Seminar Problem in ECON 4335 Economics of Banking, Fall 2016

Problem set 4 (September 30, 2016)

Consider the model of bank competition presented in Hellmann, Murdock and Stiglitz (2000) and discussed in class. Assume that banks can use their own capital, together with deposits, to buy assets. Let's measure the own capital invested as a share of the deposits, and denote it $kD(r_i, \mathbf{r}_{-i})$. The total amount invested by bank i is $(1+k)D(r_i, \mathbf{r}_{-i})$. Bank owners have also an alternative use of their capital that ensures a return equal to ρ. This implies that the opportunity cost of capital is ρ.

The prudent asset ensures per-period profit $\pi_P(r_i, \mathbf{r}_{-i}, k) \equiv m_P(r_i, k)D(r_i, \mathbf{r}_{-i})$. When the bank gambles, the per-period profit is $\pi_G(r_i, \mathbf{r}_{-i}, k) \equiv m_G(r_i, k)D(r_i, \mathbf{r}_{-i})$. $m_P(r_i, k)$ is the effective profit margin earned on each unit of deposit if the bank chooses the prudent asset, while $m_G(r_i, k)$ is the effective profit margin earned on each unit of deposit if the bank chooses the gambling asset.

(1) What are $m_P(r_i, k)$ and $m_G(r_i, k)$ equal to?

Consider first an unregulated market in which banks are free to choose any level of k. Each period can be divided in 3 stages:

Stage 1: banks decide simultaneously their interest rates,

Stage 2: each bank decides how much own capital to invest,

Stage 3: each bank decides whether to invest in the prudent asset or in the gambling asset.

The **no-gambling condition** in this case has the form $r \leq \hat{r}(k)$ ($\hat{r}$ is now a function of k).

(2) What is $\hat{r}(k)$ equal to?

In a candidate symmetric equilibrium in which all the banks choose the prudent asset the first order condition requires $m_P(r_P, k) = \frac{D(r_P, r_P)}{(\frac{\partial D(r_P, r_P)}{\partial r_i})}$.

This condition can be written as $r_P = f(\alpha, \rho, k, \epsilon)$ (where ϵ is the elasticity defined on page 4 of last hand-out).

(3) What is $f(\alpha, \rho, k, \epsilon)$ equal to?

(4) If $\rho > \alpha$ what is the optimal k for the bank?

Suppose a regulation is introduced, requiring banks to invest an amount of own capital equal to a share k^R of the deposits raised.

(5) What is the effect of an increase in k^R on r_P and on $\hat{r}$? Are there values of δ for which $\frac{\delta \hat{r}}{\delta k}$ is smaller than 0?

(6) Assume now that $\hat{r}(k)$ is increasing in k. Draw r_P and $\hat{r}$ as a function of k.

Let $\underline{k}$ be defined by the equation $r_P(\underline{k}) = \hat{r}(\underline{k})$. Consider two alternative policies, both sufficient to ensure that banks choose the prudent investment

Policy 1: impose $k^R > \underline{k}$.

Policy 2: a cap on the interest rate that requires bank to offer at most rate $r_P(k^R)$, together with a own-capital requirement equal to k_0, where k_0 satisfies $\hat{r}(k_0) = r_P(k^R)$.

(7) If you pick a $k^R > \underline{k}$ can you show where k_0 lies in the graph you drew for question (6)? Which of the two policies would you suggest to the regulator?