Capital Ratios and Systemic Risk – Regulating non-banks in the syndicated lending market

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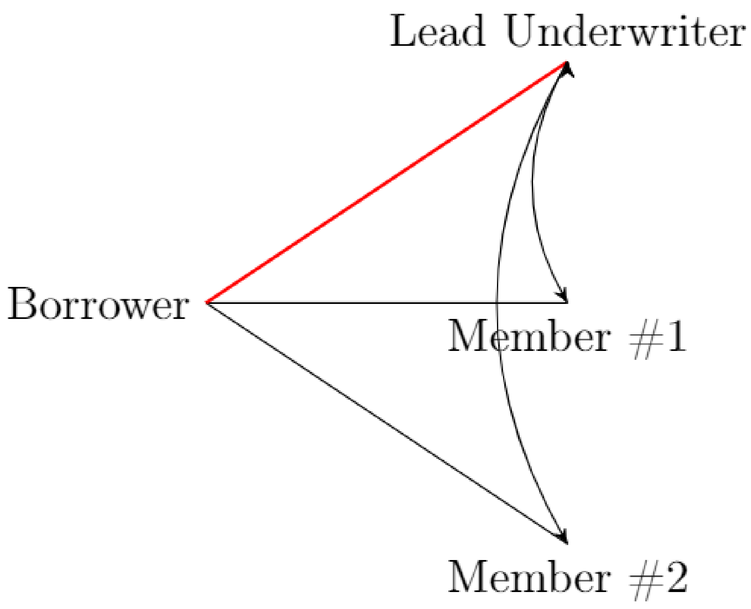
1. Introduction

Regulators frequently change policies and requirements to address rising risks and shifting market conditions. However, it is still unclear how regulations affect strategic responses from the financial institutions to risk-taking, especially when institutions vary in their business models and attitude to risk. To the best of my knowledge no formal models have been proposed to study the consequences the increased participation of shadow banks has on the risks in the lending market, though there is mounting evidence that the composition of lenders and their relationship affects the level of risk [1, 2]. To address the heterogeneity in risk-appetite, I develop a structural model of syndicated lending where each institution allocates its funding resources according to mean-variance preferences. Each institution endogenously chooses the level of risk it wants to undertake, which in turn influences the level of risk borne by the lending system. I calibrate each individual's risk aversion parameter and cost of funding, which allows me to test the regulatory capital requirement's effect on risk taking and systemic risk. I find that expanding the base of institutions subject to capital requirements may increase risk-taking and systemic risk as the lending institutions double-down on large and risky loans and end up increasing the system's vulnerability.

2. Syndicated Lending

Loan syndication is a process in which a loan underwriter, when faced with a large borrowing request, forms a syndicate of lenders, usually comprised of four or five other banks, that will each pledge parts of the loan amount. The loan is then funded by these four or five institutions, each receiving their share of the returns and bearing the credit risk proportionally.



3. Structural Model

The **Lead underwriters** are seeking to maximize expected returns and minimize the variance of their portfolio by controlling two variables, namely the price of the loan and the weights they keep on their balance sheet. However, in doing so, they must respect two conditions. First, the amount of loans the Leads own on their balance sheet must not exceed regulatory capital constraints. Second, each loan i must be fully financed, so the sum of weights across Syndicate Members j must add up to 1. The Leads' preference function $\pi(\cdot)$ is shown below. The **Syndicate Members** are solving a similar problem, though without control of the price, nor the concern of fully funding the loan. Both lender types are facing financing constraints inspired by [3, 4].

$$\begin{aligned}\pi_j =& \text{Expected Returns} - \gamma_j \text{Portfolio Variance} \\ & - \text{Financing Costs} - \text{Origination Costs} + \text{Relationship Benefits} \\ \text{s.t. } & \text{Assets} = \text{Liabilities} + \text{Equity (i.e. Balance sheet identity)} \\ & \text{Equity} \geq \text{Capital Ratio} \times \text{Risky Assets (i.e. Capital Adequacy Requirement)} \\ & \sum_j w_{i,j} = 1, \ \forall \text{ Loans } i \text{ (i.e. Full Loan Funding)} \\ & w_{i,j} \geq 0, \ \ \forall i, j \text{ (i.e. No Loan Short-Sell)}\end{aligned}$$

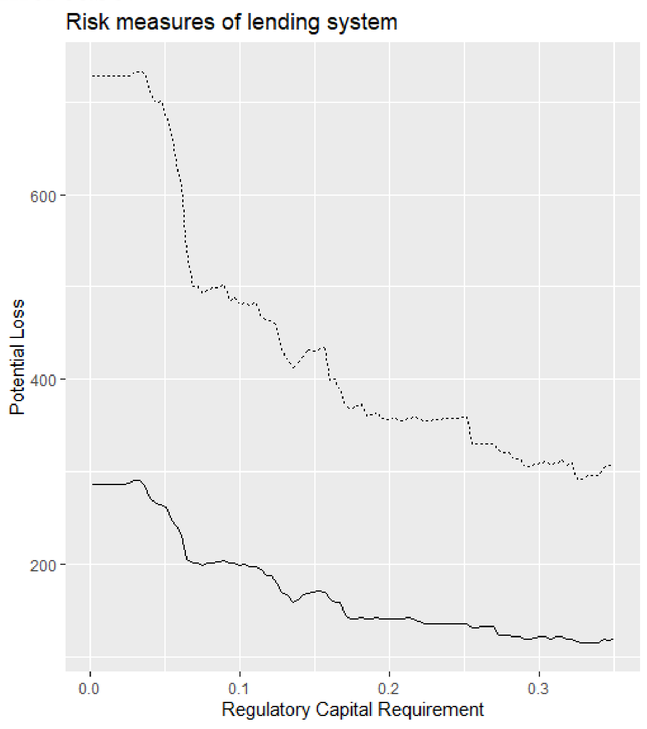
4. Risk Metrics

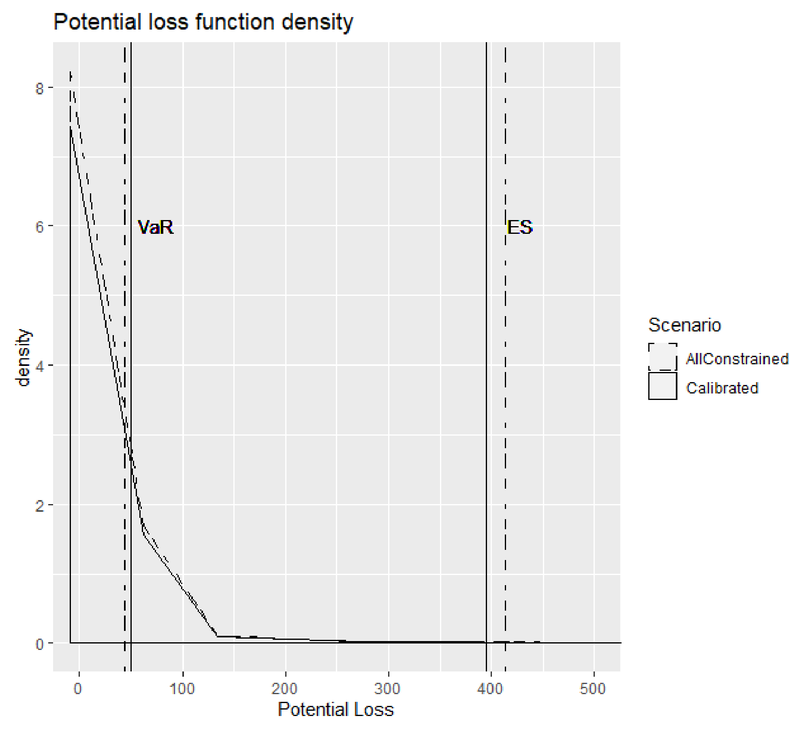
The potential loss (PL) distribution is measured by factoring the probability of default (PD) of each asset i with the loss given default (LGD) of the asset, and the firm j's exposure at default (EAD) to the asset. I report the 95% Value-at-Risk (VaR) and Expected Shortfall (ES) as the risk metrics.

$$PL = \sum_{i,j} PD_i \times LGD_i \times EAD_{i,j}$$
$$\mathbb{P}[PL \geq VaR_{95\%}] = 95\%$$
$$ES = \mathbb{E}[PL | PL \geq VaR_{95\%}]$$

5. Extensive vs Intensive Regulatory Margins

At the ***Intensive Margin (left)***, we see that as capital requirements increase, risk decreases under both measures, VaR and ES, showing how **capital adequacy ratios are effective at controlling risk when applied to banks**. At the ***Extensive Margin (right)***, capital adequacy ratios are imposed to all lending market participants, both banks and non-banks. The Value-at-Risk decreases and the Expected Shortfall increases. This divergence in risk metrics suggests that the increase in capital costs imposed by **the requirements causes credit supply to decrease while risk increases**. The effect is driven by the non-banks, who are less-risk-averse, as they are more concerned by yield-seeking than risk reduction, and end up lifting the tail risk sufficiently to cause the ES to increase.





6. Conclusions

Extending regulatory requirement to non-banks could make the system more prone to extreme shocks while reducing the quantity of credit in the economy. Tightening regulation on all financial institutions might push some actors into taking even greater risks, pushing the expected shortfall further out in the tail. In the current system, banks use the increase in participation of non-banks in order to extend credits to more borrowers of adequate risk level while the non-banks absorb much of the risk induced by the expansion of credit supply. Effective policy must consider the heterogeneity in risk-aversion when imposing new regulatory requirements.

7. References

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