I. Consider a two period household model. The household utility function
\[ U(c_1,c_2) = u(c_1) + u(c_2) \]
is function of consumption \( c \) in each period. The household has an initial
endowment of liquid asset \( y_1 \), and land holdings \( A \) in hectares. Suppose there is no land market,
but that labor, input and product markets work smoothly. The household can combine land and
input \( x \) used in period 1 with labor used in both periods (\( L_1 \) and \( L_2 \), respectively) to produce an
output available in period 2. The production function \( q(A,x,L_1,L_2) \) exhibits constant return to
scale.

(a) Suppose that credit markets work. Write the household optimization problem. Derive the
first order conditions. Show that output per hectare is independent of landholdings and liquid
asset. (You need to solve for a generic unspecified utility function and CRS production function)

(b) Suppose now that households cannot borrow more that an amount \( B \) in period 1. Write the
optimization problem. Write the (Kuhn-Tucker) first-order conditions. Show that yield may now
depend on landholdings and liquid assets.

(c) What other production behaviors (beyond output per hectare) represented in your model are
affected by the credit market imperfection? Look in particular at contrast between input use in the
two periods. Think of how non-purchased inputs would be used, if you were to add some, etc.

II. Discuss conditions of the credit market that could lead to a situation of borrowing constraint?
You do not need to write a formal model, but the reasoning need to be sufficiently complete to be
compelling. [Think of writing an introductory section to a paper (that would be on the effect of
borrowing constraint). Make sure that your discussion is tightly focused on conditions that lead to a
borrowing constraint, i.e., no access or access to a limited amount of credit at the current
interest rate, and not on any other interesting issues about the credit market. It is also insufficient
to list AS, MH, imperfect information, insurance, as potential culprit for leading to borrowing
constraint. You should be very specific and explain even briefly the channel from the “cause” to
“borrowing constraint”].

III. Following closely on question I, propose an empirical analysis that would detect the existence of a credit constraint in production decisions. For this, think on how one could use the
contrasted predictions of the models with and without binding credit constraint. Describe the
context/strategy for the data you could use.
[Avoid some common pitfalls: (i) proposing a randomized experiment that is completely
unfeasible, such as giving credit to a randomized group of people (not acceptable by any bank), or
forcing a constraint on a randomized group of people (unless you can find a context under which
it is ethically acceptable). Randomized experiments are fine only if you can put them in a
feasible framework; (ii) proposing to regress a given behavioral variable on credit amount,
landholdings, income, etc., acknowledging that there are endogeneity and omitted variable bias]
problems, and leaving it there; (iii) proposing a completely different strategy for identifying credit constraint not related to the model; (iv) analyzing the impact of having access to credit. Finally note that I am asking you to think in terms of production or income generating decision, not consumption]