Assume that firm types are ordered by first-order stochastic dominance, as opposed to the second-order stochastic dominance assumed by Stiglitz and Weiss.

Specifically, assume two firm types, G and B, with distribution functions satisfying $F_G(R) < F_B(R)$, $\forall R$. This implies that

$$\tilde{r}_G = \tilde{r}_B + \tilde{\alpha}$$

for some random variable $\tilde{\alpha} \geq 0$. That is, all realizations of $\tilde{\alpha}$ are nonnegative. Further assume that there is an additional quality parameter γ such that

$$F_i(R, \gamma_2) < F_i(R, \gamma_1) \quad \forall i \;, \forall R \;, \; \forall \gamma_2 > \gamma_1. \tag{1}$$

Thus increases in γ also reflect first-order stochastic improvements in the quality of both firms. Defining

$$\pi(R, \hat{r}) = Max[R - (1 + \hat{r}), -C]$$

$$U_i(\hat{r}, \gamma) = \int_0^\infty \pi(R, \hat{r}) dF_i(R, \gamma)$$

we see that $\pi(R, \hat{r})$ is borrower i's profit in a particular state and $U_i(\hat{r}, \gamma)$ is his expected profit.

EXERCISES

1) Compare $U_G(\hat{r}, \gamma)$ and $U_B(\hat{r}, \gamma)$. Which is higher and why? How does your result differ from Stiglitz and Weiss's (if at all) and why? Give the intuition. Do the same for $U_i(\gamma_2)$ and $U_i(\gamma_1)$ for $\gamma_2 > \gamma_1$.

2) Redo Stiglitz and Weiss's Theorems 1, 2 and 3 under these assumptions.

Problem 2 is not as hard as you think! Simply follow the same procedure as Stiglitz and Weiss, substituting in your results from Problem 1.

3) Speculate, but do not prove: does this environment exhibit credit rationing? Why do you think so? Hint: draw a picture like their Figure 3.