

How Should Health Economists and Health Policymakers Measure the Costs of Inequality?

An Approach Using Social Welfare Functions and the Generalized Risk-Adjusted Cost-Effectiveness (GRACE) Model to Measure Individuals' Values

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What are social welfare functions?

- Social Welfare Functions (SWFs) add together measures of the well-being of members of a society to get a “Total” measure of well-being.
- Since we’re “adding up,” let’s agree on some notation:
 - $\text{Total} = x_1 + x_2 + \dots + x_N = \sum_{j=1}^N x_j$
where x_j is something specific to person j .
 - Define the change in x_j as Δx_j .
 - Then $\Delta \text{Total} = \sum_{j=1}^N \Delta x_j$
- ***This is the only math I’ll use today.***

Fundamental Pillars for a Proper SWF

- **Fundamental Basis #1: Respect individual preferences.**
 - People's own measures of their well-being are the proper values, not those of somebody else.
- **Fundamental Basis #2: Respect the Pareto principle.**
 - "Mutual agreements" rule the day.
- **Resulting conclusion:** "[A proper]... social welfare function must take the form of a weighted sum ... of all individual utility functions, with more or less arbitrary weights" (Harsanyi, *J. Polit. Econ.*, 1955, p 321)

Fundamental Basis #1: Respect Individual Preferences

- Begin with the key ingredients:
 - H_j is a person's health
 - $C_j = I_j - \text{medical spending}_j$
- Now define a value (utility) function as $V(C_j, H_j)$.
 - More consumption, C_j , gives greater utility (Value).
 - Better health, H_j gives greater utility (Value).
- $V(C_j, H_j)$ is the proper utility function to use to construct SWFs that involve consumption and health.

Constructing Proper Social Welfare Functions

- In addition to individual's own values, $V(C_j, H_j)$, now add in the societal weights for each person, θ_j .
- $SWF = \sum_{j=1}^N \theta_j \times V(C_j, H_j)$
 - This is just the weighted sum of each $V(C_j, H_j)$.
 - Just like a weighted average in statistics....
- Now we have Harsanyi's (1955) proper SWF, which consists of a weighted sum of individual utilities.

Where do the value measures and weights come from?

- Economists can measure the values people place on their own consumption and health:
 - $V(C_j, H_j)$
- Politicians and/or ethicists provide the societal weights:
 - θ_j

... **not** intended to imply that politicians are ethical.....




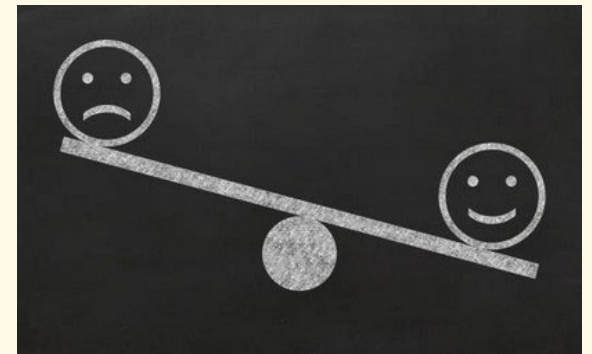
Fundamental Basis #2: Respect the Pareto Principle

- A change in policy is Pareto-improving if it improves the well-being of at least one member of society while not making anybody else worse off.
- This requires mutual agreement.



How the Pareto Principal Works in SWFs

- If two or more people are affected, and if their SWF weights are equal, then only Pareto-improving choices may occur.
 - Mutual agreement rules the day. 
- If the interests of Persons j and k conflict, then the only role of the SWF is to specify how the weights of those two compare.
 - Unaffected parties don't count.
- If the weights differ, then SWFs allow changes that benefit one person at the expense of another.
 - The extent to which this can occur depends on the relative SWF weights.



A SWF for the British National Health Service

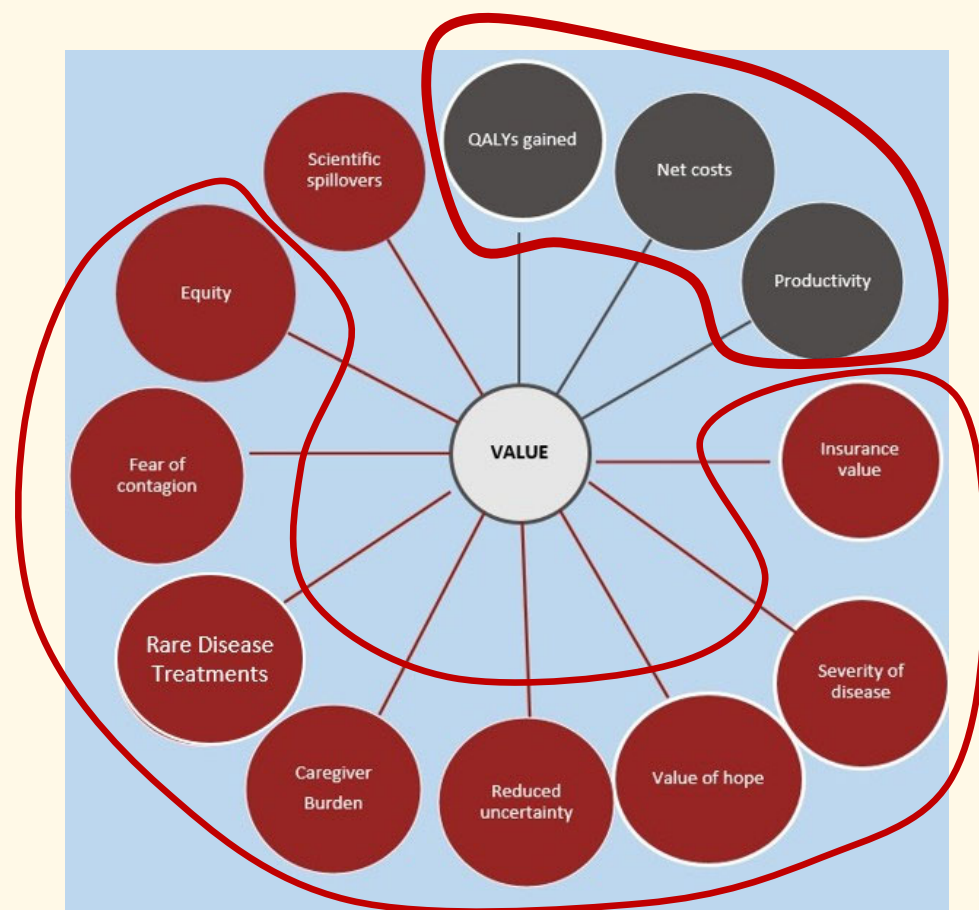
- $SWF = \sum_{j=1}^N H_j$
- $\Delta SWF = \sum_{j=1}^N \Delta H_j$
- $\Delta H_j = (LE_j \times \Delta HRQoL_j) + (HRQoL_j \times \Delta LE_j)$
 - This is the standard CEA model of value.
 - Use an intervention when $ICER \leq K$ (the decision threshold)
 - Degrees of illness or disability do not matter.
 - Levels of income (consumption) don't matter.
 - Indeed, *nothing* else matters.
 - "...a QALY is a QALY is a QALY..."

Now Introduce the Generalized Risk-Adjusted Cost-Effectiveness (GRACE) Model

- Standard CEA does not allow for the key economic concepts of scarcity and satiation.
 - In CEA, any fixed gains in health “count” the same, no matter how scarce or abundant “Health” is.
- GRACE allows for scarcity and satiation.
- This single change eliminates most of the known defects of CEA.

GRACE and the ISPOR “Value Flower”

- Standard CEA captures only QALYs, cost and productivity.
- GRACE captures almost all of the other “Value Flower” elements in a single, unified economic model.
- All of these changes arise from one single change: allowing for scarcity and satiation in the valuation of health.



In GRACE, the Ways in Which People Value Health Gains Depend on their Circumstances

- When HRQoL is “scarce” (more-serious illness) improving it has greater value.
 - Gains in HRQoL are multiplied by R_j ,
 - $R_j \geq 1$, and $R_j = 1$ only when a person is in perfect health.
 - R_j increases exponentially as untreated HRQoL falls.
- When a person has a pre-existing disability, health is also “scarce.”
 - Gains in health (ΔH_j) are multiplied by D_j .
 - $D_j \geq 1$ and $D_j = 1$ only when a person has no pre-existing disability.
 - D_j increases exponentially as the level of disability increases.

This Generalizes the SWF Approach of the BNHS

- BNHS model, without weights, says:

- $\Delta SWF = \sum_{j=1}^N \Delta H_j$

- GRACE (abstracting slightly) crucially adds the R_j and D_j multipliers:

- $\Delta SWF = \sum_{j=1}^N \{R_j \times D_j\} \times \Delta H_j$

- In standard CEA, $R_j = 1$ and $D_j = 1$

- This means that the BNHS model is a “special case” of GRACE.

- BOTTOM LINE: GRACE ***automatically*** increases SWF value more for treating those with higher untreated illness severity and pre-existing disability.

- This comes from “***respecting individual preferences,***” nothing else.

Now add Societal Weights to the SWF “Total”

- $\Delta SWF = \sum_{j=1}^N \theta_j \times \{R_j \times D_j\} \times \Delta H_j$
- A society might choose different value weights, θ_j , for other observable attributes:
 - Lower income
 - Limited access to healthcare, e.g., rural
 - Those suffering systemic discrimination by race, ethnicity, gender orientation...
 - Mothers, infants and children
 - Military Veterans
 - Etc.
- This is **GRACE** + “Distributional CEA”
 - Remember that R_j and D_j come from *respecting individual preferences*.
- In contrast, politicians and/or ethicists set the other θ_j weights.

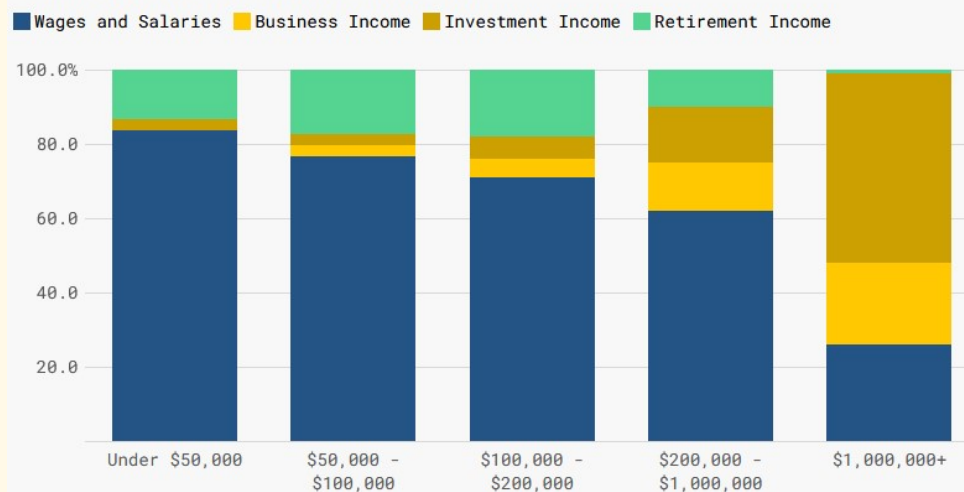
Even Better: Using GRACE Compresses Health Inequality

- GRACE says that treating people with the most-severe illnesses and/or disabilities has the highest societal value.
- This leads to greater improvements in HRQoL and/or LE for such people if these rules are followed.
- Therefore, inequality in health naturally shrinks.

Still Better: Increasing Health of the Sickest and Most-Disabled Compresses Income Disparity

Composition of Income Varies with Income Level

Sources of Total Income by Income Group, 2021



Source: IRS SOI Table 1.4.

[Get the data](#)

In Conclusion

- **The Question:** How Should Health Economists and Health Policymakers Measure the Costs of Inequality?
- **The Answer:** We should use properly constructed SWFs.
 - These SWFs should be weighted sums of individual's own values (utilities).
 - GRACE provides the proper way to measure value (utility).
 - This automatically gives higher societal weight to treatment of severely ill and disabled people.
 - Other weights, the θ_j , are outside of the realm of economics.

Thank You for Your Time and Attention

