A MEASURE OF QUALITY OF OPPORTUNITY

ABSTRACT. A ratio measure of the quality of choice alternatives available to individuals is introduced that can be calibrated using either actual revealed choice data or theoretical choice models.

The purpose of this note is to introduce a cardinal measure of the quality of choice available to individuals in different groups. Its derivation has already been given for more specialized contexts (Girt, 1976a and b, 1977). Its main advantages lie in its simplicity, particularly in calibration, its realism, when calibrated with real data, and its avoidance of some of the pitfalls of measures that could be derived from utility-maximizing theory.

The availability of a choice of alternatives for employment, housing, shopping, entertainment, etc., should be a fundamental component in any assessment of well-being. Perhaps, ideally, but not realistically, every individual in a society should have equal access and choice of alternatives for all his needs. Yet measures of the degree to which this is achieved have not been developed. It could be argued that the participation rates for activities such as unemployment rates, are such indicators, but this is not necessarily so. Range of choice and actual choice are not identical. Individuals may leave areas because they cannot find work; they may find employment elsewhere, but they may not have moved if the quality of employment opportunities had been better in the first place. Equality of opportunity is often an important consideration and this paper outlines a way towards its measurement.

The most difficult problem in measuring opportunity in a behaviorally meaningful way is the aggregation problem. It was extensively researched by Arrow (1963) with some rather negative results, but here we start from a slightly different base. We first of all simplify matters by considering the static situation where individuals can only make one choice from a set of alternatives $S$, where $x \in S$, $S \subset T$. Following the well-used logic of micro-economics and psychology we can state that if an individual chose element $x$ out of $S$, he preferred it to all other elements in the set. This may be written as
if $U_{ix} - U_{iy} > 0 \Rightarrow P_{i}(x/y) = 1$, $x \& y \in S$,

where $U_{ix}$ is the utility or value that the $i$th individual attaches to the $x$th alternative (his reasons for this do not concern us in this analysis). $P_{i}(x/y)$ is read as the probability that the $i$th individual prefers alternative $x$ to alternative $y$. If we assume that individuals always have to choose between alternatives, i.e., alternatives are not divisible, then the only alternative condition to (1) is given by

$if U_{ix} - U_{iy} < 0 \Rightarrow P_{i}(x/y) = 0 , x \& y \in S$.

The only additional condition that is required is the equivalent of a democratic vote in these circumstances, namely that when a group of individuals is allowed to choose between two sets of alternatives, say $R$ and $S$, $R \subset T, R \neq S$ it is preferable for an authority to allocate set $R$, assuming that both cannot be given, if one more individual would prefer $R$ to $S$ than $S$ to $R$.

For the sake of comparability, it is necessary to insist that the opportunities available to different groups of individuals be classified into a common typology, thus we shall re-define our elements and sets. The set of opportunities, $T$, is the global set, consisting of all types of opportunities available to any individuals being studied, $S$ and $R$ are groups of opportunities from this set, and $x$ and $y$ are individual elements in $T$. Thus, rather than $x$ now being John Doe's ironworks, it now becomes a heavy industrial plant. This being done, it is now possible to derive a measure of quality of opportunity from a sample of revealed preferences.

Let $N_{x}$ and $N_{y}$ be the numbers of individuals that preferred $x$ rather than $y$, and $y$ rather than $x$, respectively, when both were available opportunities. In a sample of $N_{x} + N_{y}$ individuals there would be

$(N_{x} + N_{y})!/N_{x}!N_{y}!$ ways in which these individuals could make the choice between $x$ and $y$ if there were no restrictions. Some of these would not be valid because they would imply that the individuals concerned had a different ordering of choice for the pairs than for their utilities, but we do not know the utility values directly. However, some information on them is available indirectly in that we know that as the size of $N_{x}/N_{y}$ increases so does the probability that for any individual in the sample