DO DEPOSITORS DISCIPLINE BANKS? AN INTERNATIONAL PERSPECTIVE

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BACKGROUND

- **Market discipline seems to have been weakened by government actions in the recent financial crisis.**

- **Government rescue actions for troubled financial institutions.**
  - **Increased deposit insurance coverage (e.g., FDIC, Dodd-Frank).**
  - **Capital injections (e.g., TARP).**
  - **Government takeovers of financial institutions (e.g., AIG, Northern Rock).**
  - **More explicit too-important-to-fail protection of large financial institutions (e.g., SCAP).**

- **Goal was to reduce panic and the potential for runs and other short term disruptions.**
  - **A potential unintended long-run consequence may be a reduction in market discipline that might otherwise penalize financial institutions for risk-taking behavior.**

OBJECTIVE OF THE STUDY

- **We examine one important source of market discipline in this study – Depositor discipline.**
- **We investigate depositor discipline effects in both the US and the EU (plus Switzerland) in the period leading up to the recent financial crisis.**
- **We consider**
  - **Two types of measures of risk: Equity capital ratios and loan performance.**
  - **Two measures of discipline: Deposit growth rates and deposit risk premiums.**
  - **Over 2000 commercial banks and bank holding companies (both called "banks" here for convenience) over the period 1997-2007.**
  - **Banks in both the US and the EU.**

RESEARCH ISSUES

- **The US and EU have different deposit insurance systems and potentially different conjectures about too-important-to-fail protection.**
  - **Conduct an international comparison of depositor discipline in the US and the EU.**
- **Large institutions may be subject to either less or more depositor discipline than small institutions because they are considered too important to fail (less discipline) or more of their deposits are uninsured (more discipline).**
  - **Examine separately large (assets > $50 bn) vs. small institutions (assets <= $50 bn).**
- **Measured depositor discipline may be greater or less for listed than unlisted institutions for reasons discussed later.**
  - **Investigate the effect of depositor discipline for listed versus unlisted institutions.**
- **Depositors may react to different indicators of financial performance.**
  - **Examine the effects of both capital ratios and measures of loan performance.**
- **Depositors may react by rationing quantities or demanding higher prices.**
  - **Look at the effect of quantity and price, i.e., deposit growth rates and deposit risk premiums.**

METHODOLOGICAL INNOVATIONS

- **We estimate three types of models: Reduced form models, joint determination models, and dynamic models.**
  - **In the reduced form models, we regress deposit growth rates and deposit risk premiums on bank risk measures and control variables.**
  - **In the joint determination models, we recognize that price and quantity may be jointly determined.**
    - **We include the lag of the other dependent variable in the deposit growth rate and deposit risk premium regressions.**
  - **In the dynamic models, we acknowledge that deposit growth rates and deposit risk premiums may not adjust quickly.**
    - **We estimate partial adjustment models.**

PREVIEW OF MAIN RESULTS

- **Significant depositor discipline in both the US and EU.**
  - **Depositor discipline is stronger at large banks in the US than in the EU.**
- **More economically significant for US large institutions (greater than $50 billion in assets) than for US small institutions (less than or equal to $50 billion in assets).**
  - **Consistent with large institutions having more uninsured depositors.**
- **Less measured discipline for large, listed institutions.**
  - **Either these organizations may be in some cases considered too important to fail, or**
  - **Depositor discipline for these institutions may be based on variables other than equity ratios and loan performance that are not highly correlated with equity ratios or loan performance measures.**
- **Depositors react more consistently to capital ratios than to loan performance measures.**
  - **Loan performance ratios may in some cases not be trusted.**
- **We find depositor discipline effects using both quantities (i.e., deposit growth rates) and prices (i.e., deposit risk premiums).**

DEPOSITOR DISCIPLINE: US EVIDENCE

- Evidence on risk pricing of deposits.
  - Hannan and Hanweck (1988).
- Adjustment of deposit holdings.
  - Goldberg and Hudgins (2002).
- More reliance on insured funds as banks get into trouble.
  - Billet, Garfinkel, and O'Neal (1998).
- Rise in the cost of deposits with a higher level of risk.
  - Maechler and McDill (2006); Cook and Spellman (1994).
- Evidence of depositor discipline at US thrifts.
  - Goldberg and Hudgins (1996); Park and Peristiani (1998).
- Others find little evidence of depositor discipline.
  - Gilbert and Vaughan (1999); Jordan, Peek, and Rosengren (1999); Jagtiani and Lemieux (2001).

DEPOSITOR DISCIPLINE: NON-US EVIDENCE

- **Scarce evidence for Europe:**
  - Mondschean and Opiela (1999): Little depositor discipline in Poland, likely due to full deposit insurance and government ownership of banks.
  - Birchler and Maechler (2001): Considerable evidence of depositor discipline in Switzerland.
- **Other countries: General support for depositor discipline.**
  - Latin American countries.
    - Martinez Peria and Schmukler (2001) for Argentina, Chile, and Mexico.
    - Calomiris and Powell (2001) for Argentina.
    - Barajas and Steiner (2000) for Colombia.
  - Russia.
    - Ungan, Caner, and Özyildirim (2008); Semenova (2007).
  - Japan.
    - Murata and Hori (2006); Hori, Murata, and Ito (2009).
  - Others.
    - Ghosh and Das (2006) for India.
    - Omet and Fayyoumi (2004) for Jordan.

DATA

- **We retrieve data on 2,038 banking organizations in the US and 21 EU countries plus Switzerland from Bankscope. We control for M&As by matching the data with the Zephyr database.**

	No. of Institutions	Listed	BHC
EU	1108	140	119
USA	930	250	475
Total	2038	390	594

- **Endogenous variables: Deposit Growth Rate (DGR) and Deposit Risk Premium (DRP).**
- **Key exogenous variables: Equity/Assets (E/A) and Nonperforming Loans/Total Loans (NPLs).**
  - **In the paper, we alternatively use the ratios of loan loss reserves and net charge-offs to total loans.**

		Total Assets ($mn)	DGR (%)	DRP (%)	E/A	NPLs (%)
US Banks	Mean	25,900	8.67	0.42	0.0980	0.68
	Std Dev	108,000	14.01	3.35	0.0446	0.91
EU Banks	Mean	38,800	10.65	1.48	0.0814	3.78
	Std Dev	172,000	18.35	3.85	0.0669	3.44

METHODOLOGY: 3 SETS OF MODELS

Reduced Form Models

$$DGR_{ij,t} = f(BankRisk_{ij,t-1}, W_{ij,t}, Z_{j,t}) + \varepsilon_{it}$$

$$DRP_{ij,t} = g(BankRisk_{ij,t-1}, W_{ij,t}, Z_{j,t}) + \nu_{it}$$

Joint Determination Models

$$DGR_{ij,t} = f(BankRisk_{ij,t-1}, DRP_{ij,t-1}, W_{ij,t}, Z_{j,t}) + \varepsilon_{it}$$

$$DRP_{ij,t} = g(BankRisk_{ij,t-1}, DGR_{ij,t-1}, W_{ij,t}, Z_{j,t}) + \nu_{it}$$

Dynamic Models

$$DGR_{ij,t} = (1-\lambda)DGR_{ij,t-1} + f(BankRisk_{ij,t-1}, DRP_{ij,t-1}, W_{ij,t}, Z_{j,t}) + \varepsilon_{it}$$

$$DRP_{ij,t} = (1-\delta)DRP_{ij,t-1} + g(BankRisk_{ij,t-1}, DGR_{ij,t-1}, W_{ij,t}, Z_{j,t}) + \varepsilon_{it}$$

$BankRisk_{ij,t-1}$: **Equity to assets; nonperforming loans to total loans.**

$W_{ij,t}$ **: Bank controls (size, market share, BHC, foreign ownership).**

$Z_{j,t}$ **: Country controls (Financial Freedom, 3-month money market rate, percentage change in real GDP, lnGDP per capita).**

WHY JOINT DETERMINATION MODELS?

- **Deposit growth rates and deposit risk premiums may be determined simultaneously through the interaction of demand and supply.**
- **High deposit risk premiums may result in an increase in deposit growth rates in the subsequent year, as depositors may be attracted by the high rates.**
- **High deposit growth rates may be followed by drops in deposit risk premiums, as banks may have enough deposits and not want to encourage more deposits with high rates.**

WHY DYNAMIC MODELS?

- **Following the Berger, DeYoung, Flannery, Lee, and Oztekin (2008) model for bank capital, depositors may adjust their supply of or banks may alter their demand for deposits and/or risk premiums toward a target partially over time, rather than fully adjusting over one year.**
  - **Depositors generally develop relationships with banks and maintain various debtor/creditor accounts.**
    - **Rapid adjustment may entail substantial switching and adjustment costs, including developing new relationships with other banks.**
  - **On the demand side, partial adjustment may also be consistent with the bank's strategy to raise funds or adjust rates gradually over time.**

SELECTED EMPIRICAL RESULTS: REDUCED FORM MODELS, DEPOSIT GROWTH RATES

- **In this and subsequent tables:**
  - **Numbers in parentheses are robust standard errors.**
  - **All control variables are included.**

		Large Banks				Small Banks			
		US Banks	**EU Banks**	Listed	Unlisted	**US Banks**	**EU Banks**	Listed	Unlisted
Deposit Growth Rates	E/A	**89.88**	**49.80**	-10.44	46.72	**18.62**	**45.34**	53.01	17.70
		(26.41)* **	**(67.98)**	(44.88)	(26.56)*	**(6.61)*** **	**(10.66)*** **	(11.52)***	(6.91)**
	NPLs	**-4.08**	**-0.25**	0.08	-1.68	**-1.65**	**-0.67**	-0.81	-0.71
		(0.83)* **	**(0.59)**	(0.76)	(0.66)**	**(0.29)*** **	**(0.18)*** **	(0.27)***	(0.16)***

- **Significant depositor discipline for small banks in both the US and EU.**
- **For large banks, more often significant for the US.**
  - **In the EU, there may be a greater *ex ante* perception on the part of depositors that large banks are likely to enjoy too-important-to-fail protection.**

SELECTED EMPIRICAL RESULTS: REDUCED FORM MODELS, DEPOSIT GROWTH RATES

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Deposit Growth Rates	E/A	89.88	49.80	**-10.44**	**46.72**	18.62	45.34	**53.01**	**17.70**
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		(0.83)***	(0.59)	**(0.76)**	**(0.66)****	(0.29)***	(0.18)***	**(0.27)*****	**(0.16)*****

- **Less measured depositor discipline for large, listed institutions.**
  - **Either these organizations may be in some cases considered too important to fail, or**
  - **Depositor discipline may be based on variables other than equity ratios and loan performance that are not highly correlated with equity ratios or loan performance measures.**

SELECTED EMPIRICAL RESULTS: REDUCED FORM MODELS

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		(0.83)***	(0.59)	(0.76)	(0.66)**	(0.29)***	(0.18)***	(0.27)***	(0.16)***
Deposit Risk Premiums	E/A	-19.50	-46.74	-24.18	-28.42	-2.08	-0.39	-4.37	-3.59
		(7.17)***	(15.64)***	(7.33)***	(6.58)***	(0.81)**	(2.08)	(1.08)***	(1.18)***
	NPLs	-0.28	-0.34	-0.33	-0.35	0.03	-0.06	-0.06	-0.03
		(0.33)	(0.09)***	(0.12)**	(0.17)**	(0.33)	(0.03)*	(0.03)**	(0.03)

- **We find depositor discipline effects using both quantities (i.e., deposit growth rates) and prices (i.e., deposit risk premiums).**

SELECTED EMPIRICAL RESULTS: REDUCED FORM MODELS

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	NPLs	-0.28	-0.34	-0.33	-0.35	0.03	-0.06	-0.06	-0.03
		(0.33)	(0.09)***	(0.12)**	(0.17)**	(0.33)	(0.03)*	(0.03)**	(0.03)

- More consistent depositor discipline results using equity to assets compared to loan portfolio performance.
  - Other portfolio measures (loan loss reserves and net charge-offs not shown) do not behave consistently across models.
- Depositors may feel that the loan portfolio performance information is more manipulable by banks, and for that reason do not interpret them as appropriate signals of risk taking.

ECONOMIC SIGNIFICANCE: REDUCED FORM MODELS, US LARGE BANKS

		Large Banks				Small Banks			
		US Banks	**EU Banks**	Listed	Unlisted	US Banks	EU Banks	Listed	Unlisted
Deposit Growth Rates	E/A	**89.88**	49.80	-10.44	46.72	18.62	45.34	53.01	17.70
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	NPLs	-0.28	-0.34	-0.33	-0.35	0.03	-0.06	-0.06	-0.03
		(0.33)	(0.09)***	(0.12)**	(0.17)**	(0.33)	(0.03)*	(0.03)**	(0.03)

- **Given an average deposit growth rate and deposit risk premium of 9.60% and 1.84%, respectively, a 1 percentage point increase in equity to assets:**
  - **Increases the deposit growth rate by almost 90 basis points to become 10.5%.**
  - **Reduces the deposit risk premium by almost 20 basis points to become 1.64%.**

ECONOMIC SIGNIFICANCE: REDUCED FORM MODELS, US SMALL BANKS

		Large Banks				Small Banks			
		US Banks	EU Banks	Listed	Unlisted	**US Banks**	EU Banks	Listed	Unlisted
Deposit Growth Rates	E/A	89.88	49.80	-10.44	46.72	**18.62**	45.34	53.01	17.70
		(26.41)***	(67.98)	(44.88)	(26.56)*	(6.61)***	(10.66)***	(11.52)***	(6.91)**
	NPLs	-4.08	-0.25	0.08	-1.68	-1.65	-0.67	-0.81	-0.71
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	NPLs	-0.28	-0.34	-0.33	-0.35	0.03	-0.06	-0.06	-0.03
		(0.33)	(0.09)***	(0.12)**	(0.17)**	(0.33)	(0.03)*	(0.03)**	(0.03)

- **The effect of equity to assets is less economically significant for small US banks.**
  - **The deposit growth rate increase is much smaller than for large US banks.**
  - **The effect on the deposit risk premium is not economically significant.**

ECONOMIC SIGNIFICANCE: REDUCED FORM MODELS, US LARGE VS. SMALL BANKS

		Large Banks				Small Banks			
		US Banks	EU Banks	Listed	Unlisted	**US Banks**	EU Banks	Listed	Unlisted
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		(26.41)* **	(67.98)	(44.88)	(26.56)*	**(6.61)*** **	(10.66)***	(11.52)***	(6.91)**
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		(0.33)	(0.09)***	(0.12)**	(0.17)**	**(0.33)**	(0.03)*	(0.03)**	(0.03)

- **Stronger effect for large US banks than for small US banks.**
  - **Likely because of higher proportions of uninsured deposits at large US banks.**

CONCLUSIONS

- We examine depositor discipline of bank risk taking in the US and EU in the 11-year period prior to the recent financial crisis.
- We also analyze how the effects of such discipline may differ between large and small institutions, and between listed and unlisted banking organizations.
- We investigate the effects on both deposit growth rates and deposit risk premiums, and examine whether depositors react more to bank equity-to-asset ratios or to measures of loan portfolio performance.
- Our results suggest that there is significant depositor discipline in both the US and EU.
- The effects are generally stronger in the US than the EU for large institutions, consistent with the conjecture that government bailouts were considered to be more likely in the EU.

CONCLUSIONS

- We also find more economically significant depositor discipline for US large institutions (greater than $50 billion in assets) than for US small institutions (less than $50 billion in assets).

- However, we find less measured discipline for large, listed institutions.
  - Either these organizations may be in some cases considered too important to fail, or
  - Depositor discipline for these institutions may be based on variables other than equity ratios and loan performance that are not highly correlated with equity ratios or loan performance measures.

- Depositors appear to react more consistently to the equity-to-assets ratio than to measures of loan portfolio performance.
  - Consistent with the conjecture that the loan portfolio performance may sometimes be considered too manipulable to be trusted.

- We find depositor discipline effects using both quantities (i.e., deposit growth rates) and prices (i.e., deposit risk premiums).

POLICY CONCLUSIONS

- **Our findings suggest that significant depositor discipline exists, or at least did exist prior to the recent financial crisis.**
- **Thus, actions such as raising deposit insurance coverage limits and rescuing troubled institutions may erode an important source of discipline on the risk taking of banking organizations in both the US and EU.**
- **However, Basel III may be complementary to depositor discipline.**
  - **To the extent that it is effective in getting banks to raise their equity capital (more likely in the EU), the affected banks may be rewarded with additional deposits at lower rates.**