*(0.93)*	*(0.79)*	*(-0.2)*	*(0.84)*
CAR	-0.356*	-1.280*	-0.157*	-1.266*	-0.003*	-0.027*	-0.001	-0.027*
	(-12.71)	*(-10.30)*	*(-3.65)*	*(-10.5)*	*(-4.66)*	*(-1.93)*	*(-0.34)*	*(-1.91)*
LR	0.039*	0.070*	0.024	0.096*	0.007*	-0.039	0.001	-0.040*
	(2.06)	*(2.29)*	*(0.99)*	*(3.10)*	*(4.80)*	*(-2.39)*	*(0.34)*	*(-2.36)*
TAlog	-0.244	0.048	0.370	-0.013	0.031*	0.078*	0.019	0.078
	(-1.85)	*(2.34)*	*(1.33)*	*(-0.41)*	*(6.38)*	*(4.91)*	*(1.71)*	*(4.81)*
REG	-2.833	-0.449	7.452*	-0.587*	-0.002	0.027	-0.053	0.019
	(-1.75)	*(-1.82)*	*(4.66)*	*(-2.45)*	*(-0.95)*	*(0.40)*	*(-1.75)*	*(0.27)*
GOV	-3.239*	-0.078	0.000	0.058	-0.082*	-0.072	0.000	-0.075
	(-3.09)	*(-0.49)*	*(0.00)*	*(0.37)*	*(-3.02)*	*(-1.37)*	*(0.00)*	*(-1.43)*
_cons	12.173	1.793	-6.610	3.874	0.262	1.035	0.526	1.040
	(4.36)	*(1.08)*	*(-1.77)*	*(2.39)*	*(3.12)*	*(2.73)*	*(3.16)*	*(2.72)*
Obs	2476	2476	2476	2476	612	612	612	612
Banks	500	500	500	500	500	500	500	500
F test	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
R-sq	0.1905	0.1299	0.1293	0.1266	0.1716	0.0582	0.1036	0.072

Source: BankScope and own calculations. * denotes statistical significance p - values below <0.05

In parentheses, we show the t –statistics. The 2006-2014 year dummies coefficients in Models 1 & 2 are omitted since they are not relevant for our analysis.