Economic Development Midterm, 2000

Your examination contains three questions, each of which carry the same weight. You have two hours to complete the exam. *Remember that long answers by themselves do not have any value.* Try to keep your answers brief and to the point.

**Total Points: 60. Each question carries the same points.**

[1] **(20 points)** Mancur Olson argued that in the joint provision of some good which is shared according to some exogenous rule, unequal division may assist in the attainment of efficiency. Describe the relevant concepts precisely and evaluate the Olson argument.

[2] **(20 points)** This exercise studies the breakdown of traditional societies. Suppose there are two societies, a “traditional society” and a “market society”. There is a continuum of agents uniformly on [0,1], each of whom decide at the beginning of any date to be “traditional” or “market” members. Each individual has a transaction need at each date (which is met by traditional or market sources depending on his membership at that date).

In each society, the probability that a particular date’s need will be met is an increasing function $p(s)$ of the total size $s$ (membership) of that society. Assume $p$ is given by the simple form $p(s) = s$ in each society.

If the need is met in the market, then the individual receives a payoff of $M$ at that date. If it is met in the traditional society, the payoff is $T$. [If a need is not met in the chosen market, the payoff is zero.] Because of greater trust in the traditional society, $T > M$, but the deal can be broken giving a one-time payoff of $D$ to the individual, where $D > T$. If this happens, the individual is excluded forever from the traditional society and joins the market.

In the market there is no possibility of breaching a transaction.

Assume that agent $i$ has a discount factor $\delta(i)$. We arrange people so that people with a lower index are more patient, and we assume that $\lim_{\delta \to 0} \delta(i) = 1$ while $\lim_{\delta \to 1} \delta(i) = 0$.

(a) **[5 points]** Suppose that the number of people in each sector is constant over time; say at $s$ for the traditional sector and $1 - s$ for the market. Give the necessary and sufficient condition for person $i$ to stay in the traditional sector without exclusion. Use this to argue that if person $i$ is in the traditional sector, then so is $j$ for $j < i$.

(b) **[5 points]** Use part (a) to construct a mapping which has $s$ — the expected size of the traditional sector — on the horizontal axis, and the fraction of the population that can credibly want to be (without exclusion) in the traditional sector as a “best response” to $s$. Argue that this mapping represents a complementarity. Describe this complementarity precisely and explain the various sources of the complementarity (in words).

(c) **[5 points]** Prove that it cannot be an equilibrium for the market to shut down entirely. Prove that it can be an equilibrium for the traditional sector to shut down entirely. Explain the asymmetry in words.

(d) **[5 points]** Provide (and interpret) conditions under which the traditional sector is (partially) active in at least one equilibrium.

[3] **(20 points)** This is another way to understand the Frankel-Pauzner argument studied in class. Let us suppose that agents live only for two periods. When they are young they
make a choice of one of two sectors to move to, A or B. When old they are forced to enjoy the payoffs of their youthful choice; they cannot change their choices. Let us assume that in Sector A, the return in normalized to 1, while in Sector B, the return at any date is given by

\[ n + s, \]

where \( n \) is the number of youthful agents joining that sector at that date, and \( s \) is the realization of some Markov process which has nice properties, no drift, and moves up and down from its current value with equal probability. That is, \( E(s_{t+1}|s_t) = s_t \), and \( P(s_{t+1} > s_t|s_t) = P(s_{t+1} < s_t|s_t) = 1/2. \)

An individual places weight \( \alpha \) on his youth and \( 1 - \alpha \) on his old age. The value of \( \alpha \) will depend on how inflexible are his career choices later: the more inflexible they are and the more determined by youth, the smaller is the value of \( \alpha \). So the payoff from choosing A is just \( \alpha + (1 - \alpha) \), or 1, while the payoff from choosing B is

\[ \alpha(s + n) + (1 - \alpha)(s' + n'), \]

where unprimed variables denote current values and primed variables denote corresponding values when our individual is at old age.

Finally, assume that the total population of youths is always of size 2.

(a) [8 points] Suppose for the moment that \( s \) is forever fixed. Then show that if \( s > 1 \), then B is a dominant choice, while if \( s < -1 \), A is a dominant choice. Show that between these two values there are all always multiple equilibria, depending on expectations (about the choices of other individuals, in the same and in future generations).

(b) [12 points] Now go back to the case where \( s \) unfolds as a stochastic process. Show that the thresholds in part (a) now change from 1 and -1 to \( \alpha \) and \(-\alpha\). You should supplement your analysis by intuition and explanation, and you can use informal reasoning (for partial credit).