

Does the capital structure affect banks' profitability?

Pre and post-financial crisis evidence from significant banks in France

3rd EBA Policy Research Workshop, 25-26 November 2014

Olivier de Bandt (presenter), Boubacar Camara, Pierre Pessarossi and Martin Rose

Summary of results

- ❑ **We find a positive effect of different indicators of capitalization on the ROE of French banks on period 1993-2012**
 - controlling for risk-taking, business model
 - and taking into account of the “pure” accounting effect
- banks that increase capital do relatively better than other banks in terms of next two periods ROE

- ❑ **Holding more capital is shown to induce higher efficiency (revenue channel more than cost-channel)**

- ❑ **Results are very robust, in particular for banks that are more constrained (using confidential data on pillar 2 capital)**

Plan

- I. Motivation and contribution**
- II. Literature and hypotheses**
- III. Data and Methodology**
- IV. Results and Robustness checks**
- V. Further investigation : capitalisation and efficiency**
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I. Motivations and contribution

1. Renewed attention to the bank capital since the last financial crisis
2. Debate on the potential trade-offs of higher capital requirements: Banks often argue that higher capital will jeopardize their performance
3. No consensus from a theoretical point of view (Modigliani-Miller (1958), Diamond and Rajan (2001), Holmstrom and Tirole (1997)...)
4. To contribute to the debate, we analyze how bank capitalization affects their Return on Equity (ROE)

I. Motivations and contribution

1. Evidence from France, major developed country with one of the largest banking system in Europe
2. Novel database assembled by the *Autorité de Contrôle Prudentiel et de Résolution*
3. We focus on several measures of capitalization
4. We focus on significant banks for which the macro prudential regulation is the most relevant

II. Literature and hypothesis (1)

According to the theoretical literature, we test three different hypotheses

- **Hyp. 1 : The capital structure has no impact on bank profitability (Modigliani & Miller, 1958)**
 - The capital structure has no impact on assets' revenues
 - For a given assets' risk, the cost of equity increases with leverage
 - After an increase in capital:
 - The cost of equity decreases due to a decrease in leverage
 - The weighted average cost of capital (equity and debt) does not change

II. Literature and hypothesis (2)

□ Hyp. 2 : Capitalisation negatively impacts bank profitability

- Debt has a disciplining effect on banks' managers since they have to make efficient decisions to regularly repay creditors (e.g. Hart and Moore, 1995)
- Debt contributes to address the agency conflicts between managers and shareholders
- Deposits may also have a disciplining effect since depositors can run on the bank (Diamond et Rajan, 2001). However, a large part of deposits is held by small insured depositors who have neither incentive nor expertise to monitor banks (Dewatripont and Tirole, 1994)
- Besides, the existence of capital requirements may lead to a lower risk/return trade-off (Berger et Udell, 1994; Thakor, 1996)

II. Literature and hypothesis (3)

- **Hyp. 3 : Capitalisation has a positive impact on bank profitability**
 - Capital reduces the incentives of shareholders to take excessive risks. This may reduce debtholders interest rate requirements
 - Higher capital contributes to improve bank's rating
 - Another potential explanation is that bank profitability increases through the *monitoring channel*. In fact, bank's incentives in terms of monitoring increase with capital (Holmstrom et Tirole, 1997; Mehran et Thakor, 2011)
 - Shareholders support a higher part of losses. Consequently, they have more incentives to monitor and require higher efficiency

III. Data & Methodology A) Data

1. 17 banks over the period 1993-2012 (but not all banks in a given year)
2. Selection criterion: significant banking groups in the definition of the European SSM (TA>30Bn € + a few banks in the 'grey' zone list close to 30Bn)
3. We take into account M&A over the period analyzed

III. Data & Methodology B) Main model (1)

$$ROE_{i,t} = \alpha_i + \theta_t + \beta_1 \cdot Capitalization_{i,t-j} + \beta_2 \cdot Equity\ accounting\ effect_{i,t-1} + X_{c,i,t} \cdot \beta_c + \varepsilon_{i,t}$$

- A fixed effect (FE) model at the bank and year level to take into account individual and temporal correlation between variables
- Standard-errors are robust to heteroskedasticity (Hubert-White (1981) standard-errors)
- Multicollinearity issue: Bank size excluded because largest contributor to multicollinearity (VIF criterion) and we only have large banks

III. Data & Methodology B) Main model: how to deal with the endogeneity of capital issue? (2)

- **Granger-causality tests show that there is not a bi-directional causality:**
 - Capital ratios measures 'Granger-cause' ROE
 - ROE does not 'Granger-cause' capital measures

- **To avoid the contemporaneous effect of retained earnings we consider:**
 - A 1y lag between the capital ratio measures and ROE
 - A 2y lag between the capital ratio measures and ROE
 - One specification including both lagged values at the same time

III. Data & Methodology B) Main model: capitalization measures (3)

□ We consider five different capital ratio measures :

- **Capital ratio:**
 - Equity / Total assets
- **Tier1/Tangible assets:**
 - $(\text{Capital Tier1} - \text{Intangible assets}) / (\text{Total assets} - \text{Intangible assets})$
- **Tier1/Total assets with off-balance sheet exposures:**
 - Tier1 / Total assets with off-balance items weighted by their revocable nature
- **Tier1regulatory ratio:**
 - Tier1 / Risk-weighted assets (Basel I)
- **Total regulatory ratio:**
 - Tier1+Tier2 / Risk-weighted assets (Basel I)

III. Data & Methodology B) Main model: controlling for the accounting effect (4)

- An “*Equity accounting effect*” is included as an additional variable in order to distinguish the “pure” accounting effect from the economic effect of capital
 - By definition, an increase in equity has a negative accounting effect on ROE
 - *Equity accounting effect* equals 1 when the growth rate of equity in the preceding year is positive:
 - This is different from a capital ratio measure
 - A bank can increase its capitalization without increasing its equity by reducing its assets
 - Thus, coefficients on capital measures identify the economic effect when this variable is controlled for

IV. Results: robustness checks (1)

- ❑ We check whether SEO have a different impact on ROE
- ❑ We take into account bank size (not included in the main model due to multicollinearity)
- ❑ We lag our control variables (1y)
- ❑ We include the growth rate of equity (instead of a *dummy*) to capture the accounting effect of capital on ROE
- ❑ We use the average value of capital measures on the 2years before ROE
- ❑ We check for non linearity effects of capital measures, diversification and loan share: we find no evidence of non-linearity in these effects

IV. Results: robustness checks (2)

- ❑ We take into account bank market power (deposits over total deposits of the banking system in a given year / a similar measure with total assets)
- ❑ We exclude the financial crisis period from the analysis
- ❑ We exclude the pre-2002 period to control for the effects of bank privatization in France (changes in management that affect both ROE and capitalization)
- ❑ We use Basel II RWA definition after 2008
- ❑ We check the results using ROA and RORAC as alternative measures of performance
- ❑ Overall, we still find a positive relationship between capitalization and performance

V. Further investigations: Capitalisation and efficiency (1)

- ❑ We identify the channel through which higher capital is associated with higher future earnings following **Berger (1995)** for a sample of US Banks
- ❑ A potential explanation may be a stronger monitoring from the bank which increases the value added of its assets
- ❑ First, net income is divided into its different components namely **revenues** (interest, commission, trading and other incomes net of impairment, amortization and provisions) and **costs** (interest, commission and administrative expenses)
- ❑ Revenues and costs are successively divided by total equity and total assets (to neutralize the 'accounting effect')
- ❑ We then construct an efficiency measure, the ratio of **net operating income to administrative expenses**

V. Further investigations: Capitalisation and efficiency (2) –LHS is net operating income over administrative expenses

	(1)	(2)	(3)	(4)	(5)
Capital ratio $t-1$	11.854***				
	(2.523)				
T1/Tang. Assets $t-1$		12.607***			
		(2.854)			
T1/TA with OBS $t-1$			19.575***		
			(3.330)		
T1 reg. ratio $t-1$				8.819***	
				(1.664)	
Total reg. ratio $t-1$					5.192***
					(1.267)
Asset div.	0.186	0.233	0.224	0.605	0.577
	(0.820)	(0.763)	(0.742)	(0.751)	(0.767)
Loan share	1.292	0.971	0.706	0.358	0.752
	(0.891)	(0.904)	(0.856)	(0.861)	(0.950)
Safety net	-1.096	-0.421	-0.516	-0.786	-0.802
	(0.751)	(0.737)	(0.715)	(0.744)	(0.826)
Portfolio risk	-0.592	-0.620	-0.555	0.957	0.482
	(0.760)	(0.826)	(0.808)	(0.795)	(0.861)
Liquidity ratio	-0.008	-0.009	-0.011	-0.015	-0.013
	(0.028)	(0.028)	(0.026)	(0.031)	(0.032)
Constant	1.128***	0.952**	0.972***	0.274	0.377
	(0.381)	(0.384)	(0.368)	(0.403)	(0.436)
Year effects	Yes	Yes	Yes	Yes	Yes
Observations	132	132	132	132	132
N. of banks	17	17	17	17	17
Adj. R ² (%)	90.26	89.86	90.64	90.07	89.23

V. Further investigations: Capitalisation and efficiency (3)

- Our results suggest that:
 - Relatively well capitalized banks tend to be more efficient
 - Revenues increase faster than costs after an increase in capital
 - An increase in capital is associated with an increase in our efficiency measure
 - Consequently, well capitalized banks tend to be more efficient

- Berger (1995) finds similar results for a sample of US banks. Also consistent with Berger-Bouwman (2013)

VI. Conclusion

- ❑ We study empirically the effect of capital on the ROE
- ❑ We find a positive effect of capital level on the ROE of French banks, taking into account of risk-taking
- ❑ Holding more capital is shown to induce higher efficiency (revenue channel more than cost-channel)
- ❑ Further research:
 - Take into account the regulatory constraint, using data on the capital buffer thanks to data on pillar 2 capital
 - Measure impact of changes in governance and effects on performance (mergers, privatizations, etc)

Thank you for your attention