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Corrigendum

Corrigendum to “Relation Between a Social Welfare
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Abstract

Fifty years ago Eytan Sheshinski constructed a composite measure of social welfare in which income per capita enters positively, and income inequality enters negatively: social welfare was defined as a strictly increasing function of the product of income per capita and one minus the Gini coefficient. In the case of a population of two persons whose incomes are distinct, Sheshinski states that social welfare depends only on the lower income, which reduces the social welfare function to the Rawlsian social welfare function. We show that this is not true: social welfare depends on both incomes, and there is no congruence with the Rawlsian perspective.

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Back in 1972, Eytan Sheshinski posed the question under what conditions the utilities of individuals from income can be transformed into a social welfare function that can be expressed in terms of income per capita and the Gini coefficient. In population $N = \{1, 2, \dots, n\}$, $n \geq 2$, let $y = (y_1, \dots, y_n)$, such that $0 < y_1 \leq y_2 \leq \dots \leq y_n$ with at least one inequality being strict, be the vector of the incomes of the members of N . Let $\bar{y} = (1/n) \sum_{i=1}^n y_i$, and let G be the Gini coefficient of the distribution of the incomes. Specifically, Sheshinski asked whether a function $W(\cdot)$ of the utilities from income of the individuals exists, such that it consists of \bar{y} and G , namely whether $W = H(\bar{y}, G)$ is a social welfare function. Imposing the restriction that $H(\bar{y}, G)$ is a strictly increasing function with respect to \bar{y} and a strictly decreasing function with respect to G , Sheshinski established existence, remarking (equation (5) in his note) that in the case of a population of two individuals whose incomes are distinct, social welfare depends only on the lower income.

We let $n = 2$ and, without loss of generality, we let $y_2 > y_1$. A replication of (4) in Sheshinski's note for case of $n = 2$ yields $W = H(\bar{y}, G) = H[2^2 \bar{y}(1 - G)]$ for some increasing function $H(\cdot)$ which, upon expansion, results in

$$W = H[2^2 \bar{y}(1 - G)] = H \left\{ 2(y_1 + y_2) \left[1 - \frac{\frac{1}{2}(y_2 - y_1)}{y_1 + y_2} \right] \right\} = H(3y_1 + y_2).$$

Thus, equation (5) in Sheshinski's note which makes W depend only on the lower income y_1 cannot hold. Sheshinski added that one attraction of the result (5) is that it links his social welfare function to the Rawlsian social welfare function. In view of the above, there is no such link. While it is valuable to provide an economics-based rationale for the philosophy-based Rawlsian social welfare function, the way to get there has to be different.¹ What is true, though, is that in terms of the impact on social welfare W , in the case of two incomes a marginal change of the lower income ($\frac{\partial W}{\partial y_1}$) is (three times) more important than a marginal change of the higher income ($\frac{\partial W}{\partial y_2}$), but the latter is not nil; social welfare is increasing in y_2 .

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¹ Stark (2020) shows rigorously that the pursuit of the Rawlsian social welfare program is equivalent to a cost-effective treatment of social stress.