Saving of production as the key to model economic growth in kinetic wealth-exchange models

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The kinetic exchange models of market propose a strong tool aim to reproduce the stylized facts of wealth and income distributions and to understand the microscopic dynamics involved in economic inequality. Some of the models within this frame assume the local conservation of wealth and money in economic transactions in analogy to elastic collisions between pairs of molecules of a gas. This ideal gas-like dynamic constitutes a useful simplification to tackle income processes which are not related to return from capital, e.g. the distribution of wages in a local closed economy as an enterprise. Nevertheless, in accordance with criticisms coming from some economists, a more accurate approach to the macroeconomic phenomena demands the notion of return from wealth, which essentially leads to non-conservative economic scenarios where the production and the economic growth play important roles to understand the underlying dynamics of wealth inequality. The former issue has been addressed from the point of view of econophysics through several models where the concept of return on capital is introduced using multiplicative stochastic processes. However, a microfoundation to these class of models and their actual macroeconomic implications are still unsolved problems. In line with the last arguments, we propose in this work a kinetic wealth-exchange model of economic growth as a non-conservative extension of the Chakraborti and Chakrabarti model of money distribution. The microfoundation of this kinetic wealth-exchange model is given through the same formalism introduced by the original model where the utility of the economic agents is maximized constrained by stochastic preferences. This method permits us to introduce the saving of production into the model, which inherently leads to capitalization and economic growth. The macroscopic consequences of the non-conservative dynamic of this model are studied numerically through Monte Carlo simulation methods and analytically using a mean field approximation. Both approaches conduce to the exponential economic growth with a constant rate proposed in neoclassical macroeconomics, as an emergent property of the microscopic dynamics. Furthermore, the emergent distributions of the model are well-fitted using Log-Pearson distributions, which implies that the logarithm of wealth holds the gamma distributions resulting from the original model and therefore the convergent-divergent behavior of the distribution is equivalent. The model has important implications in the field of econophysics because it proposes an alternative to tackle the issue of economic growth as a consequence of return from wealth, within the frame of a non-conservative model with a clear microfoundation which allows to connect the micro and macro spheres of economy.

References

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