On risk averse competitive equilibrium

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In this paper we build on [1] to consider the problem of competitive partial equilibrium in an economy with risk-averse agents. The agents are each endowed with some coherent risk measure, and produce and consume a single commodity in an uncertain environment. They optimize their own risk-adjusted welfare evaluated at equilibrium prices that clear a market for the commodity in each state of the world. Furthermore, we assume price-taking behaviour of agents.

We focus on a simple two-stage problem with strictly concave quadratic reward functions. In this problem we have a single producer that can produce in advance for a fixed cost, or in a second step for an uncertain cost. On the other hand the consumer buy only at the second step. We assume in a first place that risk can not be traded.

We show that equilibriums can be found numerically by using generic software like the PATH solver ([2]) or with Uzawa-like "tâtonnement" algorithms ([3]). With the second approach and adequate parameters we find two equilibrium to this problem. Furthermore, we prove, through exact arithmetic computation, that there exists indeed 3 equilibrium, one of them being unstable.

Finally, we show how adding risk-trading instruments like Arrow-Debreu securities can lead from a different equilibrium to a socially optimum equilibrium.

References

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