BANK CAPITAL
How Much Is Enough?

May 9–11, 2012 ■ Chicago, Illinois

Bank Capital Requirements

Moderator and Discussant

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Lax Lending Standards and Capital Requirements

Pedro Gete* and Natalie Tiernan†

December 2011

The Risk Sensitivity of Capital Requirements:
Evidence from an International Sample of Large Bank

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November 30, 2011

CoCos, Bail-In, and Tail Risk

Nan Chen*, Paul Glasserman†, and Behzad Nouri‡

April 23, 2012

General assessment

- Three related papers that complement each other quite well: important lessons on how bank capital regulations may prevent and/or solve some of the current banking problems.

- The findings of the paper do not always coincide although they do not exactly cover the same specific economic/regulatory problem. Some of the most interesting (and to some extent complementary) findings are:

  - Gete and Tierman suggest that (time varying) capital requirements can reduce excessive bank volatility.

  - Vallascas and Hagendorff suggest that capital requirements are inefficient because there seem to show a low-risk sensitivity.

  - Chen, Glasserman and Nouri suggest that current bank bankruptcy prevention and resolution mechanisms are inefficient and CoCos generally improve the resolution mechanisms since they creating the right risk-taking incentives for banks.

Lax Lending Standards and Capital Requirements
Pedro Gete and Natalie Tiernan

- This paper provides a model to understand the relationship between quantity and quality of bank lending. This has been (and still is) a very serious problem in countries such as Ireland or Spain.

- The paper offers a model where there is a continuum of firms that are heterogeneous in idiosyncratic productivity and are subject to an aggregate productivity shock. Firm productivity is always learned after one period of a credit relationship. Good customers can be "locked-in" for the next period (except if hit by an exogenous separation shock). Thus, when aggregate credit goes up, in the following period the quality of the pool of available borrowers goes down because only productive firms are retained.

- Individual banks do not internalize that by giving credit today they lower the quality of the pool of borrowers tomorrow. This leads them to allocate excessive resources to sales (too little screening) relative to a planner that internalizes the externality ("attract now, screen later" behavior).

Lax Lending Standards and Capital Requirements
Pedro Gete and Natalie Tiernan

- The authors maintain that it is optimal for lending standards to be time-varying if macroeconomic conditions are time-varying. Lending intensity should increase when interest rates are low and when GDP or personal income are growing.

- The problem is that a competitive banking system does not allocate resources efficiently between screening borrowers and selling financial products. It allocates too many resources to sales, thus it "overlends". This amount of overlending changes with macroeconomic conditions.

- The capital requirements that remedy overlending should be time varying, going up when the overlending externality goes up.

Size of the bubble: Core Capital / Total Assets

Default rates (2009)

Annual lending growth rate (2006-2007)
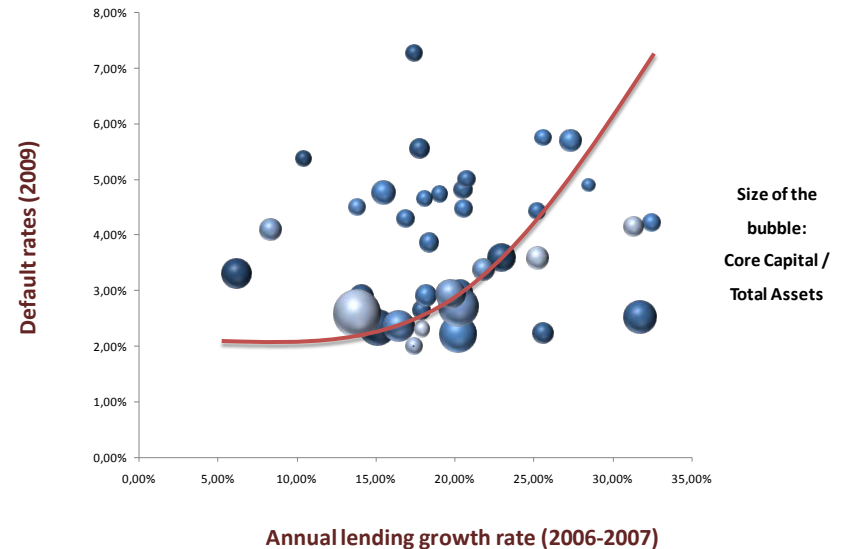
Lax Lending Standards and Capital Requirements
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- The paper nicely describes the macro implications of some micro inefficiencies (excessive competition and excessive lending).

- Competition issues are somehow implicit and they could have a more explicit treatment (non-linear relationships between lending and financial stability).

- The diagnosis (the model itself) seems quite useful seems it reflects three problems that need to be addressed simultaneously in current discussions about capital requirements:
  - Lending cycles (example of current discussions: the role of countercyclical provisions).
  - Time-varying capital requirements (example of current discussions: capital buffers)
  - Overlending (example of current discussions: can provisions and capital requirements prevent excessive loan growth?).

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- Competitive pressures may have affected the provisioning policies of banks, by broadening or narrowing managerial discretion (i.e. *Berger, A.N. and Udell, G.F. (2004): "The institutional memory hypothesis and the procyclicality of bank lending behaviour". Journal of Financial Intermediation 13, 458-495.*)

- In the model, the authors could further explore the relationship between competition and stability looking at non-linear relationships. The standard belief is that when banks charge lower rates, their borrowers have an incentive to choose safer investments, so they will in turn be safer. However, lower rates also reduce the banks' revenues from non-defaulting loans and when this effect is taken into account, a U-shaped relationship between competition and the risk of bank failure can be found (*Martinez-Miera, David, and Repullo, Raphael, 2010, "Does Competition Reduce the Risk of Bank Failure?" Review of Financial Studies, Vol. 23, No. 10, pp. 3638-664.*)
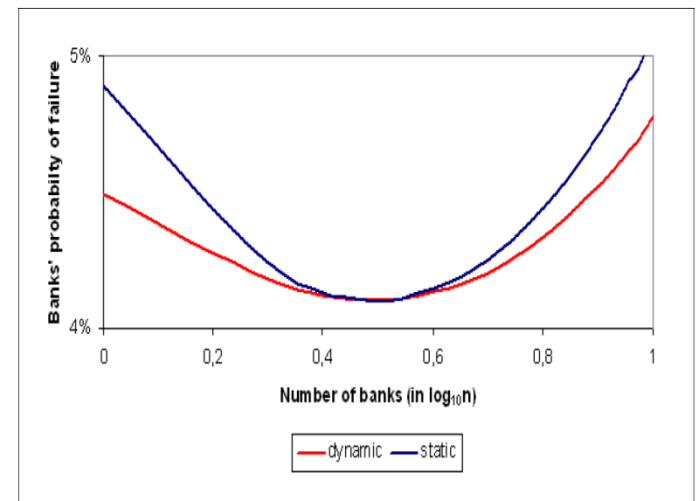
Lax Lending Standards and Capital Requirements
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- In the paper, the diagnosis is quite good (exploring the sources of overlending practices) but some further elaboration on how the recommendation should work (time-varying capital requirements) would be useful.

- For example, one key issue is what time-varying capital requirements can have a better welfare outcome. For example, a social planner does not only want to protect the economy from externalities arising from possible bank defaults but also to ensure that positive net-present value projects are funded. In some cases, if the supply of credit is too much constrained, the optimal balance for a policymaker could be accepting higher failure rates.

Lax Lending Standards and Capital Requirements
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- A key issue here would be to determine which criterion(a) would determine the time-varying nature of capital. Current proposals (using GDP growth) do not seem to be appropriate since business and credit cycles are not fully synchronized. This table shows that for more than half of the recessions, real credit growth is actually positive.:

Real credit growth during recessions[1]
In Percent

	Mean	Percentile							# Obs
		5%	10%	25%	50%	75%	90%	95%	
All data	0.3	-10.7	-5.4	-1.9	1.0	3.7	6.2	8.8	156
until 2007q2	-0.1	-11.8	-6.8	-2.1	0.3	3.6	6.3	8.9	124
Current crisis	1.9	-4.1	-1.6	-0.2	1.6	4.1	5.4	7.8	32

[1] Distribution of average real credit growth during recessions, defined as periods of at least two consecutive quarters of negative real GDP growth.

Source: Drehmann et al (BIS WP 355, 2011)

The Risk Sensitivity of Capital Requirements: Evidence from an International Sample of Large Banks

Francesco Vallascas and Jens Hagendorff

- This paper empirically evaluates the risk sensitivity of minimum capital requirements using an international sample of large banks between 2000 and 2009.

- The results suggest that banks' risk-weighted assets (the regulatory measure of portfolio risk which determines minimum capital requirements) are ill-calibrated to a market measure of portfolio risk.

- Additionally, the results suggest that low risk sensitivity of capital requirements permits banks to build up capital buffers by underreporting their true portfolio risk.

- It is also shown that a low risk sensitivity of capital requirements undermines the ability of banks to withstand adverse shocks. In the run-up to the financial crisis, capital requirements were not risk sensitive at those banks which were subsequently in need of large crisis-related recapitalizations that were at least in part induce by governments.

- While the risk sensitivity of capital requirements is higher for banks that have adopted Basel II and banks located in countries with smaller shadow banking sectors, it remains low across banks and countries.

- The authors suggest that Basel III is unlikely to materially improve the risk sensitivity of capital requirements.

The Risk Sensitivity of Capital Requirements: Evidence from an International Sample of Large Banks

Francesco Vallascas and Jens Hagendorff

- The paper deals with some of interesting regulatory and industry issues under (very intense) discussions now, such as:

  – The way RwA are computed (interesting IMF report*: Sonali; Sy and Amadou N. R. (2012): "How Risky Are Banks' Risk Weighted Assets? Evidence from the Financial Crisis"*).

RWA over Total Assets in Asia, Europe and North America (2002-2010)
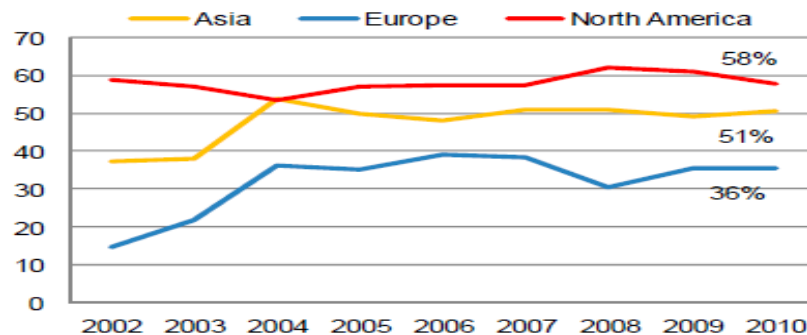
Source: Bloomberg, SNL Financial.

  – The authors examine the relationship between RwA and volatility and admit a positive relationship BUT the increase in volatility does not seem to be followed by a sufficiently large increase in RwA that compensate the risks assumed.

The Risk Sensitivity of Capital Requirements: Evidence from an International Sample of Large Banks
Francesco Vallascas and Jens Hagendorff

- As the authors show: *"Under the assumption that the minimum regulatory capital ratio is ⬚fixed at 8% of RWA, an increase in RWA/TA of nearly 10 percentage points (i.e. the difference in RWA/TA between banks with low- and high portfolio risk) causes regulatory capital to increase by less than 0.8 percentage points. In other words, banks which triple their asset volatility are required to hold less than 0.8 percentage points of additional capital in order to comply with risk-based capital regulations. Evidently, regulatory capital requirements are very weakly related to bank portfolio risk."*

- A limitation for the critique in the paper is that shadow banking is not only a consequence of imperfect solvency regulations. There are other issues currently under discussion (the scope of supervision, the scope of banking activities,…) which are beyond the coverage of this paper.

The Risk Sensitivity of Capital Requirements:
Evidence from an International Sample of Large Banks
### Francesco Vallascas and Jens Hagendorff

- Sample selection, endogeneity and other econometric issues (I):

  - The filtering of the data is correct but the authors' end up with a restricted sample of large banks. The sample consists of 246 banks chartered in 41 countries. If the problem to include a larger number of banks is that they are non-listed, there are ways of generating synthetic "market" values and volatilities for those banks (see, for example, *Carbó Valverde, S., Kane, E. and F. Rodríguez Fernández (2012), "Regulatory arbitrage in cross-border banking mergers within the EU", Journal of Money, Credit and Banking, vol. 43, forthcoming.*)

  - The sample is strongly biased towards the US.

  - Smaller banks are likely to be those most specialized in lending and those that show a higher correlation between RwA and the "true" credit exposure.

The Risk Sensitivity of Capital Requirements: Evidence from an International Sample of Large Banks
Francesco Vallascas and Jens Hagendorff

- Sample selection, endogeneity and other econometric issues (II):

  - Endogeneity issues seem well-identified. Using a system estimator is a nice (albeit not perfect) approach. No discussion is made on the instruments employed (are the standard lagged differenced variables and lagged variables in levels?…).

  - Other ways of dealing with endogeneity: trying different set of instruments and interacting some of the key variables (size, volatility,…).

  - It will be interesting to see how the basic model (without controls) performs. A key disadvantage of dynamic panel models is that coefficients are too sensitive to specification changes. This does not seem to be an important problem in the paper but some additional comments would help.

  - Capital management practices (i.e. signaling) could also explain why banks maintain capital buffers.

  - The securitization/GDP ratio is a rough measure of shadow banking practices.

CoCos, Bail-In, and Tail Risk
Nan Chen, Paul Glasserman and Behzad Nouri

- This is a hot and very interesting topic. This paper offers a great taxonomy of policy alternatives to deal with ex-ante and ex-post banks' bankruptcy problems.

- The authors develop a model of the capital structure of a financial firm that includes CoCos or bail-in debt along with insured deposits, senior debt, and subordinated debt. That seems a quite rich definition of the banks' safety net and resolution mechanisms.

- Importantly, bankruptcy in the model is endogenous: bankruptcy results from the optimal decision of shareholders to exercise their option to surrender the firm's assets to the creditors.

- The model incorporates:
  - Debt rollover (the cost of debt rollover can motivate shareholders to reduce the firm's leverage and the riskiness of its assets).
  - Jumps and diffusion in asset value. Diffusive risk is the ordinary level of volatility in the firm's business, which is readily observable by a regulator. while jumps capture the firm's ability to take on high-yielding tail risk that is much harder to measure if jumps are rare. The authors examine is how replacing straight debt with convertible debt affects the attractiveness of the two types of risk to equity holders.

CoCos, Bail-In, and Tail Risk
Nan Chen, Paul Glasserman and Behzad Nouri

PRIMARY OBSERVATIONS

If conversion precedes bankruptcy, the optimal bankruptcy level is the level for the post-conversion firm, which does not depend on the conversion trigger or ratio.

CoCos can reduce default risk, as we explain below. In so doing, they reduce the cost of rolling over straight debt as it matures, and this increases dividends available to equity holders.

THREE ALTERNATIVES

Issuing CoCos while keep other forms of debt fixed:

• If the size of the additional CoCo issue is sufficiently large, the increased coupon payments may make it optimal for shareholders to default prior to conversion resulting in greater value destruction at bankruptcy.

• The reduced default risk lowers the cost of rolling straight debt which increases the value of equity. If CoCo coupons are tax-deductible, this further increases equity value, lowering the cost of equity capital.

Replacing some straight debt with CoCos :

-Reduces the value of the debt tax shield.

• Lowers the endogenous default barrier and thus increases the firm's ability to sustain a loss in asset value. It thus reduces bankruptcy costs (this positive effect offsets the negative effect on the value of the tax shield).

• Increases the value of equity (the firm's cost of capital).

Replacing some equity with CoCos: (less common in practice)

• If CoCo coupons are tax-deductible, and if the substitution is not so large as to drive the default barrier above the conversion level, then equity holders capture all the value of the increased tax shield with no change in the firm's default risk.

• However, this replacement can also induce the equity holders to prefer less risky assets in order to preserve the funding advantage provided by unconverted CoCos through the tax shield.

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OTHER RESULTS

CoCos can mitigate the debt overhang problem, creating two incentives for new equity investment:

- If the CoCo coupons are tax deductible, it is optimal for the shareholders to invest in the firm to prevent conversion and preserve the tax shield.

- The value of the equity issued to CoCo investors is largest at the conversion trigger.

CoCos can also create incentives for equity holders to increase exposure to tail risk (i.e., downward jumps in asset value) because the cost (to shareholders) of conversion is lower if it occurs at a lower asset value.

Holders of CoCos may be unwilling or unable to hold equity following conversion and may therefore receive less than full market value in a forced sale of shares.
Anticipating this outcome, they would demand a lower price at the time of their initial investment in CoCos.

In the pure bail-in case, conversion of debt to equity occurs just as the firm would otherwise declare bankruptcy and the original shareholders are wiped out.

- Even if they are are wiped out at bail-in, the original shareholders benefit from replacing straight debt with bail-in debt because the reduction in bankruptcy costs lowers the cost of debt service.

The model identifies a phenomenon of "debt-induced collapse":
It occurs when a firm issues CoCos and then takes on excessive additional debt. If sufficiently extreme, the additional debt will induce equity holders to default prior to conversion, effectively changing CoCos to junior straight debt.

16

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REGULATORY ISSUES

The level of the conversion trigger has no direct effect on the timing of bankruptcy, so long as the conversion trigger remains above the endogenous default barrier.

Nevertheless, the regulator can have indirect influence through CoCos. A higher trigger creates a greater incentive for equity holders to invest additional capital in the firm earlier and can reduce incentives to increase the riskiness of the assets; but a lower trigger creates a greater incentive for equity holders to voluntarily replace some straight debt with convertible debt.

Charging deposit insurance in proportion to all of the firm's debt, including CoCos, reduces some of the positive incentives resulting from CoCos, just as the tax-deductibility of CoCo coupons increases some of these positive incentives.

CoCos, Bail-In, and Tail Risk

Nan Chen, Paul Glasserman and Behzad Nouri

- The paper includes a calibration of the model using bank balance sheet and stock price data during 2004Q1–2011Q3 for 17 of the 19 largest U.S. bank holding companies.

- The idea is to infer how much CoCos would have increased banks' ability to sustain losses during the crisis and also to measure debt overhang costs.

- Main finding: CoCos with a high trigger would have created positive incentives for additional investment in 2008–2009 for most of the banks.

Bank Holding Company	Parameters			Conversion Date	
	λ	η	σ	50%	75%
Bank of America Corp	0.1	5	4.1%	Jan-09	
JPMorgan Chase & Co.	0.1	8	4.4%		
Citigroup Inc.	0.1	9	3.9%	Nov-08	
Wells Fargo & Company	0.1	5	4.7%		
Goldman Sachs Group, Inc.	0.1	5	3.8%	Nov-08	
Morgan Stanley	0.1	8	4.2%	Sep-08	Dec-08
PNC Financial Services	0.3	8	7.0%	Nov-08	Jan-09
U.S. Bancorp	0.3	5	5.5%	Jan-09	
Bank of New York Mellon Corp.	0.3	6	7.3%	Oct-08	
SunTrust Banks, Inc.	0.3	9	4.1%	Apr-08	Jan-09
Capital One Financial Corp.	0.3	7	7.9%	Jun-08	Jan-09
BB&T Corporation	0.3	6	5.3%	Jun-08	
Regions Financial Corporation	0.3	8	4.7%	Jun-08	Jan-09
State Street Corporation	0.3	5	7.4%	Oct-08	
American Express Company	0.3	8	8.6%		
Fifth Third Bancorp	0.3	5	6.3%	Jan-08	Jun-08
KeyCorp	0.3	8	4.2%	Nov-07	Nov-08

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- Some limitations of the model:

  - Acknowledged by the authors:

    - The effects of asymmetric information are not considered.
    - The effects of agency issues (important for some type of banks).
    - Changes in bonds and stock prices around the trigger.

  - Related issues:

    - Introduction of CoCos by authorities as a resolution mechanism itself or as a part of the banks' State aid or nationalizations (for example, the bail-out fund FROB in Spain).
    - The co-existence of different models of resolution (regulatory-induced vs. market induced).

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- The authors could discuss the role of CoCos when there is "too much" short-term debt around (i.e. a problem in the Europe sovereign crisis):

  - When several institutions are in trouble, the discipline of short-term debt punishes all short-term debt financed institutions, causing contagious losses, fire sales. Do the authors considered this possibility?

  - When this occurs, bailouts, liquidity injections, or central bank interest rate reductions follow, imposing the risks on other claim holders in the institution, on the state, or distorting monetary policy (D. *Diamond and R. Rajan (2011), "Illiquid Banks, Financial Stability and Interest Rate Policy", NBER WP 16994).*

  - *D. Diamond and R. Rajan (2011): "Fear of Fire Sales, Illiquidity Seeking, and Credit Freezes", Quarterly Journal of Economics 126 (2): 557-591*

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- Some other ways of motivating CoCos and bail-in:

  - Regulators should be able to impose losses on long-term creditors (and on managers) near insolvency without causing systemic problems (bail in or resolution authority).

  - CoCos: avoiding perverse incentives to have "extreme failures" or to meet requirements by fire sales. Limits ability to issue equity backed by bailouts (although sometimes is part of the bailout). The basic idea of CoCos is that regulators should force institutions to recapitalize when capital is too low, but not near failure.

  - Bail in: a penalty for insiders and investors but not for society and customers.