Computer system simulates the behavior of tax evaders

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Universitat Autonoma de Barcelona researchers have developed a computer model which, in different situations, simulates the behavior of taxpayers when faced with the possibility of committing tax evasion. The simulator, described in the journal Advances in Complex Systems, analyzes the factors motivating tax evasion and allows to determine which measures are effective in reducing it, such as an improvement in tax inspections by increasing their frequency and efficacy.

Tax fraud is a very serious problem for society, especially in Spain, where tax evasion represents almost one-fourth of its Gross Domestic Product. On the one hand, evasion is a problem because it produces a loss in public resources, something which is especially difficult in a time of economic crisis with cutbacks in public funding; on the other hand, tax fraud damages the effectiveness of justice within the tax system, since not everyone is able to evade taxes equally, thus leading to injustices between small and large companies and between the self-employed and employees.

The study of the causes behind tax evasion is a relatively young field which has been dominated mainly by economists. According to the Neoclassical economic theory, the decision to evade taxes or not is the result of a rational analysis which takes into account the benefits of evasion (the monetary amount saved in taxes) in relation to the potential costs (of the evasion being discovered and having to pay a fine). Nevertheless, it is becoming more and more clear that this view is insufficient in explaining such a complex phenomenon as tax fraud, and

that is why other explanatory mechanisms have been devised from the viewpoints of psychology and sociology.

Researchers from the UAB research group GSADI (Analytical Sociology and Institutional Design Group) have tried to explain the behaviour of a tax evader through an integral model named SIMULFIS. The model is an agent-based social simulation, a computerised technique which allows creating virtual societies formed by agents which have specific individual and relational characteristics and which take decisions by following a series of rules. It is the first time that different factors are integrated into this type of simulator with the aim of creating realistic results.

Researchers calibrated the simulator to make it reproduce real traits found in the Spanish society, such as tax rates, income distribution and occupational distribution.

The SIMULFIS agents, which correspond to taxpayers in real life, decide to make use of tax evasion opportunities after passing through a series of conditions and filters. The first condition is prescriptive: when taxpayers believe the state are treating them justly, their inclination towards tax evasion diminishes. Next, they are passed through the rational election filter: the agents calculate if they will benefit by evading taxes after considering the inspections and sanctions. Lastly, a social influence filter is applied: the more tax evaded by neighbours, the more tax evasions by taxpayers in the simulation.

The simulator can be used to predict the effects of different measures taken against tax evasion to try to reduce this phenomenon. Among the conclusions of the study, researchers observed that improving tax inspections - by increasing their frequency and efficacy - would be a more effective measure against fraud than raising the amount of fines issued.

"The results of the experiments conducted with SIMULFIS allow us to reaffirm that we are working with a promising tool which will help to explain the level of tax fraud amongst a society based on individual decisions taken by the taxpayers", concludes Toni Llàcer, researcher at the UAB Department of Sociology and co-author of the study, together with researchers José Antonio Noguera (director of the study), Eduardo Tapia and Francesc J. Miguel.

Provided by Universitat Autonoma de Barcelona

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