## Practice Question \#4

Course 14.454 - Macro IV, Fall 2004

## Financial Constraints and the Labor Market

We now introduce a labor market into the CSV model you solved in problem set \#2. (You need to use the same setup given in that question to solve this practice question). The labor market is competitive, with a given upward-sloping labor supply curve. Each project now also requires one worker to operate and returns a profit $\pi=x-y$, where $y$ is the equilibrium wage and $x$ is the project's productivity (again distributed uniformly over the interval $[0,2 \bar{x}]$ ). The labor market clears and wages are paid before project productivities are realized. Also, now assume that all entrepreneurs are endowed with the same amount of wealth, $w$.
(a) Again, assume the entrepreneur is willing to undertake the project, and analyze the project from the point of view of the outside investor.
i. Find the investor's expected gain if she invests in the project.
ii. Write out the expression that that determines the $D^{*}$ that will be chosen.
iii. What are the expected verification costs for the investor? How and why does a positive wage affect the expected verification costs?
iv. Taking $D^{*}$ as given, write down the condition in which the entrepreneur is willing to undertake the project. Use the equilibrium condition for $D^{*}$ to write this condition in terms of the wage, the project's expected return, the outside return $\bar{R}$, and the expected verification costs of the investor.
(b) Compare you answer in part (a) to your answers for question 1 in the second problem set. How does the inclusion of a labor market affect the number of projects that will be undertaken?
(c) For simplicity, assume there is a continuum 1 of entrepreneurs. Explain how the labor demand curve can be derived. What is the effect of financial constraints on wages and employment? [Hint: To see the effect of the financial constraints, compare the equilibrium wage and employment level to what they would be under an efficient equilibrium].

