Computational models of tax evasion with heterogeneous agents

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Synthesis of: Optimal audit policies with heterogeneous agents

This paper considers a local-average game where the tax authority intends to curb income tax evasion within a network of heterogeneous taxpayers who are engaged in social interactions and exchange information. I propose a two-step game-theoretic optimal audit strategy from the point of view of the tax authority. The first step consists of emitting a credible threat-to-audit message which ensures taxpayer heterogeneity with respect to productivity. In the second step, the tax authority derives the optimal network-based audit policy which strategically targets taxpayers in function of their individual productivity and their position inside the network, triggering a series of spillover effects which eventually maximize the perceived subjective probability of being audited among all taxpayers. The paper also argues how the solution to the problem of maximizing the subjective probability of being audited is mathematically equivalent to that of maximizing tax collections across the entire taxpayer network.

A series of computer simulations determined that the proposed enforcement regime is robust to an ample range of parameter specifications and settings. In particular, the optimal strategy is more effective in denser taxpayer networks, robust to large numbers of taxpayers given a constant network density, and where the outcome is proportional to the degree of attention that taxpayers place on the new information acquired from their neighbors. Moreover, the unique steady state Nash Equilibrium of the mean subjective audit probability is mathematically characterized. Furthermore, on average, the rational and stochastic Nash Equilibria are equivalent in our context. That is, convergence is reached whether agents make decisions fully rationally or bounded rationally.

Although this is not the first game-theoretic audit policy which has been proposed, to the best of my knowledge, it is the first one to be robust against expected and non-expected utility theories, taxpayer heterogeneity and invariant to any individual payoff or utility function. Consequently, the network-based optimal strategy derived and discussed in my doctoral dissertation gives a novel solution to a long-standing problem in economics.

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