Operationalizing Amartya Sen’s Capability Approach through Capability-Equivalent Income

Yuan Cheng, PhD\textsuperscript{1}; John K. Dagsvik, PhD\textsuperscript{2}; Xuehui Han, PhD\textsuperscript{3}
\textsuperscript{1}Fudan University, \textsuperscript{2}Statistics Norway, \textsuperscript{3}Asian Development Bank

Abstract

Economic conditions that have strong impact on individual well-being and freedom are sometimes not reflected in income. To capture the welfare impact of such non-income-related economic condition, Amartya Sen proposed the Capability Approach. However, empirical applications of the capability approach are typically expressed in reduced form which is not fit for conducting welfare analysis. Using the random utility theory, we incorporate capability into the job market choice set as well as the utility through disposable income and leisure, so that we can translate it to the traditional concept of income. We showed that capability disadvantages can be converted to capability-equivalent income through the compensation variation. We simulate a transfer program where the disabled individuals are compensated with capability-equivalent income through an income tax to the top 20% earners. We find that inequality would be mitigated and the overall welfare of whole society would improve by 4%.

Methods and Materials

The utility of agent $i$ is assumed to have the form:

$$U^D(C_i, h_i, j, x) = \max_{c_i, h_i, j, x} \left( \theta h_i j + \log(x) \right),$$

where $(C_i, h_i)$ denotes disposable income and monthly hours of work of $i$, respectively. The term $(x, j, z)$ is i.i.d. across jobs $j$ and agent $i$ with the extreme value distribution of c.d.f. $\exp(-1/x^2)$. $x > 0$.

The probability $\varphi(h_i, j)$ of choosing hours of work $h_i$ in sector $j$ when working in either one of the three sectors—agriculture, manufacturing, and the other industries—such that $h_i > 0$ can be expressed as:

$$\varphi(h_i, j) = \frac{w(j)}{w(j) + \exp(\gamma)}$$

where $w(j)$ is the average wage of sector $j$ and $\gamma$ is the non-labor income. $D_i = 1$, if agent $i$ is disabled, and zero otherwise.

The empirical specification and measurement is:

$$\log\varphi(C_i, h_i) = \alpha_0 D_i + \alpha_1 + \alpha_2 D_i C_i + \alpha_3.$$ 

The opportunity sets of jobs faced by agent $i$ if he chooses to work is:

$$log\varphi(C_i, h_i) = \log\varphi(j) + \log g_j(h_i) = \gamma_j + y_j X_j.$$ 

The job opportunity measure $(\gamma_j, y_j X_j)$ can be explicitly linked to the number of jobs faced by agent $i$ in sector $j$ as: $\gamma_j = \theta g_j(h_i) = \exp(\gamma_j + y_j X_j).$

The likelihood function for the maximization is:

$$\log L = \sum_{i=1}^{N} \sum_{j=1}^{M} \gamma_j \log(\varphi_i, j(\gamma_j, \gamma_j, \gamma_j)).$$

**Capability-Equivalent Income** can be expressed as:

$$CV(x_i, x_i) = l_i - \bar{l_i},$$

so that $V(\theta, g_j, w_i, X_j) = V(\theta, g_j, x_i, X_j)$, where the status of disability in $X_j$ is artificially assumed gone (equal to zero) to get $X_j^*$, and the expected utility takes the form:

$$V(\theta, g_j, w_i, X_j) = v(\theta_i, x_i + \sum_{j=1}^{3} \theta_j g_j(h_i, l_i, x_j))$$

The impact of the transfer program can be assessed as:

- **Pre-Transfer Welfare:**
  $$W^T = \sum_{i=1}^{N} V(\theta, g_j, w_i, l_i, x_j) + \sum_{i=1}^{N} V(\theta, g_j, w_i, l_i, x_j).$$

- **Post-Transfer Welfare:**
  $$W^T = \sum_{i=1}^{N} V(\theta, g_j, w_i, l_i, x_j) + \sum_{i=1}^{N} V(\theta, g_j, w_i, l_i, x_j).$$

**Conclusions**

We found that: (1) Having a disability reduces job opportunities significantly and individuals with disability have higher utility towards consumption and values leisure more. (2) The reduced job opportunities can be measured with a money metric measure, Capability-Equivalent-Income, which generates the same utility level as if the disabled were free of disability. (3) A transfer program, where individuals with disabilities are fully compensated for their capability-induced loss of job opportunities and this is financed by taxing the top 20% earners, can reduce inequality in income and welfare and increase the overall welfare.

**References**