

Capital Requirements and Systematic Risk in Banking

(Work in Progress – Ideas Welcome!)

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Systemic Risk?

- “Systemic” → affecting many institutions simultaneously
- Motivating question:
Can banks amplify market stress by acting together in a similar fashion?

Market Risk

- 1996: Basel Capital Accord was amended and market-risk based capital charge was introduced (based on Value-at-Risk)
- Aim: improve soundness of individual bank balance sheets
- “VaR vicious cycle” (Persaud 2000):
Rise in market vol. → VaR limits of some banks are hit → sell at the same time → more vol. → more selling

Prior Research

- Empirical study of Jorion (2005): correlation between trading revenues and market risk capital charges of large US commercial banks
- Theoretical work:
 - capital requirements do not mitigate banks' incentives to undertake correlated investments (Acharya, 2001)
 - VaR-induced incentives for choice of assets and under/over reporting (Cuoco and Liu (2003))
- Capital constraints and banks' lending practices and effects of monetary policy (VanHoose (2007) : Survey)

Our Approach

- Systematic Risk: Comovement of a stock return of a publicly traded bank holding company with a return of portfolio of banking stocks or market portfolio.
- Use market beta as a measure of exposure to systemic risk.
- Focus on differences before and after 1996, low/high capital, low/high trading activities

Research Questions

- Overall change in systematic risk after 1996?
- What effects do capital and trading activity have on a bank's exposure to systematic risk?
- Differences in the effect of the bank trading activity on exposure to systematic risk of undercapitalized/well capitalized banks before/after 1996?

Variables

- Dependent: individual bank's quarterly holding period return
- Explanatory :
 - holding period return of the market or banking industry portfolio (R_m or R_b)
 - $HTA = 1$ if the ratio of a bank's trading assets to its total assets is in the 50+ percentile, 0 otherwise
 - $HKA = 1$ if a bank's capital-to-assets ratio is above 8% and 0 otherwise
 - $After1996 = 1$ for the period starting from the first quarter of 1996 and 0 otherwise

Specifications

$$R_{it} = \alpha + \beta_1 * R_{M_t} + \beta_2 * R_{M_t} * HTA_{it} + \beta_3 * R_{M_t} * HKA_{it} + \beta_4 * R_{M_t} * HTA_{it} * HKA_{it} +$$
$$\text{After1996} * (\phi + \beta_5 * R_{M_t} + \beta_6 * R_{M_t} * HTA_{it} + \beta_7 * R_{M_t} * HKA_{it} + \beta_8 * R_{M_t} * HTA_{it} * HKA_{it}) + \varepsilon_{it}$$

where

- R_{it} return on stock of i th BHC over quarter t
- R_M market (banking) portfolio return
- HTA is a dummy variable for “high trading accounts as a fraction of total assets”
- HKA is a dummy variable for “high capital-to asset ratio”

Data

- Quarterly , 1986:Q2 to 2007:Q4
- 53 publicly traded BHCs (4,611 observations)
- “Large” banks
- Assets and capital: bank holding company financial statements (Y-9 forms)
- Returns on stocks of : CRSP database
- Returns on banking and market portfolios: Kenneth French’s web-site

Table 1. Systematic risk exposure for different groups of banks and expected signs

	<i>Before 1996</i>	
	Low KA	High KA
Low TA	β_1	$\beta_1 + \beta_3$
High TA	$\beta_1 + \beta_2$	$\beta_1 + \beta_2 + \beta_3 + \beta_4$
Difference (High TA – Low TA)	$\beta_2 > 0$	$\beta_2 + \beta_4 > 0$
	<i>After 1996</i>	
	Low KA	High KA
Low TA	$\beta_1 + \beta_5$	$\beta_1 + \beta_3 + \beta_5 + \beta_7$
High TA	$\beta_1 + \beta_2 + \beta_5 + \beta_6$	$\beta_1 + \beta_2 + \beta_3 + \beta_4 + \beta_5 + \beta_6 + \beta_7 + \beta_8$
Difference (High TA – Low TA)	$\beta_2 + \beta_6 > 0$	$\beta_2 + \beta_4 + \beta_6 + \beta_8 > 0$

Table 3. Estimates of the systematic risk exposure for different groups of banks

Bank portfolio return as a measure of R_m

	<i>Before 1996</i>	
	Low KA	High KA
Low TA	0.726*** (0.00)	0.604*** (0.00)
High TA	0.907*** (0.00)	0.705*** (0.00)
Difference (High TA – Low TA)	0.181*** (0.00)	0.101 (0.20)
	<i>After 1996</i>	
	Low KA	High KA
Low TA	0.601*** (0.00)	0.685*** (0.00)
High TA	0.944*** (0.00)	0.792*** (0.00)
Difference (High TA – Low TA)	0.343*** (0.00)	0.107** (0.04)

Table 5. Estimates of the systematic risk exposure for different groups of banks

Return on S&P 500 index as a measure of R_m

	<i>Before 1996</i>	
	Low KA	High KA
Low TA	0.885*** (0.00)	0.746*** (0.00)
High TA	1.081*** (0.00)	1.008*** (0.00)
Difference (High TA – Low TA)	0.196** (0.02)	0.262* (0.07)
	<i>After 1996</i>	
	Low KA	High KA
Low TA	0.343*** (0.00)	0.455*** (0.00)
High TA	0.801*** (0.00)	0.525*** (0.00)
Difference (High TA – Low TA)	0.458*** (0.00)	0.070 (0.33)

Estimation Results

- No overall increase in beta after 1996
- K/A tends to reduce (not always significantly) exposure to systematic risk
- Trading activities increase exposure to systematic risk
 - Effect is the strongest for undercapitalized banks after 1996 (more than doubled compared to pre-1996)
 - For well-capitalized banks the effect becomes insignificant after 1996

Interpretation?

Suppose a bank with high trading accounts is in need of capital due to an unexpected market shock

→ needs to either sell its assets or raise more capital (maybe not easy)

→ 1) perceived by the markets as bad news

2) simultaneous massive sales may drive prices even further down and volatility up

→ Undercapitalized bank will have higher sensitivity to market conditions after the introduction of market risk-based capital requirements

Conclusions

- Found no industry-wide increase in exposure to systemic risk after 1996 capital accord amendments
- While market-risk-based capital requirements “help” well capitalized banks, they may “hurt” undercapitalized banks
 - Having more capital became even more important

Future Work

- Shortcoming:
 - more capital because a bank is more prudent or because its positions are riskier?
 - Need to control for riskiness of assets
- Need to distinguish between good and bad times
- Measures of systemic risk
- Looking directly at bank portfolios?