Does CEO Gender Influence Bank Risk?

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Abstract

This paper addresses the effect of CEO gender on bank risk. We exploit a unique dataset of 347 Polish cooperative banks. They provide a sample of homogenous financial institutions in which the presence of female CEOs is a frequent characteristic. We find that banks headed by female CEOs are less risky as they report consistently higher capital adequacy and equity to assets ratios. Credit risk in female-led banks is not different from their peers, thus higher capital adequacy does not stem from lower asset quality and is likely to be linked to higher risk aversion of female CEOs. Our evidence supports then the view that women are more risk-averse bank CEOs than men. Our findings suggest that gender quotas in the management boards of banks can contribute to reduce risk-taking behavior.

JEL Codes: G21, J16.
Keywords: female CEOs, bank risk-taking, gender.

1. Introduction

The financial crisis has provided evidence for the effects of bank risk-taking on financial stability, and then on the real economy. It is therefore of importance to appraise the determinants of bank risk-taking. There is a large bunch of literature investigating these factors with a specific focus on risk-taking incentives of bank managers. A first category of studies has examined how factors at the country or at the bank level can influence risk-taking behavior of bank managers by affecting their incentives (e.g., Boyd and De Nicolo, 2005, and Berger, Klapper and Turk-Ariss, 2009 for competition; Berger and DeYoung, 1997 for efficiency). A second category of papers has investigated how corporate governance practices and compensation schemes can affect incentives of bank managers (e.g., Fahlenbrach and Stulz, 2011).

Research in the area of behavioral finance has stressed the influence that personal traits like gender may have on on financial outcomes, (Barber and Odean 2001). As a result, risk-taking behavior may differ between male and female bank executives and thus the presence of female bank CEOs can influence the risk-taking behavior of banks. This hypothesis is based on the observation of differences in risk aversion between men and women. Literature tends to show greater risk aversion in individual investment decisions for women (Jianakopoulos and Bernasek, 1998; Agnew, Balduzzi and Sunden, 2003). Barber and Odean (2001) explain this finding by the lower overconfidence of women relative to men. In the context of corporate investment decisions, literature is however less conclusive. Farrell and Hersch (2005) observe a negative relation between firm risk and the presence of female directors, but Adams and Funk (2012) find the opposite result.

In the context of banking, we are only aware of one study which has investigated the influence of gender of executives on bank risk-taking: Berger, Kick and Schaeck (2014). They provide an analysis of three demographic characteristics of executive officers of German banks, including gender, on bank risk-taking. They document a positive link between female representation at the board of banks and portfolio risk.

Our aim in this research is to provide new evidence on the influence of gender of CEOs on bank risk. We use a unique dataset of Polish cooperative banks over the period 2008-2012 for which we have information on balance sheet variables, but also on corporate governance. This dataset presents three key advantages for the investigation of the influence of CEO gender on bank risk.

First, the presence of women as CEOs is very frequent in the considered sample of banks. Namely about 40% of CEOs are women, which is unique for the banking industry. As a comparison, only about 3% of executive directors are women in the study of Berger, Kick and Schaeck (2014). Therefore, we can provide a thorough comparison of bank risk between banks supervised by men and by women which is not influenced by the specific characteristics of a handful of female managers.

Second, our sample is large and very homogenous. We consider 365 banks all performing similar activities, within the same regulatory environment and under the same supervision. They are all small cooperative banks, involved in sme- and retail banking activities and with similar funding possibilities. As a consequence, differences in risk across banks are not strongly influenced by differences in their business models.

Third, all banks have a small and simple management structure. These financial institutions have a management board with three to five members, including the CEO at the head. As a consequence, the effect of CEO characteristics on corporate decision-making is likely to be stronger than in large banks, in which complex corporate governance structure makes it harder to disentangle the role of CEO and thus of her personal traits on crucial decisions.

Our evidence on higher risk aversion of women CEOs thus advances the understanding of the determinants of risk-taking behavior in banks. It has broad implications for bank regulatory authorities. Measures implemented to limit excessive risk-taking behavior of banks should not be restricted to capital requirements in line with the objective to prevent moral hazard behavior. Regulators may also need to influence corporate governance of banks by supporting female participation in bank executive structures. Our results provide an important argument to on-going policy discussions regarding introducing gender quotas in the management board of companies. Following the Norwegian example of 2003 for public companies, many EU countries have seriously considered implementing such measures..

The rest of the article is structured as follows. Section 2 presents the associated literature. Section 3 develops data and methodology. Section 4 presents the findings. Section 5 concludes.

2. Related literature

In our paper, we join a few strands of literature. Firstly, both psychological and economic research suggests that there is a gender-specific difference in risk aversion. Women are found to be more risk averse, both in survey responses (Barsky et al. 1997) and in trading

behaviour (Barber and Odean, 2001). They perceive risks to be higher (Finucane et al., 2000) and are less prone to hold their retirements in risky assets, especially if they are not married (Sunden and Surette 1998). Similarly, single women are found to be significantly more risk averse when allocating their total household wealth (Jianakoplos and Bernasek, 1998). Powell and Ansic (1997) underline that the one gender difference that persists throughout the literature is the higher risk aversion of women. Other gender differences, e.g. in management styles, studies of personality traits of entrepreneurs or leadership roles, are no longer taken for granted. In a meta-analysis of experimental studies based on a common investment game Charness and Gneezy (2012) confirm that women are consistently found to be more risk averse. Similarly, an extensive review of experimental evidence on gender differences in preferences done by Croson and Gneezy (2009) supports higher risk aversion of women. On the other hand, using survey data, Adams and Funk (2012) demonstrate that women who are directors are less risk-averse than their male counterparts, contrary to the general population results.

Secondly, there is a growing literature studying effects of gender board diversity on corporate policies. A number of studies have explored consequences of introducing a 40% quota of women board members in Norwegian listed companies. Ahern and Dittmar (2012) show it has led to a deterioration in operating performance of these firms, due to choosing younger and less experienced members. A different explanation to deteriorated profits of Norwegian firms is demonstrated by Matsa and Miller (2013). They show that firms affected by quotas undertook fewer workforce reductions, thus increasing labor costs and reducing short-term profits. On the other hand, post-quota female board members in Norway were more qualified than their female predecessors (Bertrand et al., 2014). Gender diversity on boards of US firms brings mixed results, enhancing their monitoring abilities and boosting performance in weakly governed firms, but undermining shareholder value in companies with strong governance (Adams and Ferreira, 2009). Women directors tend to serve on boards of better performing companies, but the announcement of the appointment of female directors does not bring significant abnormal returns, so the market does not value them or their impact on performance more than male directors (Farrell and Hersch, 2005). On the other hand, Huang and Kisgen (2013) demonstrate that investors react more favorably to corporate decisions made by firms with female executives, and that male executives, due to overconfidence, engage in value-destroying mergers. In Chinese non-financial listed firms, board gender diversity enhances firm performance (Liu, Wei and Xie, 2014), while no relation is found between the share of female directors and performance of the largest 50 Chinese banks (Liang, Xu and Jiraporn, 2013).

Thirdly, an increasing number of papers demonstrate the effects of personal traits of CEOs on corporate decision making. Overconfidence of CEOs makes the company's investment decisions strongly dependent on cash flow (Malmendier and Tate, 2005) and increases the probability of their firm making value-destroying acquisition (Malmendier and Tate, 2008). CEOs that have experienced the Great Depression avoid debt financing in their corporate decisions (Malmendier et al. 2011), similarly to these that avoid personal indebtedness on home mortgages (Cronqvist, Makhija and Yonker, 2012). Managers with military experience pursue more aggressive corporate strategies (Malmendier, Tate and Yan, 2011), while CEOs scoring higher on risk appetite psychometric tests make more corporate acquisitions (Graham et al. 2013). The most direct evidence of personal traits affecting corporate policies is provided by Graham et al. (2013) and Cronqvist, Makhija and Yonker (2012), where the authors apply respectively psychometric personality tests and personal indebtedness measures. Similarly, Kaplan, Klebanov and Sorensen (2012) use data from CEO candidate interviews to conclude that their general abilities and execution skills are positively related to subsequent performance.

Last but not least, a few studies have investigated the influence of gender in banking. Two works have focused on the gender of loan officers and tend to find that default rates of loans originated by women are lower than men's (Agarwal and Wang, 2009, Beck, Behr and Güttler, 2009). This finding supports the view that women would take lower risk than men. In the context of bank-firm relationships, Bellucci, Borisov and Zazzaro (2010) also find that women are more risk-averse and less self-confident. Finally the closest paper to our investigation is the study of Berger, Kick and Schaeck (2014). They examine the effects of management board members' traits on risk taking in German banks for the period 1994-2010. They find that higher risk taking is associated with the young age of executives, a lower proportion of executives with PhD and - last but not least - female board members. Concerning this latter finding, they therefore tend to support the view that the presence of women in management would be associated with risk. However it has to be stressed that they consider two measures related to portfolio risk and the female participation in executive boards in their sample is very low (at c.3%).

3. Data and Methodology

The Polish cooperative banking sector consists of 565 cooperative banks, which are associated under two associating banks, Bank Polskiej Spółdzielczości (BPS) and Spółdzielcza Grupa Bankowa (SGB). The two banking associations cover the north-western part of Poland (SGB) and the south-eastern regions (BPS). Cooperative banks are supervised by the national bank supervisory authorities and are regular members of the deposit insurance system. Cooperative banks are frequently headquartered in smaller towns and their activities are restricted to serving clients from their core regions ('poviats'). Only the largest banks are allowed to expand their deposit- and lending- activities beyond their home poviats. The business of cooperative banks strongly bases on agriculture (c.40%) and local sme's, along their retail business. They perform traditional loan-and-deposit bank activities and they are practically not active on securities or equity markets. Frequently, cooperative banks serve local administration units and participate in regional projects. Thus, despite their relatively low share in banking sector assets (c.8%), cooperative banks are regarded as important institutions contributing to regional business development.

We use data for 365 Polish cooperative banks. They are all active in Poland and are associated under one associating bank, Bank Polskiej Spółdzielczości. [1] Our sample contains observations from 2008 to 2012. Our final sample for estimation consists of 1494 bank year observations. We match the bank dataset with Polish Statistical Office (GUS) data on regions (*Local Data Bank*).

The focus of our research is to investigate the influence of gender of bank CEOs on bank risk. The explanatory variable of primary concern is *Female CEO*, defined as a dummy variable equal to one if the CEO is a woman, and to zero else.

To select control variables, we follow the empirical literature on the determinants of bank risk (e.g., Berger, Kick and Schaeck, 2014). We take CEO age into account with the age in years of the CEO (*CEO Age*). We consider bank size defined as the natural logarithm of total assets (*Size*) and the business model of the bank, proxied by the share of fees in total operating income (*Fee share*). We refrain from using additional bank-level control variables for two reasons. First, cooperative banks in Poland are very homogenous and then our estimations do not require the same set of control variables as other estimations on more diverse datasets of banks. Second, the introduction of further control variables can distort the results on bank risk, given the possible correlations between variables. We control for the macroeconomic

[1] Our dataset covers around two thirds of the total cooperative bank population in Poland. We belive this is fairly representative of the whole sector.

environment with the level of registered unemployment in the commune (”poviat”) where the bank is headquartered (*Unemployment*).

The explained variable is bank risk. Our key variable for bank risk is the total capital adequacy ratio reported by the bank (*Capital adequacy*), due to a number of reasons. First, it is the most comprehensive measure, accounting for all risk types and reflecting current bank policy towards maintaining more or less conservative reserves. Second, regulatory capital ratios are under detailed supervisory scrutiny in Poland, especially given recent problems with capitalization in the Polish credit union sector. Thus, reported capital adequacy ratios are unlikely to suffer from significant managerial discretion. Third, the main source of risk for Polish cooperative banks is credit risk. However, credit risk ratios have been criticized to expose only the realized portion of asset quality problems. Non-performing loans display loans that have already defaulted and loan loss provisions are made to account for these realized losses.

However we also consider three alternative risk measures to provide a broad analysis of the effects of CEO gender on bank risk. *Equity to Assets* is used as an alternative risk measure that sheds more light on whether capital is held depending on risk weightings or as a simple nominal reserve buffer against adverse events. It then provides complementary information to capital adequacy ratio.

In spite of their limitations, we use for comparison sake the ratio of non-performing loans to loans (*NPL*) and the ratio of loan loss provisions to total assets (*LLP*). Both ratios rather reflect the consequences of earlier policy conducted by CEOs. In comparison, capital adequacy ratios most closely reflect the risk attitude of CEOs, with higher capital adequacy ratios corresponding to risk aversion and lower ratios denunciating risk appetite of CEOs. However credit risk ratios are commonly used in the literature to take bank risk into account (e.g., Berger and DeYoung, 1997; Berger, Klapper and Turk-Ariss, 2009), so it is of interest to consider them as alternative measures of bank risk in our estimations.

We do not use additional indicators for bank risk. First, as cooperative banks are not listed, our choice of bank risk measures cannot include indicators based on market value or stock prices. Second, we do not use the z-score because our period of study is too short to allow computing relevant measures. Third, we do not compute the measures of portfolio risk as Berger, Kick and Schaeck (2014). This study considers the ratio of risk-weighted total assets to total assets and a Herfindahl-Hirschman index for loan portfolio concentration to measure bank risk. We prefer using capital adequacy ratio which provides a better indicator of bank risk of the banks of our sample as explained above, or adopting non-performing loans ratio and loan loss provisions ratio which are most commonly used in the studies on bank risk.

Descriptive statistics of main variables are presented in Table 1 for the total sample and Table 2 for male and female CEOs separately. Table 3 depicts correlations between the main variables. A key observation is the fact that 41.2% of CEOs are women. So the appointment of female CEOs is not at all exceptional, and allows a satisfactory comparison between male and female CEOs.

In order to analyze the effect of CEO gender on bank risk, we then estimate the following equation:

$$Bank\ risk_{i,t} = \alpha + \beta\ CEO\ gender_{i,t} + \gamma\ Control\ Variables_{i,t} + \varepsilon_{i,t} \quad (1)$$

With *i* represents bank and *t* year. We use the random effects estimation with standard errors clustered at the bank level.

4. Results

This section presents the results for the impact of CEO gender on bank risk. We begin with the main estimation results and then turn to additional estimations. We finally provide some robustness checks.

4.1 Main estimations

Our main results are displayed in Table 4. We perform estimations by using alternatively the four bank risk measures.

In our benchmark estimation with *Capital adequacy*, we observe that *Female CEO* is significantly positive. This finding also stands when using *Equity to assets* as the risk measure. We then support the view that female CEOs heading banks are associated with lower risk aversion and then contribute to reduce bank risk. Financial institutions headed by female CEOs record higher levels of capital, both in terms of total capital adequacy and equity to assets ratios.

The economic effect of gender on capital adequacy is relatively high, amounting to over one percentage point in the total capital ratio. It may not appear high at first glance in comparison to the conservative average capitalization of Polish cooperative banks, but it is significant in relation to the Basel minimum of 8%.

Capital is regarded as a buffer against the unexpected part of a bank's loss distribution. However, capital is also used to offset losses suffered on non-performing loans, when loan loss

reserves are not sufficient. As a result, it is possible that women-led banks maintain higher capital ratios because their credit risk is more elevated.

It is then of interest to examine the estimations with both bank risk measures considering credit risk, *NPL* and *LLP*. They prove that this is not the case: we have no significant coefficient for *Female CEO* in these estimations. Hence female CEOs do not lead banks with higher non-performing loans nor larger loan loss provisions.

Our results thus indicate that being led by a woman improves capital adequacy and equity to assets ratios without a simultaneous increase in credit risk. As a result, a female CEO is associated with more prudent capital adequacy ratios which results in higher stability of the bank.

A potential concern of the influence of CEO characteristics on firm policies is the discussed in the literature endogeneity problem. The appointment of a particular CEO with a specific set of traits may be the consequence rather than the cause of the financial situation of the firm. It is difficult to fully solve this endogeneity, but our sample allows to limit its scope. Due to high representation of female CEOs, we can trim our sample and consider only these banks, for which no CEO replacement took place during the period of study. These banks have a male CEO or a female CEO from the beginning till the end of the period of study. We then redo our estimations. The results are presented in Table 5. Apart from lower endogeneity concerns, we believe the restricted sample allows to double-check the CEO effects. They are obviously more visible in a longer period, during which the CEO had the chance to influence firm policy.

We obtain the same findings as on the full sample. Namely we find a significantly positive of *Female CEO* on *Capital adequacy* and on *Equity to Assets.,* At the same time we observe no significant relation between *Female CEO* and both credit risk measures. In addition, the positive impact of female CEOs on capital adequacy increases by about 25% for banks where these CEOs have not changed within the sample period, in comparison to the full sample. These results strongly support our main conclusion. The banks with CEO change over the period do not drive the findings obtained on the full sample of banks. Thus, it is not the case that female CEOs are appointed in less risky and more capital-affluent banks, or that they introduce higher capital adequacy because they arrive at problem banks.

In a nutshell, our main conclusion is the positive influence of female CEOs on capital adequacy, which supports the view that women appointed at the head of banks have lower risk aversion and contribute to lower bank risk.

4.2 Additional estimations

We perform additional estimations to have a broader view of the influence of CEO gender on bank risk.

First, we redo estimations by considering subgroups of banks by size. We want to investigate if our main findings stand for all sizes of banks. The determinants of bank risk can differ across types of banks by size, thus the impact of CEO gender can evolve with bank size. Subsamples are constructed based on the median of average total assets for the full period. Banks lying above the median are classified as large, while the others are classified as small. Results are presented in Table 6.

Interestingly we find exactly the same results for both subgroups. When considering large banks or small banks, *Female CEO* has a positive and significant influence on *Capital adequacy* and on *Equity to assets* but no significant impact on *NPL* and *LLP*. Another interesting result concerns the magnitude of the impact of *Female CEO*: the coefficient of this variable is much higher for small banks than for large banks when explaining *Capital adequacy* and *Equity to assets.* It then suggests that a female executive is even more influential on bank risk within smaller institutions.

Second, we consider the potential role of the local economic environment. It can affect the relation between CEO gender and bank risk in various ways. On the one hand, it can influence risk aversion as evidence shows that bank risk aversion enhances with poor economic conditions. On the other hand, men and women can react differently when facing loan requests, given their sensitivity to poverty.

Consequently we reestimate the equation for two subsamples based on the mean employment over the whole period. Regions with unemployment below the median are classified as strong economies, while the remainder makes up the weak economy subsample.

The results are displayed in Table 7. Our main finding is not influenced by the nature of the local economic environment: female CEOs maintain persistently higher capital adequacy ratios in banks located both in stronger and weaker economies. This demonstrates that the capital buffer is not earmarked to cover a lack of robustness in local economic environments.

However the relation between gender and equity levels loses significance for the weaker economies subsample, so the level of capital is possibly related to the general risk level within the bank. Indeed, higher equity levels held by female CEOs in stronger regions correspond to higher non-performing loans experienced by them in these economies. The relation between

gender and loan loss provisions remains insignificant, indicating that despite weaker asset quality, loan loss reserves are not more generous and potential buffers are maintained within capital.

Third, we analyze if the relation between CEO gender and bank risk is influenced by CEO age. There are again several reasons for these additional estimations. The most notable one is the fact that there is a possibility that women become CEOs in certain conditions, for example that male CEOs retire and are replaced by women of the younger generation. In such a case, the gender effect could be in fact representative of the age effect. In order to check this, we add an interaction term between *Female CEO* and *CEO age* in the estimations.

The results are reported in Table 8. We observe no significant coefficient for the interaction term between *Female CEO* and *CEO age*. In other words, the influence of *Female CEO* on bank risk is not influenced by the age of the CEO. This finding helps us rejecting then the fact that the gender effect would indeed be an age effect.

4.3 Robustness checks

In order to determine the robustness of our results, we reestimate the main model by incorporating two different indicators.

First, we include the loans to assets ratio as an explanatory variable. Namely this indicator can be considered as a control variable of prime importance as it takes into account the structure of assets. However some studies consider this ratio as a measure of bank risk, which creates concerns for our investigation. We then decide not to include it in our main estimations for this reason. We want nonetheless to test the inclusion of this ratio to check if our main findings are preserved. Table 9 displays the estimations with the loans to assets ratio. We obtain the same findings: *Female CEO* is significantly positive when explaining *Capital adequacy* and *Equity to assets*, and not significant for both credit risk measures.

Second, we take into account the bankruptcy rate in the local economy. The idea is to include one additional variable for the local economic environment. Namely we take into account the local economic conditions with the unemployment rate, but we want to also include a direct variable for the global financial situation of companies in one region. We therefore define the bankruptcy rate as the ratio of liquidated firms to total firms in the region. Our main results are sustained, with female CEOs holding higher capital adequacy and equity to assets levels.

5. Conclusion

In this study, we examined the relation between CEO gender and bank risk. To achieve this goal, we use a unique dataset of Polish cooperative banks which gather homogenous financial institutions, for which about 40% of CEOs are women.

Overall we find evidence that the presence of a female CEO is associated with lower bank risk. Banks headed by women have higher capital adequacy and equity to assets ratios. Credit risk in female-led banks is not different from their male-led peers, thus higher capital adequacy does not stem from lower asset quality and is likely to be linked to higher risk aversion of female CEOs. The effect is even stronger for banks which have not experienced any CEO turnover throughout the whole sample period. Additional estimations show that these findings are very robust.

Our conclusions are of particular importance for the banking industry. They provide some support for the view that regulators should favor gender quotas in the board management of banks to reduce risk-taking behavior. We do not claim that such measures would be sufficient, but they can complement measures aimed at directly reducing incentives for moral hazard behavior.

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Table 1
Descriptive statistics of main variables

Variable	Number of obs.	Mean	Std. Dev.	Min	Max
Risk measures					
Capital adequacy	1538	16.966	6.408	8.070	50.770
Equity to assets	1538	13.040	4.331	6.292	30.743
NPL	1538	3.663	3.585	0.005	22.737
LLP	1522	0.211	0.319	-2.585	3.189
Explaining variables					
Female CEO	1494	0.412	0.492	0	1
Size	1538	18.237	0.805	16.448	21.283
Unemployment	1538	14.1	5.155	2.8	33.8
Fee share	1538	25.465	6.008	12.700	44.744
CEO age	1494	57	8	29	79

Notes: Capital adequacy is the total capital adequacy ratio reported by bank; Equity to assets is the relation of equity in year *t* to assets in year *t*; NPL are non-performing loans in year *t* to total loans in year *t*; LLP is loan loss provisions in year *t* to total assets in year *t*; Fee share is the share of net fees in total operating operating income; Loans/assets is the relation of total loans in year *t* to assets in year *t*; Size in the natural logarithm of total assets; Unemployment is the level of registered unemployment in the powiat where the bank is headquartered; Female CEO is a dummy variable equal to 1 if CEO is female, CEO age is the time-varying age expressed in years measured from end-2013; Bankrupcty ratio is the ratio of liquidated firms at the end of year *t* in relation to total firms registered in the powiat.

Table 2
Descriptive statistics for female and male CEOs

Variable	Female CEOs					Male CEOs				
	N	Mean	St. Dev	Min	Max	N	Mean	St. Dev	Min	Max
Risk measures										
Capital adequacy	616	18.53	6.94	9.02	50.77	878	15.86	5.74	8.07	46.94
Equity to assets	616	14.23	4.53	7.07	30.74	878	12.22	3.99	6.29	28.84
NPL	616	3.56	3.68	0.01	22.52	878	3.69	3.47	0.01	22.74
LLP	607	0.21	0.31	-0.94	1.55	872	0.22	0.33	-2.59	3.19
Explaining variables										
Female CEO	616	1	0	1	1	878	0	0	0	0
Size	616	18.04	0.74	16.45	20.63	878	18.38	0.82	16.54	21.28
Unemployment	616	13.71	5.19	2.8	33.3	878	14.40	5.14	2.8	33.8
Fee share	616	25.29	6.06	12.70	44.50	878	25.52	5.99	12.94	44.74
CEO age	616	56.37	8.18	29	79	878	56.80	8.40	32	77

Notes: Capital adequacy is the total capital adequacy ratio reported by bank; Equity to assets is the relation of equity in year *t* to assets in year *t*; NPL are non-performing loans in year *t* to total loans in year *t*; LLP is loan loss provisions in year *t* to total assets in year *t*; Fee share is the share of net fees in total operating operating income; Loans/assets is the relation of total loans in year *t* to assets in year *t*; Size in the natural logarithm of total assets; Unemployment is the level of registered unemployment in the powiat where the bank is headquartered; Female CEO is a dummy variable equal to 1 if CEO is female, CEO age is the time-varying age expressed in years measured from end-2013; Bankrupcty ratio is the ratio of liquidated firms at the end of year *t* in relation to total firms registered in the powiat.

Table 3
Correlation between the main variables

	Capital adequacy	Equity to assets	NPL	LLP	Fee share	Size	Unempl.	CEO age
Capital adequacy	1							
Equity to assets	0.866*	1						
NPL	-0.087*	-0.129*	1					
LLP	-0.054	-0.026	0.345*	1				
Fee share	-0.155*	-0.183*	-0.024	-0.153*	1			
Size	-0.668*	-0.719*	0.255*	0.123*	0.030	1		
Unemployment	0.086*	0.109*	-0.136*	-0.003	0.125*	-0.095*	1	
Female CEO	0.205*	0.229*	-0.018	-0.013	-0.019	-0.207*	-0.066	
CEO age	0.054	0.040	0.061	0.046	-0.006	0.028	0.063	-0.026

Notes: *Capital adequacy* is the total capital adequacy ratio reported by bank; *Equity to assets* is the relation of equity in year *t* to assets in year *t*; *NPL* are non-performing loans in year *t* to total loans in year *t*; *LLP* is loan loss provisions in year *t* to total assets in year *t*; *Fee share* is the share of net fees in total operating operating income; *Size* in the natural logarithm of total assets; *Unemployment* is the level of registered unemployment in the powiat where the bank is headquartered; *Female CEO* is a dummy variable equal to 1 if CEO is female, *CEO age* is the time-varying age expressed in years; *, ** and *** denote significance levels of 0.1, 0.05 and 0.01 respectively. Standard errors are in brackets.

Table 4
Main estimations

	Capital adequacy	Equity to assets	NPL	LLP
Female CEO	1.1005***	0.6406***	0.3739	0.0155
	[0.320]	[0.219]	[0.297]	[0.022]
CEO age	0.0245*	0.008	0.0069	0.0014
	[0.015]	[0.009]	[0.016]	[0.001]
Fee share	-0.0871***	-0.0789***	-0.0527***	-0.0116***
	[0.020]	[0.015]	[0.019]	[0.002]
Size	-3.6921***	-3.9607***	1.7961***	0.0702***
	[0.325]	[0.224]	[0.211]	[0.014]
Unemployment	0.2426***	0.1307***	0.0425	0.0059***
	[0.029]	[0.023]	[0.029]	[0.002]
Constant	81.4916***	84.8295***	-28.8037***	-0.9350***
	[6.129]	[4.217]	[3.888]	[0.276]
Number of obs.	1494	1494	1494	1479
Number of banks	347	347	347	347
R^2	0.019	0.1870	0.1007	0.0911

Notes: *Capital adequacy* is the total capital adequacy ratio reported by bank; *Equity toassets* is the relation of equity in year *t* to assets in year *t*; *NPL* are non-performing loans in year *t* to total loans in year *t*; *LLP* is loan loss provisions in year *t* to total assets in year *t*; *Fee share* is the share of net fees in total operating operating income; *Size* in the natural logarithm of total assets; *Unemployment* is the level of registered unemployment in the powiat where the bank is headquartered; *Female CEO* is a dummy variable equal to 1 if CEO is female, *CEO age* is the time-varying age expressed in years; *, ** and *** denote significance levels of 0.1, 0.05 and 0.01 respectively. Standard errors are in brackets.

Table 5
Gender - risk effects for banks with changes in CEO position and no changes

	Capital adequacy	Capital adequacy	Equity to assets	Equity to assets	NPL	NPL	LLP	LLP
	CEO constant	Total sample	CEO constant	Total sample	CEO constant	Total sample	CEO constant	Total sample
Female CEO	1.371**	1.100***	0.495	0.641***	0.439	0.374	0.0259	0.0155
	[0.590]	[0.320]	[0.339]	[0.219]	[0.396]	[0.297]	[0.026]	[0.022]
CEO age	0.231***	0.0245*	0.117***	0.008	0.0827***	0.00689	0.00495***	0.00137
	[0.033]	[0.015]	[0.021]	[0.009]	[0.021]	[0.016]	[0.001]	[0.001]
Fee share	-0.0663***	-0.0871***	-0.0700***	-0.0789***	-0.0386*	-0.0527***	-0.0110***	-0.0116***
	[0.022]	[0.020]	[0.018]	[0.015]	[0.020]	[0.019]	[0.002]	[0.002]
Size	-4.307***	-3.692***	-4.391***	-3.961***	1.693***	1.796***	0.0682***	0.0702***
	[0.371]	[0.325]	[0.266]	[0.224]	[0.237]	[0.211]	[0.015]	[0.014]
Unemployment	0.152***	0.243***	0.0973***	0.131***	-0.0101	0.0425	0.00361	0.00588***
	[0.033]	[0.029]	[0.029]	[0.023]	[0.034]	[0.029]	[0.002]	[0.002]
Constant	81.87***	81.49***	86.93***	84.83***	-30.80***	-28.80***	-1.088***	-0.935***
	[6.777]	[6.129]	[4.966]	[4.217]	[4.260]	[3.888]	[0.306]	[0.276]
Number of obs.	1234	1494	1234	1494	1234	1494	1222	1479
Number of banks	283	347	283	347	283	347	283	347
R^2	0.0502	0.019	0.2450	0.1870	0.0944	0.1007	0.0921	0.0902

Notes: *Capital adequacy* is the total capital adequacy ratio reported by bank; *Equity to assets* is the relation of equity in year *t* to assets in year *t*; *NPL* are non-performing loans in year *t* to total loans in year *t*; *LLP* is loan loss provisions in year *t* to total assets in year *t*; *Fee share* is the share of net fees in total operating income; *Size* in the natural logarithm of total assets; *Unemployment* is the level of registered unemployment in the powiat where the bank is headquartered; *Female CEO* is a dummy variable equal to 1 if CEO is female, *CEO age* is the time-varying age expressed in years; *, ** and *** denote significance levels of 0.1, 0.05 and 0.01 respectively. Standard errors are in brackets.

Table 6
Estimations by size

	Capital adequacy	Capital adequacy	Equity/assets	Equity to assets	NPL	NPL	LLP	LLP
	Large banks	Small banks	Large banks	Small banks	Large banks	Small banks	Large banks	Small banks
Female CEO	0.6121**	1.2189**	0.4199**	0.6312*	0.4606	0.1156	-0.0066	0.0361
	[0.307]	[0.524]	[0.203]	[0.362]	[0.353]	[0.462]	[0.032]	[0.032]
CEO age	0.0213*	0.0436	0.005	0.0329*	0.0076	0.0078	-0.0004	0.0029
	[0.012]	[0.029]	[0.007]	[0.017]	[0.017]	[0.030]	[0.002]	[0.002]
Fee share	-0.0355	-0.0904***	-0.0584***	-0.0808***	-0.0905***	-0.0012	-0.0119***	-0.0101***
	[0.023]	[0.031]	[0.015]	[0.022]	[0.028]	[0.025]	[0.003]	[0.002]
Size	-0.7097**	-6.9873***	-2.0158***	-7.8237***	2.6318***	1.5556***	0.1173***	0.1146***
	[0.294]	[0.786]	[0.258]	[0.466]	[0.396]	[0.479]	[0.027]	[0.035]
Unemployment	0.1480***	0.2918***	0.1220***	0.1936***	0.0742*	-0.0093	0.0065**	0.004
	[0.030]	[0.047]	[0.023]	[0.034]	[0.043]	[0.041]	[0.003]	[0.003]
Constant	24.3929***	138.6865***	47.9901***	150.4508***	-44.4750***	-24.6470***	-1.7383***	-1.8026***
	[5.750]	[13.658]	[5.036]	[8.234]	[7.509]	[8.009]	[0.549]	[0.598]
Number of obs.	740	754	740	754	740	754	732	747
Number of banks	167	180	167	180	167	180	167	180
R^2	0.0365	0.0651	0.1757	0.3008	0.1832	0.0428	0.1422	0.0655

Notes: *Capital adequacy* is the total capital adequacy ratio reported by bank; *Equity/assets* is the relation of equity in year *t* to assets in year *t*; *NPL* are non-performing loans in year *t* to total loans in year *t*; *LLP* is loan loss provisions in year *t* to total assets in year *t*; *Fee share* is the share of net fees in total operating income; *Size* in the natural logarithm of total assets; *Unemployment* is the level of registered unemployment in the powiat where the bank is headquartered; *Female CEO* is a dummy variable equal to 1 if CEO is female, *CEO age* is the time-varying age expressed in years; *, ** and *** denote significance levels of 0.1, 0.05 and 0.01 respectively. Standard errors are in brackets.

Table 7
Estimations by local environment

	Capital adequacy	Capital adequacy	Equity to assets	Equity to assets	NPL	NPL	LLP	LLP
	Strong economies	Weak economies	Strong economies	Weak economies	Strong economies	Weak economies	Strong economies	Weak economies
Female CEO	1.0499**	1.0159**	0.5993***	0.5635	1.0601***	-0.4607	0.0271	0.0085
	[0.411]	[0.462]	[0.230]	[0.371]	[0.403]	[0.398]	[0.033]	[0.028]
CEO age	0.0237	0.0233	0.0055	0.0098	0.0228	-0.0091	0.0012	0.0013
	[0.018]	[0.024]	[0.008]	[0.018]	[0.022]	[0.017]	[0.002]	[0.002]
Fee Share	-0.0611**	-0.1145***	-0.0692***	-0.0867***	-0.0721***	-0.0355	-0.0152***	-0.0079***
	[0.027]	[0.028]	[0.019]	[0.025]	[0.026]	[0.024]	[0.002]	[0.003]
Size	-4.0260***	-3.5568***	-3.9851***	-4.1886***	1.8629***	1.4579***	0.0669***	0.0684***
	[0.438]	[0.486]	[0.319]	[0.327]	[0.302]	[0.279]	[0.021]	[0.017]
Unemployement	0.3265***	0.2415***	0.2139***	0.1240***	0.1088	0.0934**	0.0245***	0.0067*
	[0.056]	[0.041]	[0.033]	[0.039]	[0.067]	[0.040]	[0.006]	[0.004]
Constant	86.8309***	79.1901***	84.7267***	88.8259***	-30.9734***	-23.2315***	-0.9460**	-1.0322***
	[8.265]	[9.083]	[6.031]	[6.013]	[5.461]	[5.269]	[0.419]	[0.363]
Number of obs.	752	742	752	742	752	742	741	738
Number of banks	173	174	173	174	173	174	173	174
R^2	0.0442	0.0107	0.2803	0.1412	0.1058	0.0999	0.1425	0.0638

Notes: *Capital adequacy* is the total capital adequacy ratio reported by bank; *Equity/assets* is the relation of equity in year *t* to assets in year *t*; *NPL* are non-performing loans in year *t* to total loans in year *t*; *LLP* is loan loss provisions in year *t* to total assets in year *t*; *Fee share* is the share of net fees in total operating income; *Size* in the natural logarithm of total assets; *Unemployment* is the level of registered unemployment in the powiat where the bank is headquartered; *Female CEO* is a dummy variable equal to 1 if CEO is female, *CEO age* is the time-varying age expressed in years; *, ** and *** denote significance levels of 0.1, 0.05 and 0.01 respectively. Standard errors are in brackets.

Table 8
Estimations with the interaction between Female CEO and CEO age

	Capital adequacy	Equity/assets	NPL	LLP
Female CEO	2.6446	1.8614	-0.689	-0.0156
	[2.066]	[1.240]	[1.703]	[0.139]
CEO age	0.0335*	0.0152	0.0003	0.0012
	[0.019]	[0.012]	[0.021]	[0.002]
Female CEO*CEO age	-0.0278	-0.0219	0.0189	0.0005
	[0.036]	[0.022]	[0.030]	[0.002]
Fee share	-0.0873***	-0.0791***	-0.0525***	-0.0116***
	[0.020]	[0.016]	[0.019]	[0.002]
Size	-3.6834***	-3.9530***	1.7898***	0.0701***
	[0.324]	[0.223]	[0.212]	[0.014]
Unemployment	0.2436***	0.1314***	0.0425	0.0059***
	[0.029]	[0.023]	[0.029]	[0.002]
Constant	80.8216***	84.2793***	-28.3222***	-0.9217***
	[6.132]	[4.148]	[4.018]	[0.288]
Number of obs.	1494	1494	1494	1479
Number of banks	347	347	347	347
R^2	0.0195	0.1880	0.1018	0.0911

Notes: *Capital adequacy* is the total capital adequacy ratio reported by bank; *Equity/assets* is the relation of equity in year *t* to assets in year *t*; *NPL* are non-performing loans in year *t* to total loans in year *t*; *LLP* is loan loss provisions in year *t* to total assets in year *t*; *Fee share* is the share of net fees in total operating income; *Size* in the natural logarithm of total assets; *Unemployment* is the level of registered unemployment in the powiat where the bank is headquartered; *Female CEO* is a dummy variable equal to 1 if CEO is female, *CEO age* is the time-varying age expressed in years; *, ** and *** denote significance levels of 0.1, 0.05 and 0.01 respectively. Standard errors are in brackets.

Table 9
Robustness check: With Loans to Assets

	Capital adequacy	Equity to assets	NPL	LLP
Female CEO	1.0760***	0.6237***	0.3694	0.0156
	[0.322]	[0.218]	[0.294]	[0.022]
CEO age	0.024	0.0076	0.0069	0.0014
	[0.015]	[0.009]	[0.016]	[0.001]
Fee share	-0.0872***	-0.0784***	-0.0521***	-0.0117***
	[0.020]	[0.015]	[0.019]	[0.002]
Size	-3.7592***	-3.9970***	1.7890***	0.0697***
	[0.327]	[0.224]	[0.211]	[0.014]
Unemployment	0.2334***	0.1246***	0.0404	0.0060***
	[0.029]	[0.024]	[0.029]	[0.002]
Loans / assets	0.0192*	0.0131**	0.004	-0.0005
	[0.010]	[0.006]	[0.009]	[0.001]
Constant	81.1757***	84.4225***	-29.0115***	-0.8798***
	[6.115]	[4.237]	[3.942]	[0.318]
Number of obs.	1494	1494	1494	1479
Number of banks	347	347	347	347
R^2	0.0207	0.1927	0.1007	0.0902

Notes: *Capital adequacy* is the total capital adequacy ratio reported by bank; *Equity/assets* is the relation of equity in year *t* to assets in year *t*; *NPL* are non-performing loans in year *t* to total loans in year *t*; *LLP* is loan loss provisions in year *t* to total assets in year *t*; *Fee share* is the share of net fees in total operating income; *Size* in the natural logarithm of total assets; *Unemployment* is the level of registered unemployment in the powiat where the bank is headquartered; *Female CEO* is a dummy variable equal to 1 if CEO is female, *CEO age* is the time-varying age expressed in years; *, ** and *** denote significance levels of 0.1, 0.05 and 0.01 respectively. Standard errors are in brackets.

Table 10
Robustness check: With the bankruptcy rate in the local economy

	Capital adequacy	Equity to assets	NPL	LLP
Female CEO	1.1013***	0.6371***	0.3769	0.0152
	[0.321]	[0.219]	[0.297]	[0.022]
CEO age	0.0245*	0.008	0.0069	0.0014
	[0.015]	[0.009]	[0.016]	[0.001]
Fee share	-0.0847***	-0.0841***	-0.0495***	-0.0117***
	[0.020]	[0.016]	[0.019]	[0.002]
Size	-3.6873***	-3.9653***	1.7974***	0.0698***
	[0.325]	[0.224]	[0.211]	[0.014]
Unemployment	0.2446***	0.1258***	0.0461	0.0056***
	[0.029]	[0.023]	[0.029]	[0.002]
Bankruptcy rate	-0.0112	0.0276***	-0.0211	0.0012
	[0.011]	[0.008]	[0.014]	[0.002]
Constant	81.4084***	84.8888***	-28.7863***	-0.9335***
	[6.138]	[4.213]	[3.883]	[0.275]
Number of obs.	1494	1494	1494	1479
Number of banks	347	347	347	347
R^2	0.0196	0.1896	0.1007	0.0911

Notes: *Capital adequacy* is the total capital adequacy ratio reported by bank; *Equity/assets* is the relation of equity in year *t* to assets in year *t*; *NPL* are non-performing loans in year *t* to total loans in year *t*; *LLP* is loan loss provisions in year *t* to total assets in year *t*; *Fee share* is the share of net fees in total operating income; *Size* in the natural logarithm of total assets; *Unemployment* is the level of registered unemployment in the powiat where the bank is headquartered; *Female CEO* is a dummy variable equal to 1 if CEO is female, *CEO age* is the time-varying age expressed in years; *, ** and *** denote significance levels of 0.1, 0.05 and 0.01 respectively. Standard errors are in brackets.