Equality of Opportunity and Incomplete Information

Aitor Calo-Blanco
University of Alicante

(Extended Abstract)

1 Introduction

This study refers to the optimal behaviour of public funding from an equal opportunity viewpoint, focussing on the connection between education and income distribution. Many papers dealing with Social Evaluation an Equality of Opportunity (EOp) have been published lately. Those papers want to measure and rank the welfare evaluation of income and opportunity. Most of them are based on the axiom that the final income is a monotone increasing function of effort. In this work we argue that such an assumption might be too strong. We propose a model to deal with public funding from an EOp viewpoint when the former assumption is dropped.

Our approach to EOp follows the works by Roemer, who develops a model in which income distribution may be regarded as the result of (at least) two different effects: effort and opportunity. Effort has to do with responsibility and involves the choice of occupation, investment in human capital, length and intensity of work, healthy lifestyle, etc. Opportunity refers to the agents’ external circumstances, which include genes, race, gender, family socioeconomic and cultural background, and other aspects for which agents cannot be held responsible. The bottom line is that a fair society should compensate agents for differences in opportunity but not for those differences derived from autonomous personal decisions.

The problem at the time of using the EOp approach is that the planner must be able to differentiate agents regarding their level of responsibility. To deal with this problem,
what it is commonly done is to use a statistical solution proposed by Roemer, based on
the assumption that the final income is a monotone increasing function of effort. Such a
solution makes possible to identify perfectly the level of responsibility of any agent with
her final income. From our viewpoint such an assumption is excessively strong, as the
final income is explained by nothing else than effort and responsibility in an obvious way.

We argue that it is only natural to think that the final income should be explained by
any other factor apart from effort and circumstances. If this were the case, the planner
would not be able to identify, ex-post, the level of personal responsibility of each agent
any longer. Some authors have suggested that without that assumption, previous results
in EOp would not be ethically defensible any longer. In spite of those suggestions, just
very little attention has been paid to such an issue.

We present a principal agent model of repeated public funding in which the level
of effort made by each agent cannot be inferred (perfectly) at the end of the period.
Heterogeneous agents, given private and public resources, decide the amount of education
(in terms of effort made) and then work to get an income. The model consider a social
planner who is concerned about equality of opportunity rather than about equality of
outcomes.

The key idea of our model is the following one. As external circumstances are assumed
to be common knowledge, we are thinking of a planner that, according to what should be
expected from agents, learns period by period how they behave.

2 About the Model

We consider a principal agent model of public funding with bilateral relationships between
one social planner and $M$ heterogeneous agents. The planner funds and taxes agents in
order to maximize a social evaluation function that takes into account both the size and
the distribution of the overall income.

Any agent’s income can be expressed as a function of two deterministic facts, the level
of effort made by the agent and her total resources (private wealth plus public funds) to
fund her education. Moreover, it is also assumed that such an income is a function of
the realization of a given random variable, over which the planner and agents have the
same distribution a priori. Therefore, it would be impossible for the principal to identify,
perfectly, effort with income.

The agent’s probability of obtaining a certain income depends positively on the agent’s
resources and in the level of effort that she has made. More precisely, the higher the level of
effort made (or the total resources), the higher the probability of obtaining a high income.
Each agent derives utility from net income and leisure, as the inverse of the effort made. Each one of them has a certain initial endowment, that is, her external circumstances. Additionally, she receives a certain amount of public funds from the planner as a help to fund her education. That help, jointly with the tax policy, must be understood as the way in which the planner redistributes income. Afterwards, she decides the level of effort that she is going to make.

Regarding agents’ personal characteristics, we assume that they can be heterogeneous in two different ways. From the viewpoint of their circumstances they can be classified into two types, the rich and the poor. With respect to personal responsibility, we assume that agents can make either a high effort, a low effort or a mixture between both. Let us define an effort group as the set of agents who have exerted a comparable degree of effort. On the one hand, income differences within effort groups provide a suitable measure of the inequality of opportunity. On the other hand, income differences between effort groups only represent diverse rewards of people’s autonomous choices and will not be consider unfair.

The timing of the model is as follows. First of all, the nature chooses the agents’ characteristics. Afterwards, the planner proposes to them pairs of subsidies and taxes. At the time of deciding her optimal allocation, the planner takes into account that agents might be different concerning their attitudes towards education and leisure (that is, the effort decision). Given these pairs and the individuals’ personal circumstances, every agent must make an effort so as to become educated and get a personal income. After the realization of the incomes, the planner updates her beliefs and every agent is taxed according to her external circumstances and income.

3 Results

We solved our model for several different scenarios. Main results are summarized here. We started with the case in which the planner cared about inequality and she had complete information. We obtained that she was able to induce agents to behave as she wished, in spite of the fact that it was impossible for her to identify agents.

Subsequently, we analysed the same scenario but without complete information. In that case, the planner was still able to induce agents to behave in a different way although they had received the same public subsidy. However, the final result was ‘worse’ than in the former case due to the fact that the planner had less flexibility at the time of allocating her resources.

Afterwards, we moved to the case in which the planner cared about equality under
complete information. In that case the main result was that any society that was concerned about EOp it would be willing to give up increasing the overall income so as to equalize opportunity among all citizens.

Finally, we focused on a social planner who was concerned about inequality and had incomplete information about agents’ responsibility. We obtained that any social planner who did not have complete information could update slightly her beliefs about agents’ behaviour at the end of each period.

In that case, the planner might induce all agents, at least in the short run, to make a higher level of effort if she applied to them a ‘reward-punishment’ mechanism according to her updated beliefs. The reason is that all agents would work harder in order to provide the principal with the signal that they are the good workers.

4 Concluding Remarks

The aim of this piece of work was to deal with EOp when the planner was not able to infer perfectly the characteristics of each individual. Surprisingly, the literature has paid very little attention to that case.

We obtained that our framework fits in with previous conclusions in the literature. As usual, when the maximization problem was restricted by the lack of information or by the implementation of an EOp, the planner had less flexibility to maximize the overall welfare. As usual, the last case is always ethically defensible.

We proposed a learning model to deal with the lack of information. More precisely, the planner updated, slightly, her beliefs about agents’ responsibility at the end of every period. We obtained that a mechanism based on such beliefs could induce all agents to behave more adequately. This is because all agents wanted to provide the principal with a high effort signal.

Last but not least, we argue that if we understand academic research centres as agents and the Ministry of Education as the principal, our model could be used to design the research funding.