1. **Description of the Model**

There are two kinds of individuals, type $A$ and type $B$. The measure of type $A$ individuals is $N_A$ and the measure of type $B$ individuals is $N_B$, where $N_A < .5N_B$.

There are two periods, $t = \{1, 2\}$. Each individual is endowed with a single labor unit in each period. The discount factor is $\beta = 1$.

There are two technologies for producing the final good, the regular technology and the special technology. With the regular technology, a type $j$ individual can produce $q_j$ units of the final good with a single unit of time. Assume that $q_A > q_B$ so that a type $A$ individual has an absolute advantage in production with the regular technology.

The special technology works as follows. In period 0, a type $A$ individual builds a factory (type $B$ individuals cannot build factories). Factories vary in quality $i$. To build a factory of quality $i$ requires $i$ units of time in period 0. A type $A$ individual building a factory of quality $i$ uses the balance $1 - i$ of his or her time endowment in period 0 to make the final good (and thus produce $(1 - i)q_A$ units in period 0).

A factory produces no final good in period 0. A factory will produce output in period 1 if an individual uses his or her unit time endowment to manage the factory in period 1. When a factory is built in period 0, it is customized to be managed in period 1 by a particular individual. If this particular individual manages the factory in period 1, the output in period 1 is $f(i) + q_S$, where $f(0) = 0$, $f'(0) > 0$, and $f''(0) < 0$. It does not matter whether this particular individual is a type $A$ or type $B$ person; the output is the
same in either case. It also makes no difference whether the particular individual is the type A person who built the plant or whether the particular individual is someone else.

But there is a difference if the person who manages the factory is different from the person the factory was customized for. In this case, the output is $q_S$ instead of $f(i) + q_S$; i.e., the investment $i$ is wasted.

2. Complete Contracting Case

Suppose that contracts are complete and can specify a publicly observable investment level $i$.

The questions to be addressed are: What is an equilibrium in this economy? Under what conditions is the special technology used? Under what condition is there specialization where one worker customizes a factory for a different worker?

3. Incomplete Contracting Case

Suppose contracts are incomplete. Investment decisions must be made in period 0 before any contracts can be written. Suppose in period 0 one agent customizes a factory for another agent. Model the bargaining in period 1 between these two agents as Nash bargaining, with weight $\alpha$ the person doing the customizing and weight $1 - \alpha$ on the person the factory is customized for.