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The Dynamics Of Inequalities Of Income And Wealth In South Africa: A Computational Approach

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Debates about the importance of inequalities predate the Covid-19 pandemic; however, the current pandemic differentiated impact has highlighted the degree of existing inequalities across the world. While the SARS-CoV-2 virus itself does not discriminate along with the markers of race, ethnicity, class, religion, wealth, or income, the vulnerability to the virus and its impact remains discriminated by a different set of categories. Such a fact is illustrated by how the health risks (infection and death rates) and the economic and social impacts of the virus (e.g., unemployment, undernourishment) vary dramatically across different income and wealth brackets.

We make use of a computational rendering to illustrate two main arguments presented in the literature (Atkinson, 2015, Piketty, 2014, 2020):

Argument one: The initial conditions matter for the driving forces of inequality. Thus, higher initial stocks of wealth vs. income create significant inequities due to the interaction of initial conditions with feedback effects. Therefore, these small differences in percentage points lead to substantial differences in wealth.

Argument two: When we speak of income vs. wealth, we usually speak of them as if they are quantities of the same order of magnitude. However, even in the case of slight differences in the initial conditions, changes in the rates of return lead to significant differences (in sizes of several orders of magnitude), which explain the differences between inequalities of income and wealth.

To do this, we use a simple computational model to illustrate how the general dynamics of inequalities of income and inequalities of wealth in the context of South Africa emerge out of the actions of independent individuals. We depart from a general comprehension that, while this model does not intend to render the South African particularities in extreme detail, it incorporates some general features of this country regarding the inequalities of income and wealth.

To develop a computational model, we use a three-stage strategy: first, key variables and factors are rendered through a causal loop diagram, allowing for the representation of interdependencies within the economic system. Second, aggregated forces are represented in a system of differential equations. This strategy leads to identify (i) sources of inflows and outflows of the economic system of interest; and (ii) sources of accumulation (i.e., inequality). A second stage will focus on disaggregation, where key subsystems identified in the first stage are represented at the household level. The latter stage will aim to complement extant works of agent-based macroeconomic models of inequality (Russo et. al, 2015).

In this paper, we make several contributions to the study of inequality. We depart from the ideas of Piketty in Capital in the 21st century to discuss how the different rates of return from capital (r) and the rate of growth of an economy (g) are an important driving mechanism behind the increase of inequalities. Our operational approach explains how the structure resulting from the recurrent interaction of different actors, information, and material produces inequality dynamics of income and wealth. Our contribution is fourfold. Firstly, we aim to illustrate and discuss the role of feedback effects and path dependence, which are central to the creation and reproduction of inequities across time. Modelling and representing such apparently basic dynamics is a useful lens to illustrate the relationship between income and wealth and their inequalities concerning the r>g axiom. Secondly, we disaggregate the analysis of these tendencies and explain how such dynamic does not emerge as the result of a hidden agenda in a particular clique in society but as the consequence of the actions of multiple independent actors and different incentives which lead to such unequal results, illustrating how such dynamics to an extent illustrate the existing inequalities along with different sets of categories (racial category, class) in South Africa. Thirdly, we discuss how when we speak of inequality and wealth, we need to talk of two types of quantities. In fact, we argue that the difference between these income and wealth speaks of variables that are different in order of magnitude, making even more salient the importance of recognizing wealth as an essential driver of inequality. Finally, such framing allows the understanding, modelling, and analysis of structural factors and their link with the agency of agents.

KEYWORDS: computational modelling, inequality of income, inequality of wealth, South Africa.

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