Capital Structure and Bank Risk Taking---
The Case of German Banks in 1895-1933

Alex Ching Yiu Ng
Faculty Sponsor: Richard Grossman, Economics Department

Introduction

• The heavy use of debt financing by commercial and investment banks had been hypothesized to cause the credit crisis in 2007-2008. To lower future risk in the banking system, Basel III was developed to restrict bank leverage and strengthen bank liquidity requirements. Meanwhile, some argue that the mere imposition of minimum thresholds on capital and liquidity is insufficient for reducing risk.
• This research collects balance sheet data of German banks during 1895-1933 from a manual of German share companies to study the relationship between capital structure and bank risk.
• The fixed effects models show that banks do exercise more prudence under a higher capital ratio. This, however, does not reduce the risk that is eventually faced by banks. There appears to be a gap between the level of risk that banks pursue and the level of risk that remains in the system.

Methodology

• Fixed effects regressions are chiefly used to investigate the association between capital-to-asset ratio and bank risk taking.
• Capital includes ordinary shares, preference shares, share premium, and other reserves but excludes profit/loss for the current fiscal year.
• How risky a bank behaves is measured by its liquidity condition and asset growth rate, assuming that banks that are risk-seeking tend to back their current liabilities with less amount of current assets and are more eager to grow their businesses.
• Variability of profit over years is this study’s ultimate measurement of bank risk since profit is the operating result of a bank and variability is a common measure of risk in finance.

Sample

• Handbuch der Deutschen Aktien-Gesellschaften was an annual publication that attempted to record detailed balance sheet data of all public and private share companies registered in Germany at that time. For the purpose of this research, only banks located in contemporary Germany are studied.
• Balance sheet data of 1552 German banks during 1895-1933 were extracted from the Handbuch, giving a total of 13168 observations. Data include not just aggregate asset, liability, and capital, but also individual items such as cash holdings and deposits from customers.
• As data cleaning process is still on-going and 1923 data are heavily skewed by hyperinflation, only 1054 banks (5973 observations, spreading across all years of 1895-1933 except year 1923) whose asset and liability balances are 95% accurate are actually used as sample.
• To obtain a more balanced panel for the fixed effect models, 70 banks that appear continuously during 1904-1913 (700 observations) are sub-sampled. This is the largest number banks over the longest continuous panel that can be obtained. All models are run on both the sample and the sub-sample.

Models

1. \( CR_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 EV_{it} + \beta_3 \text{State}_{i} + \alpha_i + \epsilon_{it} \)
2. \( EV_{it} = \beta_0 + \beta_1 CAR_{it} + \beta_2 GDP_{it} + \beta_3 \text{State}_{i} + \alpha_i + \epsilon_{it} \)
3. \( \ln(PV_{it}) = \beta_0 + \beta_1 CAR_{it} + \beta_2 \ln(TA_{it}) + \beta_3 EV_{it} + \beta_4 \text{State}_{i} + \alpha_i + \epsilon_{it} \)

- CR = Current Ratio = Current Assets/Current Liabilities
- PV = Profit Variability = \((\text{Profit}_{t-1} - \text{Profit}_{t-20}) / \text{Profit}_{t-1}) \times 100
- CAR = Capital Ratio = (Capital/Total Assets) \times 100
- TA = Total Assets
- GDP = Real GDP Growth Rate
- EV = Variability in Economy = \((\text{Real GDP Growth Rate}_{t-1} - \text{RGDP Growth Rate}_{t-20}) / \text{Real GDP Growth Rate}_{t-1}) \times 100

Discussion

• As capital ratio increases, banks hold more current assets against current liabilities (meaning a better liquidity position) and are more cautious to grow. Both measures show that banks pursue less risk when they are financed more by equity.
• Capital ratio is not significantly associated with profit variability after unobserved heterogeneity is taken out.
• Although capital structure has an effect on bank risk-taking behaviors, the final resulting bank risk seems to be affected rather more by macro-economic fluctuations.
• Models run on the sub-sample tend to show no significant results, and in the case of asset growth, show insignificant results that are contradictory to models run on the entire sample. Hausman tests indicate that random effects should be used over fixed effects in all the three regressions on the sub-sample; the tests show that fixed effects are rightly chosen for all the three regressions on the entire sample.

References & Acknowledgements

[6] "Effective Federal Funds Rate (FEFFUNOS)." Federal Reserve Bank of St. Louis

I would like to thank Prof. Richard Grossman for his guidance in this research, QAC director Manolis Kaparakis for software coaching, and all other RAs who had helped inputting the data.