Monetary Policy, Bank Leverage, and Financial Stability

Fabian Valencia

IMF Research Department

June 17, 2013

The views expressed in this presentation are those of the author and do not represent the views of the IMF or IMF policy.
Motivation

- During 2002-2005 interest rates in U.S.A. were lowered aggressively and kept low (1 percent) for a prolonged period of time.

- After the crisis, it became natural to wonder whether easy monetary conditions can increase bank risk-taking.

- And empirical studies conducted after the crisis (De Nicolo et al (2010), Jimenez et al (2007), Ioannidou et al (2009), and others) suggest the answer may be yes.

- But, empirical evidence does not allow us to conclude if risk-taking was excessive. To answer this question we need a theoretical framework.

- Shedding light on this issue is important because it has implications for the conduct of monetary policy and the design of financial regulation.
This paper presents a dynamic bank model in real terms in which the bank faces frictions in raising external funds.

It shows, consistent with empirical evidence, that a decrease in the risk free rate, increases bank risk-taking through leverage.

In the presence of limited liability, risk-taking can be excessive because the bank does not internalize the losses it imposes on creditors when it goes bankrupt.

In this model, capital requirements are more effective than loan-to-value caps in reducing excessive risk-taking because they are closer to the origin of the distortion.
Model highlights

- The bank is a monopoly managed by its risk-neutral shareholders who maximize the present discounted value of dividends.
- The bank makes decisions on how much dividends to pay out and how much to lend, with the balance sheet constraint determining the required amount of deposits.
- To fund new loans the bank issues deposits (or debt) but it cannot issue equity.
- Risk of default stems from the fact that borrowers’ project values are stochastic and unknown when decisions are made.
- Debtors (borrowers and the bank) are protected by limited liability.
In the presence of limited liability and costly monitoring (Townsend 1979), the bank needs to compensate depositors (and borrowers need to compensate the bank) ex ante for the risk of default and monitoring costs.

Ex-post, when project values are high enough, borrowers repay the agreed amount to the bank. When they are too low, borrowers default, but the losses faced by the bank are large enough that they force the bank to default as well.

There is an intermediate region where the bank is able to absorb the losses.
The model

The lender: Optimization Problem

Assume risk-neutral and impatient shareholder-managers who maximize present discounted value of dividends:

\[
\max_{\{d_t, c_t, l_t\}} \mathbb{E}_t \left[ \sum_{t=s}^{t=\infty} \beta_t^{s-t} c_t / \alpha_{t+1} \geq \alpha \right]
\]

\[l_t \leq d_t + n_t - c_t\]

\[\rho_{t+1} = a_0 + a_1 (\rho_t - a_0) + \epsilon_{t+1}\]

\[c_t \geq 0\]

\[g(\alpha_{t+1}, l_t, \rho_t) = \begin{cases} 
R(l_t, \rho_t)l_t & \text{if } \alpha_{t+1} \geq \bar{\alpha} \\
(1-u)\alpha_{t+1} \mathcal{R}(1+l_t) & \text{if } \alpha_{t+1} < \bar{\alpha}
\end{cases}\]

\[n_{t+1} = \begin{cases} 
g(\alpha_{t+1}, l_t, \rho_t) - i(l_t, d_t, \rho_t)d_t & \text{if } \alpha_{t+1} \geq \alpha \\
0 & \text{if } \alpha_{t+1} < \alpha
\end{cases}\]
Consider a constrained social planner who internalizes the losses the bank imposes on its creditors when it defaults.

All other aspects of the model are the same.

The difference is that now the bank’s default region is taken into account in the maximization problem.
Marginal Value of Bank Capital

<table>
<thead>
<tr>
<th>q/l</th>
<th>1.04</th>
<th>1.06</th>
<th>1.08</th>
<th>1.10</th>
<th>1.12</th>
<th>1.14</th>
</tr>
</thead>
<tbody>
<tr>
<td>H</td>
<td>0.10</td>
<td>0.15</td>
<td>0.20</td>
<td>0.25</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- **Baseline**
- **Benchmark**
- **Optimal Leverage**

$(1/\beta_t)$
Optimal Decision Rules
Excessive risk-taking
Simulations

Responses to a transitory reduction in risk-free rate
Modifications to Baseline Model

- Relax no-equity-finance constraint to allow for equity injections from shareholders, but assume that adjusting dividends is costly.

- These assumptions bring the model closer to reality because banks can issue equity, although it is costly, and dividends tend to be sticky.

- The latter is achieved by assuming shareholders are risk averse. This can be justified by arguing that shareholders have a significant fraction of their wealth in bank shares.
Optimal Decision Rules

![Graphs showing the relationship between Bank Capital, Risk-free Rate, and Lending, Dividends.]
Excessive risk-taking
Use the model to simulate how regulatory intervention in the form of capital requirements and loan-to-value caps reduce excessive risk-taking.

Assume that if capitalization falls below some regulatory threshold, shareholders are forced to recapitalize the bank.

Alternatively, assume that borrower leverage is capped, achieved through imposing loan-to-value caps.
Excessive risk-taking

Model with capital requirements (left) and with Loan-to-value Caps.
Conclusions

- Reductions in the risk-free rate can induce excessive risk-taking when a bank does not internalize the losses it imposes on creditors when it defaults.

- The lower the risk-free rate the higher the incentives to take on excessive risk, especially when bank capital is low.

- At least in this model, capital requirements work better than loan-to-value caps in neutralizing this distortion because they are closer to where it originates.

- Moreover, the model favors the use of regulation that is contingent on the aggregate state of the economy.

- At a broader level, the model highlights how a benign macro environment could lead to excessive risk-taking.