Allocation of Opportunities

Wilson Law, PhD
Baylor University

Abstract

This paper develops a matching model to study the efficient allocation of opportunities from the advantaged to the disadvantaged group. Efficiency is measured by total output and social welfare. Opportunities are matches that produce value to contracted parties, such as employers and employees, universities and students. Opportunity allocation differs from income redistribution because its value depends on the characteristics of the matched parties.

The model demonstrates that: (1) the meritocratic principles may produce an equilibrium outcome that is not socially optimal under fairly general conditions. (2) Reallocation policy, such as affirmative action, can be efficient when the opportunity's value-added gain outweighs the loss. (3) When social preference leans toward equality, reallocation of opportunities is more efficient to begin from the top of the distribution rather than the middle, as in progressive taxation. (4) Political support for reallocation depends on the information environment available to, and the behavioral bias of voters.

Introduction

The world has become more egalitarian, characterized by improved healthcare, universal education, and a robust social safety net for many over the last two centuries. While income inequality remains substantial between regions, inequality persists between advantaged and disadvantaged groups within many countries. In the U.S., earnings inequality has risen persistently since ~1980 until the last decade. Income inequality is also correlated with lower intergenerational mobility, a phenomenon that attracted considerable academic interest.

Income redistribution has often been advocated as a means of addressing economic inequality. But a less studied area is the efficacy of opportunity redistribution, despite its prevalence in areas such as college admissions, hiring, and procurement contracts.

This project develops a matching model below to study the efficient allocation of opportunities.

Model

There is a unit mass of people who can potentially benefit from an opportunity. Group $g \in \{A, D\}$ represents the Advantaged and Disadvantaged individuals. The fraction of D is $\varphi \in (0,1)$. Let $h_i \in [0,1]$ be the percentile rank of i's human capital or productivity within their own group.

Everyone applies to an opportunity and the decision maker is generically called a university to fix idea. The opportunity has a capacity constraint $0 < \kappa < \min(\varphi, 1-\varphi)$. If matched, both parties receive a payoff $W_g(h)$ which is increasing in h. If not matched, the outside option is $V_g(h)$ which is also increasing in h. Assume $W_g(h) > V_g(h)$: no crossing, no information problem or mismatch. Everyone will apply. $W_g(h) - V_g(h)$ is thus the value-added of the opportunity.

University maximizes its own payoff by choosing candidates with h above cutoffs:

$$H_{U,g} = \{h \geq W_g^{-1}(\omega(\kappa)) \equiv h_g^*\}.$$

A social planner who wants to maximize total payoff would choose acceptance sets that maximize the value-added of opportunity:

$$H_{S,g} = \{h | W_g(h) - V_g(h) > \delta(\kappa)\},$$

Where value-added exceeds a threshold δ.

Results

Result 1:
The acceptance sets of the university and the social planner are the same only if the value-added functions are increasing in h and the outside options are identical at the cutoffs. Generally, not the same results.
University and candidates maximize private returns with positive assortative matching, which is meritocratic. However, the allocation might not be socially optimal. A failure of Non-Transferrable Utility: D cannot compensate spots from A.

Contact

Wilson Law
Baylor University
Email: wilson_law@baylor.edu
Website: https://sites.google.com/site/wilsonwblaw
Phone: (254) 710-4390

Results (cont.)

From Result 1, reallocation can improve efficiency. Additionally, if the Social Welfare Function is concave, transferring resources from high-income to low-income individuals can improve social welfare.

Let u be an individual's utility function and $U(y) = \mathrm{SWF}(u(y))$ be the social welfare function where its curvature represents the extent of social preference for equality. Consider a policy: transfer a small fraction of opportunities γ from A to D by changing the acceptance cutoffs to $h_A^* + \eta_A, h_D^* - \eta_D$.

Result 2:
Welfare change:

$$\varphi \int_{h_D^*-\eta_D}^{h_D^*} [U(W_D(h)) - U(V_D(h))]dh$$
$$-(1-\varphi) \int_{h_A^*}^{h_A^*+\eta_A} [U(W_A(h)) - U(V_A(h))]dh$$

is positive if the welfare gain from reallocating opportunity outweighs the loss.

Result 3:
If social preference leans toward equality such that $U(W_A(h)) - U(V_A(h))$ is decreasing in h, opportunities from the top of A's distribution are better candidates for reallocation than those around the cutoffs. Similar to progressive taxation.

Candidates' Welfare:
They know their identities and ranks, the general properties of W and V but not the exact functional forms. They are uncertain about the acceptance cutoffs. They form their subjective probabilities of acceptance based on information environment m. Index $m = 0$ indicates no knowledge at all and $m \to \infty$ indicates perfect knowledge. Figure 1 plots the probabilities under different information environment.

Result 4:
When acceptance cutoffs are changed, candidates form new beliefs. The perceived change varies by information environment. In less informed environment, more people "feel" the impact, but less acutely, in terms of change in probabilities. Political support/opposition for such reallocation depends on the information environment, the utility differences, and potential behavioral bias.

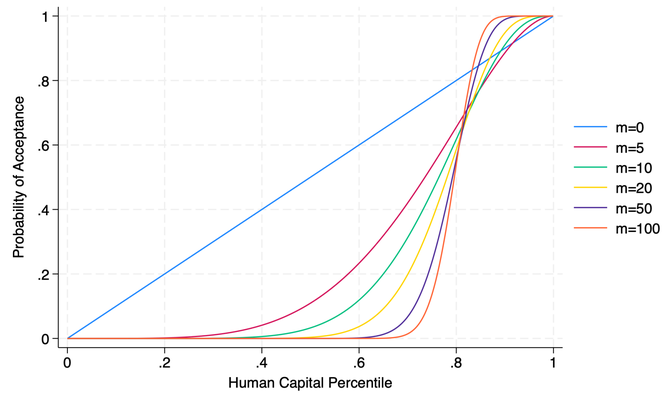

Figure 1. Subjective Probability of Acceptance under Different Information Environment m, where $m = 0$ is least informed.

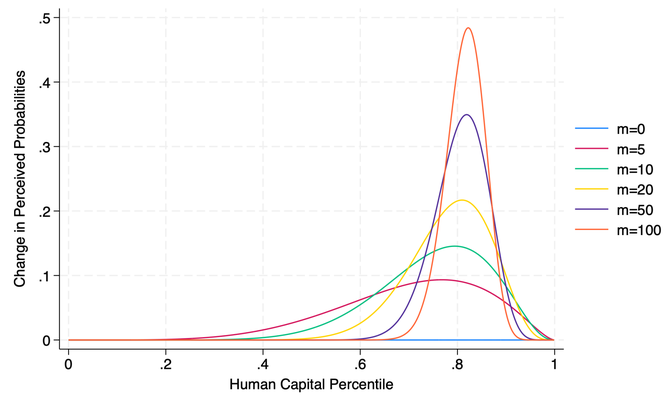

Figure 2. Population Perceived to be Impacted by Reallocation: When less informed, more people are impacted, but less acutely.

Discussion/Conclusions

Asymmetric payoffs: if the university and outside options' payoffs are proportional to the candidates', the results above still hold. If the university has a relatively higher payoff than that of the candidates in D, more D candidates can be optimally accepted; however, it can also lead to overcorrection.

When opportunities cannot be optimally reallocated, progressive income taxation and redistribution can improve social welfare. However, income redistribution cannot mitigate economic loss from misallocation. Therefore, taxation is not a perfect substitute for opportunity reallocation.