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COMPETITIVE EQUILIBRIUM CONTINGENT COMMODITIES AND INFORMATION

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A NOTE ON

COMPETITIVE EQUILIBRIUM CONTINGENT COMMODITIES AND INFORMATION*

by

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Two simple examples are presented to illustrate a problem in the interpretation of competitive equilibrium with contingent goods.

Consider an economy with two individual, each of which has the same utility function of the form

$$\Pi_i = \sum_{j=1}^{m} p_j \log (1 + x_j^i)$$

where i is the "name" of the trader, $i = 1, 2$ and j is the commodity consumed by i when the system is in state j. We assume that there is only one basic noncontingent commodity which appears in the j states of the system.

For simplicity let us assume that the system reaches 3 states each with probability of 1/3. The distribution of the commodity in state j is given by (x_j^1, x_j^2). In particular in:

State 1 the distribution is $(0,1)$,

State 2 the distribution is $(1,0)$,

and in State 3 the distribution is $(1,1)$.

We now consider two markets which differ only in their information content. They are illustrated in Figure 1a and 1b.

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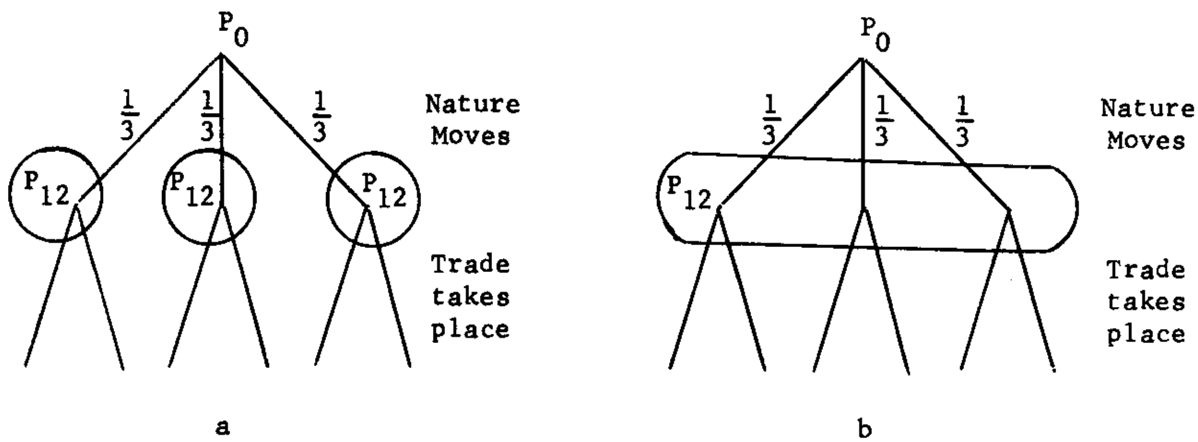

FIGURE 1

In the first market there is no uncertainty. Nature randomizes first and the traders are informed before they go to market. Thus we have essentially three separate markets without uncertainty with one market for each state. There will be no trade in any of the three markets and each will obtain a payoff of:

$$\Pi_1 = \Pi_2 = \frac{1}{3}\log(1) + \frac{2}{3}\log(2) = .20066 \ .$$

In the second market, at the point of trade, there is uncertainty. Following the Arrow-Debreu[1,2] way of dealing with this we may consider that the first trader has an endowment of the three contingent goods of (0,1,1) and the second trader has (1,0,1) . There will be an exchange of (contingent) commodity 1 for 2 and the payoff that each will obtain in the competitive market is:

$$\Pi_1 = \Pi_2 = \frac{2}{3}\log(1.5) + \frac{1}{3}\log(2) = .21773.$$

We note that this is greater than in the first case where they had more information.

Figure 2 shows the (*ex ante*) Pareto optimal surface for the traders. c_1 is the payoff associated with the markets without uncertainty and c_2 the markets with uncertainty. We thus have higher payoffs (and Pareto optimality) for greater ignorance.

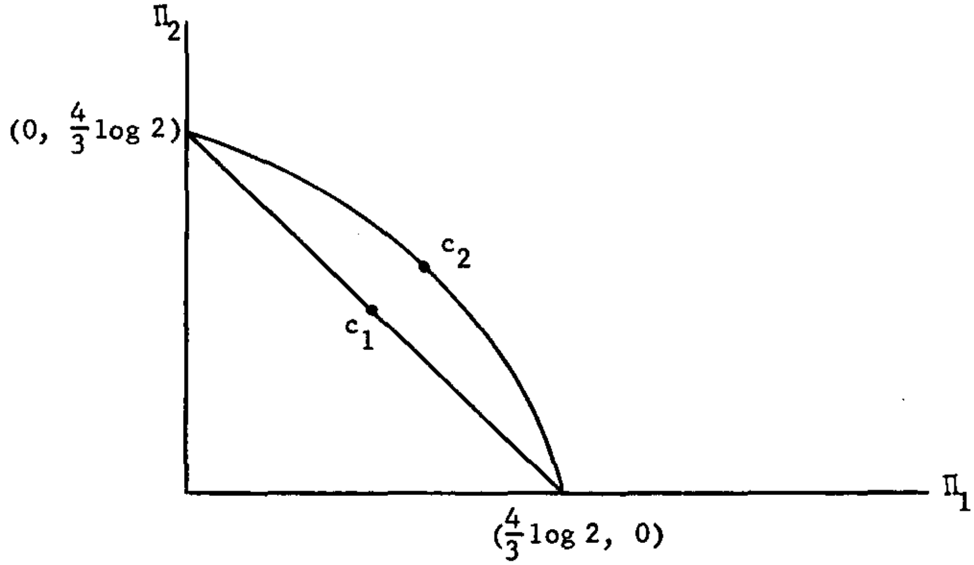

FIGURE 2

We can improve the payoffs for the first market by giving the traders the option of trading in ignorance of Nature's move, i.e. the option of throwing away the (unwelcome) additional information. But this appears to require a somewhat detailed rational in terms of the actual mechanisms of the order of trade, information, communication and types of insurance contract available. This can be done by modeling the markets as noncooperative games in extensive form.[3]

References

[1] Arrow, K. J. "Le role des valeurs boursures pour la repartition la meilleure des risques," Econometrie CNRS, 1953, 41-48.

[2] Debreu, G. Theory of Value, Wiley, 1959.

[3] Shubik, M. "Mathematical Models for a Theory of Money and Financial Institutions," CFDP 377.