Discussion of “Banks’ Incentives and the Quality of Internal Risk Models” by Matthew C. Plosser and Joao Santos

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October 3, 2015

1 The views expressed in this discussion do not necessarily reflect the views of the Federal Reserve Bank of Cleveland or the Federal Reserve System.
Some History on Capital Requirements

Basel 1 - 1988

- Fixed capital charge by asset class
- Everyone recognized right away that there is lots of variation of risk within asset classes
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Goal since mid-1990s

- Make capital charge more risk tailored
The Strategy to Make Assets more Risk Tailored

Get the information from the banks
The Strategy to Make Assets more Risk Tailored

Get the information from the banks

Banks know risk better than regulators

- So elicit that information from banks
- (also use agency ratings when available)
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Idea of bank reporting risk underlies
  • Pre-commitment approach proposal (Kupiec and O’Brien (1995))
  • Internal models approach for market risk (used for trading book since 1998)
  • Basel 2 - Advanced Internal Ratings Based approach
  • Stress tests
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The big challenge with using bank reports

Banks have an incentive to report low risk
What this Paper is About

Banks’ incentives to report risk under Basel 2

Basel 2 uses banks’ internal risk models as an input into determining capital

Finds evidence that some banks under report risk
Advanced Internal Ratings Based Approach (AIRB)

- Uses a formula to calculate capital based on
  - PD - probability of default
  - LGD - loss given default
  - EAD - exposure at default

- Formula depends on type of asset (e.g., retail, wholesale, etc.)

- PD, LGD, EAD come from a bank’s internal risk model
  - Where bank could conceivably misreport
  - More on this later
PS Approach

Clever idea: Use syndicated loans
  - Multiple banks with the same credit
  - Compare their reports

Regulators have a Shared National Credits (SNC) program for these loans
  - Large syndicated loans are examined by one regulator and results shared across bank regulators
  - Means regulators have same risk assessment of a loan across banks
  - (Program also developed to avoid costly duplication of credit evaluation)
Empirical Strategy

Look for deviations in reported PD from median report for each loan.

Find that some banks consistently deviate below median
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But banks closest to regulatory capital constraint report lower PD

Their key result
Use Theory to Think about Results

Assumptions: $p$ is risk

Bank - wants to minimize $k$

Regulator - wants $k(p)$ concave and increasing
Optimal Regulatory Capital under Simple Model
Consider Effect of Private Information on $p$

Give banks full leeway in risk report
Consider Effect of Private Information on $p$

Give banks full leeway in risk report

Incentive constraint

$$k(p) \leq k(\hat{p}), \forall p, \hat{p}$$

• Capital depends on report and banks do not report lowest risk
• So this incentive constraint too strong to describe environment (Looks like Basel 1)
Consider Effect of Private Information on $p$

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Incentive constraint

$$k(p) \leq k(\hat{p}), \forall p, \hat{p}$$

Any feasible allocation satisfies

$$k(p) = \bar{k}, \forall p$$
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PS Data

- Capital depends on report and banks’ do not report lowest risk
- So this incentive constraint too strong to describe environment
Designers of Basel 2 Aware of Incentives

Pillar 2 of Basel 2 is about supervisory review and compliance with Pillar 1

Implementation of AIRB puts restrictions on reports
  • Gives the formula based on PD, LGD, EAD
  • Formula based on Gordy model

Banks have some flexibility on inputs to formula
  • Choice of internal model
  • Data range
  • How loans are characterized
But Even More Restrictions on Reports

Supervisory Review of Modeling Process

- Risk rating model checked
  - Most models put credits into bins (7+)
- In practice, bins roughly map to Moody’s/S&P ratings
- PDs are associated with bins
- Examiners check the default frequency by bins
- If off, supervisory penalties (MRA letters, etc.)
- Some benchmarking across banks goes on
- Credits on publicly traded firms easy to check by looking at ratings
Modeling Supervisory Review

Suggests additional features for an incentive model:

- Ex ante approvals of internal risk models
- Ex post audits of reports
- Repeated interactions
- Implicit penalties
Two Possible Formulations of Incentive Constraints

Direct restrictions on reporting

\[ k(p) \leq k(\hat{p}), \forall p, \hat{p} \in P(p) \]
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Direct restrictions on reporting

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Audits and misreporting penalties

\[ k(p) \leq k(\hat{p}) + \text{prob}(\hat{p})u, \forall p, \hat{p} \]

\text{prob}(\hat{p}) - probability of an audit
\[ u - \text{penalty imposed if misreport.} \]

See elements of both approaches in discussion of supervisory review. Plenty of other alternatives.
Interpretation

I don’t know the right model of the process

But there are clearly mechanisms in place that limit the ability of banks’ to under report
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I view results as providing evidence on the effectiveness of the implicit mechanism in place
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But there are clearly mechanisms in place that limit the ability of banks’ to under report

I view results as providing evidence on the effectiveness of the implicit mechanism in place

I also view results as suggesting ways to improve the implicit mechanism
Possible Improvements

An Easy One

Tier 1 capital is easy to measure info
  - Index capital schedules by tier 1 capital

Would give something like ...
Optimal Regulatory Capital Schedules for Heterogeneous Banks
Possible Improvement 2

Make ex post review of models explicit and impose sanctions if negative review
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Furthermore, make review a function of the report.
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Furthermore, make review a function of the report.

Next two slides show optimal capital and auditing frequency as a function of the report in an auditing model (like the one described earlier) from Prescott (2004).
Optimal Regulatory Capital under Auditing
Optimal Auditing Frequency
A Third Mechanism

Compare reports (relative performance)
  • For PD, only two banks report below median
    • Check their models the most carefully
## Absolute Deviations Bank Fixed Effects

<table>
<thead>
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<th>Panel B</th>
<th>(1) $PD$</th>
<th>(2) $LGD_{Bef}$</th>
<th>(3) $PD + LGD_{Bef}$</th>
<th>(4) $E(L_{Bef})$</th>
<th>(5) $PD + LGD_{Aft}$</th>
<th>(6) $E(L_{Aft})$</th>
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Summary

Information theorists have analyzed incentives and capital requirements since at least Giammarino, Lewis and Sappington (1993)

Now have some measurement of the size of some of these effects for a particular, implicit supervisory mechanism

If results hold up and economic effects big then these findings are evidence that the mechanism could be improved (at least for wholesale credit)

A very interesting paper that breaks new ground by providing empirical evidence on a topic that has been exclusively theoretical