Can Poverty Be Reduced by Acting on Discrimination? An Agent-Based Model for Policy Making

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ABSTRACT

In the last decades, there has been a deceleration in the rates of poverty reduction, suggesting that alternative insights to advance the number one UN Sustainable Development Goal are required. The criminalization of poor people has been denounced by several NGOs, and an increasing number of voices suggest that discrimination against the poor (a phenomenon known as *aporophobia*) could be an impediment to mitigating poverty. In this paper, we present the novel *Aporophobia Agent-Based Model (AABM)* to provide evidence of the correlation between aporophobia and poverty computationally. We present our use case built with real-world demographic data and poverty-mitigation public policies (either enforced or under parliamentary discussion) for the city of Barcelona. We classify policies as discriminatory or non-discriminatory against the poor, with the support of specialized NGOs, and we observe the results in the AABM in terms of the impact on wealth inequality.

CCS CONCEPTS

• Computing methodologies → Agent / discrete models; • Applied computing → Law; Economics.

KEYWORDS

agent-based modelling; norms; policy-making; poverty; discrimination

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1 https://github.com/albaaguilera/Aporophobia

1 INTRODUCTION

According to the World Bank, over six hundred and fifty million people (10% of the global population) still live in extreme poverty and COVID-19 has particularly affected the poorest: the number of people living in extreme poverty rose by 11% in 2020 [14]. In this context, urgent and innovative measures are required to work towards poverty eradication, the number one UN SDG.

In 2017, the Spanish philosopher Adela Cortina coined the term *aporophobia* to refer to the “rejection, aversion and fear directed toward the poor” [5]. The impact of aporophobia in poverty mitigation has been described in the literature, but there is no empirical evidence yet that aporophobia hinders poverty reduction. This paper aims to fill this gap by presenting the first experimental results and proof of concept of the model, built from the published architecture in [12]. An Agent-Based Model (ABM) is the most popular computational tool used for policy-making studies [7]. We contribute to the existing ABM literature with a use case that aims to be representative of an urban environment and its underlying social characteristics. The main novelty of the article is the approach to tackling the multidimensional topic of poverty from the perspective of discrimination.

2 APOROPHOBIA AGENT-BASED MODEL

The Aporophobia Agent-Based Model (AABM), is a multiagent simulation with autonomous decision-making agents designed to represent citizens, who carry out their daily affairs and are influenced by the legal framework. These individuals have a personal profile based on real-life demographic data. Their decision-making is based on their needs [13], while the legal norms reflect real-world policies enforced in a specific region. All the project materials can be accessed from the GitHub public repository 1.

As a first case study of the simulation, we choose 4 districts within the city of Barcelona. The data is mainly extracted from OpenData Ajuntament de Barcelona databases [2] and other sources provided by NGOs [1]. The initial institutional framework prototype is a set of 6 norms, introduced in Table 1.
Table 1: Policies (expressed as norms) implemented in the AABM, tagged as aporophobic (Apo) or non-aporophobic (Non-Apo). The description of the norms is included, as well as the legal reference of each policy.

<table>
<thead>
<tr>
<th>Tag</th>
<th>Norm</th>
<th>Description</th>
<th>Legal Ref.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Apo</td>
<td>(1)</td>
<td>Receive unemployment benefits if you have fulfilled the required contributions.</td>
<td>[8]</td>
</tr>
<tr>
<td></td>
<td>(2)</td>
<td>Receive minimal vital income when a month has gone by.</td>
<td>[11]</td>
</tr>
<tr>
<td></td>
<td>(3)</td>
<td>Receive a dignified living space in case of being homeless when a month has gone by.</td>
<td>[4]</td>
</tr>
<tr>
<td>Apo</td>
<td>(4)</td>
<td>Pay a fine when you sleep on the street or commit a minor crime.</td>
<td>[6]</td>
</tr>
<tr>
<td></td>
<td>(5)</td>
<td>In case you can not pay the fine for a crime, the fine can be commuted to days of imprisonment.</td>
<td>[3]</td>
</tr>
<tr>
<td></td>
<td>(6)</td>
<td>Evicted from your home in a bankruptcy situation when a month has gone by.</td>
<td>[9]</td>
</tr>
</tbody>
</table>

Figure 1: Results extracted from the AABM’s proof of concept across all combinations of norms. Gini coefficients as a function of the proportion of aporophobic norms (blue to pink color gradient) in each norm combination executed. Lowest and Highest Gini computed are indicated, as well as their associated combination of norms. All the Gini coefficients obtained with a combination containing Norm 1 are circled in black.

3 RESULTS

To comprehensively examine the impact of the norms proposed in Table 1, we use the the IIIA’s high-performance computing infrastructure to generate a sample of executions (τ = 10), for all the combinations (subsets) of norms. This corresponds to the power set of the norms, denoted as \( P(N) \), and equal to \( 2^N = 64 \). All simulations are executed for \( T = 2880 \) timesteps (the equivalent of 4 months), with \( N = 100 \) agents.

Every rule configuration is assessed in terms of the final wealth distribution and the Gini coefficient. Since there are numerous subsets of norms, we focus on studying the effects of some subsets in particular: every norm individually, the aporophobic and non-aporrophic subsets of norms, and all subsets together (in Fig 1). One can see that a higher proportion of Aporophic norms (maximum value of 1) generally corresponds to higher Gini coefficients, located on the right side of the plot. Conversely, Non-Aporophobic norms lead to lower values, located on the left side of the plot.

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