

Equity and Welfare: An Analysis of Resource Allocation for Disadvantaged Individuals from The Perspective of Rawlsian Theory of Justice

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Abstract: Resource allocation policies play a crucial role in promoting equity and welfare among disadvantaged individuals. This paper attempts to investigate how rational decision-making processes by governments in public policy influence the livelihoods and socio-economic status of disadvantaged individuals. We explore the complementary nature of the Rawlsian theory of justice and market theory to develop comprehensive policymaking approaches that balance fairness, efficiency, and market mechanisms. By examining the case of weighted student funding strategies, this study aims to provide insights for policymakers in developing effective resource allocation policies to tackle the issue of socio-economic inequality.

1. Introduction

Efficient and equitable resource allocation lies at the core of economic systems, as it determines the distribution of scarce resources among competing needs and desires [23]. Fair resource allocation is essential for promoting economic growth, reducing poverty, and enhancing societal well-being [2, 30]. However, within the realm of resource allocation, the needs and well-being of disadvantaged individuals warrant special attention. These individuals often face barriers such as income inequality, discrimination, and limited access to essential services, perpetuating social and economic disparities [20]. Addressing the resource allocation challenges faced by disadvantaged individuals is not only a matter of ethical concern but also crucial for creating a more just and inclusive society. Various theoretical frameworks and policy approaches have been developed to analyze and promote equity in resource allocation. One prominent framework in this domain is the Rawlsian theory of justice which prioritizes the well-being of the least advantaged individuals and promotes a fair distribution of resources [21].

On the other hand, Market mechanisms, driven by the forces of supply and demand, allow for the optimization of resource allocation based on consumer preferences and production capabilities [25]. Through price signals, markets efficiently allocate resources to their most valued uses, promoting productivity and economic growth. Efficiency is particularly relevant in resource allocation discussions, as the scarcity of resources necessitates their efficient utilization. Scarce resources must be allocated in a manner that maximizes their overall benefit to society. Market theory provides insights into how market prices guide the allocation process, ensuring that resources are allocated to their most highly valued uses, thereby increasing overall societal welfare [28].

By examining past research, particularly through the lens of equity and Rawlsian theory of justice, and also by exploring the influence of market theory, the aim of this study is to delve deeply into the issues of equity in resource allocation for disadvantage individuals and provide insightful discussion for both researchers and policy makers.

Rawlsian Theory of Justice

The Rawlsian theory of justice, developed by philosopher John Rawls, proposes a set of principles for the fair distribution of resources in a society. The theory emphasizes the concept of the original position and the veil of ignorance, whereupon individuals make decisions without knowing their social position or personal circumstances. This ensures impartiality and fairness in the allocation of

resources. The two principles of justice, namely the principle of liberty and the principle of difference, further guide the distribution of resources [21].

The principle of equal basic liberties emphasizes the importance of individual rights and freedoms within a just society. According to Rawls, each person should have an equal right to the most extensive set of basic liberties. These basic liberties include freedoms of speech, assembly, religion, and the right to participate in political activities. Rawls [22] argued that these liberties should be guaranteed to every individual, regardless of their social or economic position and all individuals have equal opportunities to pursue their own conception of the good life and participate in the democratic process. On the other hand, the principle of difference is the second principle of Rawls' theory of justice. It states that inequalities in the distribution of resources and wealth are permissible only if they work to the benefit of the least advantaged members of society. In other words, with its primary objective of addressing and remedying disparities, the principle of difference operates on the premise of ensuring that the allocation of social and economic advantages is carried out in a manner that prioritizes the well-being of those most disadvantaged and in direct need.

Based on the principles mentioned above, the following formula can be used for the expression of the theory:

$$R = (w_1 * U_1) + (w_2 * U_2)$$

Where:

R represents the total amount of social welfare resources,

U1 represents the welfare level of the most disadvantaged group,

U2 represents the welfare level of other groups,

w1 and w2 represent weights used to balance the level of attention to be given to each of the two groups.

In this formula, by adjusting the values of weights w1 and w2, different preferences for social welfare resource allocation strategies can be reflected. If the value of w1 is relatively high, more attention will be given to the most disadvantaged group to satisfy the maximin principle. Conversely, if the value of w2 is relatively high, a certain degree of inequality is allowed to incentivize and reward more efficient production and contribution.

Research by Rawls and subsequent scholars has explored the implications of the Rawlsian theory for resource allocation. Several scholars have further contributed to the development and understanding of the Rawlsian theory in the context of resource allocation. Ronald Dworkin, in his work "Sovereign Virtue: The Theory and Practice of Equality," expands on Rawls' ideas and emphasizes justice as fairness. Dworkin argues that individuals should have equal access not only to basic resources but also to resources that are necessary for them to develop their abilities and lead flourishing lives. This expands the scope of resource allocation policies beyond mere equality to consider individual well-being and personal development.

2. Market efficiency and Resource Allocation

In addition to the Rawlsian theory of justice, turning to an economic-based perspective provides valuable insights into resource allocation policies and their implications for societal well-being. Market theory focuses on efficiency and market mechanisms as important considerations in resource allocation decisions. Market mechanisms, such as price signals and competition, are believed to facilitate the optimal allocation of resources [3].

Efficiency, in the economic context, refers to the optimal use of resources to maximize the overall output or welfare of a society. In the domain of resource allocation decisions, market mechanisms manifest as influential forces, notably exemplified by the interplay between supply and demand. Functioning as potent signals, they convey the subjective value attributed by individuals to goods and services, consequently exerting a substantial impact on the allocation of resources. Proponents of market-oriented approaches argue that individuals, pursuing their own self-interest within a competitive market framework, lead to efficient outcomes and the allocation of resources to their most valued uses. From this point of view, the market mechanism offers several advantages. Operating as a facilitator of efficient resource allocation, it harnesses the decentralized reservoir of

knowledge and preferences inherent to individuals, thereby empowering them to make decisions that are attuned to their distinct needs and preferences, resulting in an optimized allocation of resources. This decentralized decision-making process ensures that resources flow to areas where they are most highly valued or desperately needed, leading to the production of goods and services that cater to society's needs and wants.

However, critics of market-oriented approaches contend that they often neglect the needs of disadvantaged individuals and exacerbate existing inequalities. Market outcomes can be influenced by factors such as unequal bargaining power, unequal access to information, and externalities, which may result in some individuals being left behind [28]. These concerns align with the Rawlsian theory's emphasis on fairness, equal opportunities, and the well-being of the least advantaged members of society [21].

The relationship between market theory on resource allocation and the Rawlsian theory is not necessarily one of contradiction, but rather one of complementarity. While market theory prioritizes efficiency, Rawlsian theory places a strong emphasis on fairness and equal opportunities for disadvantaged individuals. On the other hand, further research has demonstrated that market-oriented policies can enhance productivity and promote economic development, which may indirectly benefit disadvantaged individuals [1].

3. An Analysis of Resource Allocation Policies

3.1 Education and Human Capital Development

Investing in education and human capital development is essential for promoting equity and welfare among disadvantaged individuals. Policies that ensure equal access to quality education, including early childhood education and vocational training, can reduce the educational attainment gap [18].

Let us consider the scenario of education expenditure in which the Rawlsian theory can be applied and assume there are N individuals, each with an initial income of Y_i and an initial education expenditure of E_{0i} . The goal of education expenditure is to reduce inequality by redistributing resources and providing equal educational opportunities. The following formula can be used to represent the allocation of social welfare resources:

$$E_i = (1 - \beta) * E_{0i} + \beta * (\text{GDP per capita} - T)$$

Where:

E_i represents the final education expenditure received by individual i ,

E_{0i} represents the initial education expenditure for individual i ,

GDP per capita represents the per capita gross domestic product used to measure the level of economic development,

T represents the total amount of taxation or other expenditures used to regulate inequality or other social goals.

In this formula, $(1 - \beta) * E_{0i}$ represents the initial level of education expenditure multiplied by a weight $(1 - \beta)$ based on the maximin principle, ensuring that welfare is maximized for the least advantaged group in the allocation of educational resources.

$\beta * (\text{GDP per capita} - T)$ represents the adjustment of economic development level and taxation or other expenditures, multiplied by a weight β , to balance social fairness and economic development.

The choice of weight β depends on the specific research context, policy objectives, and the priority of education in the allocation of social welfare resources. A larger value of β will prioritize increasing education expenditure, while a smaller value of β will emphasize the balance between economic development and other social goals.

Assuming β is the weight for education expenditure, the following formula can be used to represent it:

$$\beta = f(\alpha, \gamma)$$

Where:

α represents an indicator of social fairness,

γ represents an indicator of economic development.

Function f is a function that translates social fairness and economic development into weights.

In Rawlsian theory of justice, determining the weight involves considerations of values, policy objectives, and social consensus.

Research has shown that early childhood education programs, such as high-quality preschools, can have long-term positive effects on children's cognitive and socio-emotional development [12,13]. Disadvantaged children can significantly benefit from these programs, establishing a strong foundation for their future success. In addition, vocational training programs can equip individuals with the necessary skills for employment and economic self-sufficiency, hence promoting social mobility [19].

3.2 Income and Wealth Redistribution

Income and wealth redistribution policies are vital for addressing economic inequalities among disadvantaged individuals. These policies can include progressive taxation, social welfare programs, and targeted transfers. The example below applies the Rawlsian principles of justice to the concept of income redistribution:

Let us assume there are N individuals, each with an initial income of Y_i and an initial resource allocation of R_{0i} . The goal of income redistribution is to reduce inequality by redistributing income. The following formula can be used to represent the allocation of social welfare resources:

$$R_i = R_{0i} + \beta * (Y_i - E(Y))$$

Where:

R_i represents the final resource allocation received by individual i ,

R_{0i} represents the initial resource allocation for individual i ,

Y_i represents the initial income of individual i ,

$E(Y)$ represents the average income level of the entire economic system,

β represents the parameter for income redistribution, controlling the degree of redistribution.

This formula indicates that the final resource allocation received by each individual is determined by both the initial resource allocation and the adjustment through income redistribution. By calculating the difference between an individual's initial income and the average income of the entire economic system, and afterward multiplying it by the income redistribution parameter β , we can obtain the additional resource allocation beyond the initial allocation through income redistribution.

Past research revealed that income redistribution through progressive taxation can reduce income inequality [20]. Through the imposition of higher tax rates on higher-income individuals and the allocation of resulting revenues to fund social programs and services, governments can effectively create a safety net for those who experience limited immediate opportunities. Social welfare programs, such as unemployment benefits and healthcare coverage, can help alleviate the financial burden faced by disadvantaged individuals and provide them with access to essential services [15].

Moreover, targeted transfers, such as conditional cash transfer programs, can directly address the needs of disadvantaged individuals and promote social inclusion. These programs provide conditional financial support to low-income families, based upon certain requirements including their child's school attendance record and need for healthcare services [7]. Such targeted interventions aim to break the cycle of intergenerational poverty and provide opportunities for upward mobility.

3.3 In consideration of both theories in resource allocation

It can be assumed that there are N individuals, and each individual's utility function is represented as $U(Y_i, E_i)$, where Y_i denotes the income and E_i represents the educational expenditure of the individual. The objective is to maximize the utility of the least advantaged group while satisfying the two principles of Rawlsian justice.

According to the first principle of Rawlsian justice, we can define the utility of the least advantaged group as U_{min} and assume the initial resource allocation as E_0 and Y_0 .

Taking into account the above principles, we can formulate the following:

Maximize U_{min}

subject to

$U(Y_i, E_i) \geq U_{min}$ (ensuring the utility of the least advantaged group is not less than U_{min})

$E_i \geq E_0$ (ensuring equal initial resource allocation)

$\Sigma(P_x E_i) \leq \Sigma(P_x Y_i)$ (resource allocation consistent with market mechanisms)

Here, U_{min} represents the utility of the least advantaged group, $U(Y_i, E_i)$ represents the individual utility function, E_i represents the educational expenditure of the individual, Y_i represents the income of the individual, E_0 and Y_0 represent the initial resource allocation, $\Sigma(P_x E_i)$ represents the total educational expenditure, and $\Sigma(P_x Y_i)$ represents the total income. P_x represents the price of educational expenditure.

$\Sigma(P_x Y_i)$ represents the total income, where P_x is the price of income and Y_i is the income of the individual. This formula aims to aggregate the individual incomes weighted by their prices to obtain the total income of the society. Again, the specific choice of utility function, prices, initial resource allocation, and other parameters are subject to specific social contexts.

3.4 The Case of Weighted Student Funding Strategies

Formula funding is a policy mechanism used by governments to allocate resources to disadvantaged groups based on predetermined formulas or criteria. It offers a systematic approach to resource distribution, aiming to ensure equity and fairness [27]. Weighted student formula (WSF) is one type of formula funding strategy that allocates resources to schools based on the characteristics and needs of individual students [24]. Under a WSF model, schools serving disadvantaged students receive additional funding to address the challenges associated with poverty, English language learning, or special education requirements. To ensure equal opportunities, this strategy directs resources toward schools with a heightened concentration of disadvantaged students, fostering an environment of inclusivity and providing a level playing field for all [9].

Regarding the design of WSF strategies, a Rawlsian perspective necessitates a focus on equalizing opportunities and catering to the needs of the most disadvantaged students. This principle aligns with the concept of weighted funding, which allocates additional resources to students with greater needs. Embracing a fair and equitable formula that takes into account various factors such as poverty, disabilities, and language proficiency, the Weighted Student Formula (WSF) aligns seamlessly with Rawls' principles, actively promoting social justice within the realm of education.

According to the aforementioned two key principles comprising the Rawlsian theory, the design of WSF can be expressed as the following calculation.

Suppose there are N students, each with the following indicators:

- 1) Family income (I_i): Measures the economic situation of the student's family.
- 2) Academic performance (G_i): Reflects the student's academic ability and performance.
- 3) Special needs index (D_i): Measures whether the student has special learning needs or disabilities.

Taking into consideration the two principles of Rawlsian justice, the following formula can be constructed:

$$W_i = \alpha * I_i + \beta * G_i + \gamma * D_i$$

where α , β , γ are parameters used to adjust the relative importance of each indicator in the weighting.

To account for the principle of equal basic liberties, we can set the weights to be inversely proportional to the indicators. For example:

$$W_i = 1 / I_i + 1 / G_i + 1 / D_i$$

This ensures that students with smaller indicator values have higher weights, leading to a more favorable resource allocation for the least advantaged group.

To account for the principle of difference, we can introduce an adjustment parameter (δ) to balance the inequality in resource allocation. For example:

$$W_i = (1 / I_i + 1 / G_i + 1 / D_i) * \delta$$

where δ is a parameter between 0 and 1, representing the degree of inequality in resource allocation. As δ approaches 1, the resource allocation tends more towards the difference principle.

Finally, based on the weighted student funding allocation formula, the education expenditure (E_i) for student i can be calculated as:

$$E_i = W_i * \text{Total Funding}$$

This formula allocates educational funding based on the weight of each student, considering the two principles of Rawlsian justice. However, if the market theory as the utility function is taken into account, the formula can be revised as following:

Assume that each individual has a utility function $U(Y_i, E_i)$ representing their income (Y_i) and education expenditure (E_i), and the goal is to maximize overall social welfare through resource allocation, we can modify the formula as follows:

$$\begin{aligned} &\text{Maximize } \Sigma U(Y_i, E_i) \\ &\text{subject to } \Sigma E_i \leq B \end{aligned}$$

Here, Σ represents the sum over all individuals, B represents the total resource budget.

To reconcile this with the principles of Rawlsian justice, weights to each individual's utility function can be assigned based on their characteristics. For example, considering the indicators mentioned earlier:

$$W_i = \alpha * U(Y_i, E_i) + \beta * I_i + \gamma * G_i + \delta * D_i$$

Here, α , β , γ , and δ are parameters that determine the relative importance of each characteristic in the overall utility calculation.

To satisfy the principle of original equality, we can assign higher weights to individuals with lower values of their indicators. This can be achieved by using the inverses of the indicators as weights:

$$W_i = \alpha * U(Y_i, E_i) + \beta / I_i + \gamma / G_i + \delta / D_i$$

This weighting scheme ensures that individuals with lower income, lower academic performance, or higher special needs have a higher weight in the overall utility calculation, prioritizing the least advantaged group.

To incorporate the principle of difference, we can introduce an adjustment parameter (ϵ) to balance the inequality in resource allocation:

$$W_i = \epsilon * (\alpha * U(Y_i, E_i) + \beta / I_i + \gamma / G_i + \delta / D_i)$$

Here, ϵ is a parameter between 0 and 1 that represents the degree of inequality in resource allocation. A higher value of ϵ emphasizes the difference principle, while a lower value emphasizes the principle of original equality.

Finally, the education expenditure (E_i) for individual i can be calculated based on their weighted utility:

$$E_i = (W_i / \Sigma W) * B$$

This formula allocates education expenditure to each individual based on their weighted utility, considering both the Rawlsian principles and the overall resource budget.

It's important to note that these modifications aim to incorporate the Rawlsian principles alongside utility maximization and resource constraints. The specific parameter values and weighting scheme can be adjusted based on the context and desired outcomes.

Some studies indicated that WSF policies can effectively address inequities by providing additional resources to schools serving disadvantaged students. For example, Tuchman et al. [29] employed an event study model to determine if the implementation of the Weighted Student Formula (WSF) had a positive impact on student academic performance. The study focused on 18 districts between 2009 and 2016 and compared the performance of districts that implemented WSF with those that did not. The results showed that holistically, the implementation of WSF was associated with increased math and ELA test scores for all students, especially in ELA during the first year. Similar positive effects were observed for black students. Additionally, the study found that implementing WSF helped to reduce the achievement gap between white and black students in ELA and math scores.

On the other hand, Hoxby's research examined the economic impact of WSF and found that funding mechanisms based on student characteristics can enhance resource distribution and lead to positive outcomes. Such evidence demonstrates the effectiveness of weighted funding models in achieving equity and addressing educational disparities. Moreover, public statistics data further support the economic analysis of WSF strategies. For instance, a study analyzing the correlation between resource allocation and student achievement in a specific district implementing WSF can provide insights into the economic efficiency of the model. Through an evaluation of the allocation

of financial resources among educational institutions and an analysis of student achievements, valuable evidence can be obtained, illustrating the cost-effectiveness and efficacy of the Weighted Student Formula (WSF) in enhancing educational outcomes [17].

Several principles should be considered to ensure WSF-type policies align with the theory of Rawlsian justice and economic efficiency. These principles include transparency, fairness, flexibility, and accountability. Transparency is important to build trust among stakeholders. Clear guidelines regarding the allocation formula, criteria, and data used should be provided to ensure fairness and equal opportunities for all students. Flexibility is essential to cater to diverse student needs. Schools should have autonomy in allocating funds to tailor interventions and support services, promoting a more personalized approach to education. Moreover, accountability mechanisms should be in place to evaluate the impact of WSF strategies. Regular monitoring and evaluation, coupled with stakeholder feedback, can facilitate adjustments and improvements in the allocation model. This fosters a continuous cycle of improvement and ensures that resources are effectively utilized to benefit the most disadvantaged students.

4. Discussion and Conclusion

In this study, it can be seen while efficiency is a crucial consideration in resource allocation, the Rawlsian theory suggests that it should not come at the expense of fairness [26]. Despite that market theory is also important for resource allocation [2], in the context of involving disadvantaged individuals, market mechanisms may not result in equitable outcomes due to systemic disadvantages and unequal starting points [28]. Therefore, targeted policies that prioritize the needs of the disadvantaged are essential to mitigate inequalities and promote welfare [4]. Integrating both justice theory and market theory within resource allocation strategies allows for a balanced approach that considers both efficiency and equity.

Weighted student funding involves allocating additional resources to schools with students from disadvantaged backgrounds, recognizing the additional challenges they face, and aiming to level the playing field [10]. It is a concrete example for the discussion of resource allocation in this study. The findings suggest that such strategies can contribute to reducing educational disparities and improving outcomes for disadvantaged students [16], and moreover it can bring positive economic influences as well.

However, it is important to acknowledge the limitations of this study. Firstly, the analysis is primarily based on a theoretical framework and a review of existing literature, which may limit the generalizability of the findings. While this provides valuable insights, further empirical research is needed to assess the practical implications and effectiveness of resource allocation policies in different contexts. Secondly, the focus on weighted student funding strategies limits the scope of the study. Future research should explore a broader range of policies and interventions that address various dimensions of disadvantage beyond education. Future research could also consider the interplay between different resource allocation policies and their cumulative impact on disadvantaged individuals. It is essential to examine how multiple policies, such as targeted welfare programs, affirmative action initiatives, and inclusive economic policies, can complement each other to create a more equitable society [5]. Through the integration of diverse approaches, policymakers can construct all-encompassing strategies that effectively tackle the multifaceted aspects inherent in challenges like a socio-economic disadvantage or disability and foster a sense of holistic well-being [8].

In addition, investigating the potential unintended consequences and trade-offs of resource allocation policies is crucial to ensure that they do not inadvertently perpetuate or reinforce existing inequalities [14]. For instance, while weighted student funding strategies have shown promise in reducing educational disparities, it is important to evaluate their potential impact on school segregation or unintended stigmatization of disadvantaged students [22]. Understanding and mitigating such unintended consequences can help refine resource allocation policies and ensure they are effective in promoting both equity and welfare.

To strengthen the basis on which resource allocation policies should rely, further empirical studies should be conducted, employing rigorous quantitative and qualitative methods. Longitudinal studies that track the outcomes of disadvantaged individuals over time can provide valuable insights into the long-term impacts of different resource allocation strategies [6]. Moreover, comparative studies across different jurisdictions can shed light on the effectiveness of diverse policy approaches and inform best practices [11]. Through a thoughtful examination of the intricate interplay between various policies, a thorough evaluation of potential unintended consequences, and the rigorous conduct of robust empirical studies, a pathway can be paved toward the development of effective strategies aimed at addressing inequality and fostering the overall welfare of individuals facing disadvantage.

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