

Analyzing Risk Taking of German Banks, 1895-1933

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Abstract

•This project analyzes bank balance sheets from Germany during the period 1897-1933. The objective is to see if banks that hold higher levels of capital undertook less risk than those that were less highly capitalized. Given the emphasis of current day policy makers on strengthening bank capital ratios (e.g., Basel Accords, stress tests), this should be of interest to both economic historians and those interested in current issues in banking.

•The first part of the project was to compile individual bank sheets from 1895 to 1933 into a single database. Although aggregate banking data is readily available (*Deutsche Bundesbank, 1976*), there is no easily accessible data on individual bank balance sheets.

•The second part was to observe how individual banking behavior may have been affected by the characteristics of the bank balance sheet. We attempted to identify which, if any, traits of banks, such as size or region, might have affected bank behavior.

•You can say, contrary to what we expected, we found that banks with higher capital to asset ratios held less cash and were more rapidly growing than those holding lower capital to asset ratios.

Data and Methods

•Panel data from individual bank sheets ranging from 1895 to 1933 obtained from the *Handbuch der deutschen Aktiengesellschaften*, a manual of German share companies

•Only banks from areas falling within present-day Germany were included. This was to help preserve the data from outliers and hopefully give a more accurate portrayal of domestic bank behavior.

Method: We used fixed effect and random effect models

Dependent Variables:

Asset Growth Rate- Used as an indicator for bank performance. Rapid growth may be a sign of profitability, but could also be a sign of excessive risk-taking. Also indicative of higher risk taking.

Cash/Asset-Used as a measure of how solvent the bank is and how cautious a bank is.

Independent Variables:

Dividend – Payments made to its shareholders. Most modern corporations attempt to keep dividends smooth to not disturb shareholders, but they were more fluid in the time period we're working in. Used as perceived economic health in the public eye

Regional Change- Change in number of banks in specific region. Used as an indicator of bank concentration within a region.

Current Age-Current age of bank according to the bank statement year to account for year-specific effects.

Log(Total Assets)-Log of total assets to account for size effects.

Capital/Asset- Capital to asset ratio, used to determine bank's adequacy to meet time liabilities and credit risks. More capital suggests that banks will behave more cautiously.

Profit/Capital – Profit divided by capital.

GDP rate- GDP growth rate.

Hyperinflation- Dummy variable where hyperinflation =1 when the bank statement year is 1923

Liquidation- Dummy variable where liquidation =1 if the bank is liquidated or in the process of liquidation

Results

The equations for our models are the following

$$y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_{it} + \beta_4 X_{it} + \alpha_i + u_{it}$$

y_{it} = cash to asset ratio

β_1 = coefficient for regional bank change

β_2 = coefficient for capital to asset ratio

β_3 = coefficient for log(total assets)

β_4 = coefficient for GDP growth

$$y_{it} = \beta_0 + \beta_1 X_{it} + \beta_2 X_{it} + \beta_3 X_{it} + \beta_4 X_{it} + \beta_5 D_{it} + \beta_6 D_{it} + \alpha_i + u_{it}$$

y_{it} = asset growth rate

β_1 = coefficient for log(total assets)

β_2 = coefficient for capital to asset ratio

β_3 = coefficient for dividend

β_4 = coefficient for profit to capital ratio

β_5 = coefficient for hyperinflation dummy

β_6 = coefficient for kommandit type bank dummy

	(1) Cash/Assets	(2) Cash/Assets	(3) Cash/Assets	(4) Cash/Assets
Capital/Assets	-0.0207*** (0.000)	-0.0232*** (0.000)	-0.00912 (0.092)	-0.00905 (0.095)
Regional Bank Growth		0.0000428* (0.013)	0.0000554** (0.001)	0.0000460* (0.010)
log(Assets)			0.00278*** (0.000)	0.00296*** (0.000)
GDP Growth Rate				0.000209* (0.030)
Constant	0.0458*** (0.000)	0.0463*** (0.000)	-0.000399 (0.966)	-0.00357 (0.709)
Observations	8944	8721	8721	8721
Adjusted R ²	-0.181	-0.183	-0.180	-0.179

p-values in parentheses
*p < 0.05, **p < 0.01, ***p < 0.001

	(1) Asset Growth Rate	(2) Asset Growth Rate	(3) Asset Growth Rate	(4) Asset Growth Rate	(5) Asset Growth Rate	(6) Asset Growth Rate
Capital/Assets	-157585.4*** (0.000)	291924.9*** (0.000)	266366.1*** (0.000)	76377.6*** (0.000)	35030.4** (0.003)	33518.0** (0.004)
log(Assets)		79990.5*** (0.000)	83897.6*** (0.000)	11642.9*** (0.000)	2129.7* (0.048)	1916.8 (0.074)
Dividend			-587926.5*** (0.000)	68387.5** (0.003)	112685.5*** (0.000)	115357.5*** (0.000)
reincap				0.00946 (0.475)	-0.0763*** (0.000)	-0.0754*** (0.000)
Hyper Inflation					202932.0*** (0.000)	200634.0*** (0.000)
Kommandit						-33461.5*** (0.000)
Constant	51620.1*** (0.000)	-1305168.9*** (0.000)	-1320457.4*** (0.000)	-202828.6*** (0.000)	-48687.3** (0.008)	-42892.9* (0.019)
Observations	7573	7573	7573	1243	1243	1242
Adjusted R ²	-0.159	-0.118	-0.115	-0.309	-0.040	-0.024

p-values in parentheses
*p < 0.05, **p < 0.01, ***p < 0.001

	(1) Cash/Assets	(2) Asset Growth Rate	(3) Cash/Assets	(4) Asset Growth Rate
Capital/Assets	-0.00608 (0.202)	6294.7 (0.224)	-0.00538 (0.258)	7085.5 (0.191)
Regional Bank Growth	0.0000457** (0.009)		0.0000168 (0.639)	
log(Assets)	0.00242*** (0.000)	358.0 (0.459)	0.000228 (0.715)	790.1 (0.150)
GDP Growth Rate	0.000254** (0.007)		0.000387* (0.032)	
Dividend		76926.6*** (0.000)		80199.8*** (0.000)
reincap		-0.0935*** (0.000)		-0.0906*** (0.000)
Hyper Inflation		237868.6*** (0.000)		228164.0*** (0.000)
Kommandit		-2264.5 (0.599)		-2523.4 (0.550)
Constant	0.0110 (0.412)	-10749.2 (0.214)	0.0427*** (0.000)	-13950.3 (0.457)
Observations	8721	1242	8721	1242
Adjusted R ²				
Location Dummy	Yes	Yes	No	No
Year Dummy	No	No	Yes	Yes

p-values in parentheses
*p < 0.05, **p < 0.01, ***p < 0.001

Conclusions

Our results show that there is a strong correlation between capital/assets and asset growth rate and a weak correlation with cash/assets. These results do not accord with our priors—we expected higher capital to asset ratios to be associated with greater cash holdings and slower bank growth, since more capital at risk suggests banks will be more cautious.

- The cash to assets ratio diminishes as capital to assets increase. The results are significant at the 10% level, suggesting weak correlation
- As banks have more capital, their asset growth rate increases. This is significant at the 1% level, suggesting a strong correlation between the variables
- When regional and yearly dummy variables were included in the models, the capital to asset ratio was not significant in either model.

Our results are not consistent with other studies. These correlations, despite their strengths, do not coincide with explanations presented in prior research. Possible reasons for the unusual results include incorrect models and faulty data.

According to our models, banks with higher capital to asset rates took on more risk by keeping a lower cash to asset ratio. These banks also experienced high asset growth rates. Larger banks also appear to hold a higher cash to assets ratio.

Further Research

Although the results were not typical, there are many methods to test the validity of the results. Some could be used to evaluate the credibility of our research and others to discover different conclusions.

- Control for confounding factors** – Other factors that could affect bank performance can be controlled for. Obtaining data on regional population is one possibility. This would help isolate the effect of capital/assets on bank performance.
- Clean up data set** – Having a large dataset allowed for mistakes in data format, missing data and incorrectly entered data. There were many mistakes and missing data in the balance sheets, and some missing years with no data.
- Duration Modeling** – Duration models can be used to see how long a bank survived and how capital to assets affected their performance. These models can account for the different time periods each bank existed in.

References and Acknowledgements

Deutsche Bundesbank, *Deutsches Geld- und Bankwesen in Zahlen, 1876-1975*, Frankfurt am Main : Knapp, 1976.

Grossman, Richard S. and Masami Imai "Contingent Capital and Bank Risk-Taking: Evidence from British Equity Markets before World War I," unpublished working paper, March 2011.

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