

Incorporating Distributional Issues into the Economic Agency Index (EAI)

1. Current Limitations of the EAI Regarding Distribution

The Economic Agency Index (EAI) as proposed by David Shapiro has a significant limitation in its treatment of distributional issues. The current formula:

$$\text{EAI} = \text{Property} + \beta * \text{Wages} - \text{Transfers}$$

Where:

- **Property:** Income from dividends, rents, interest, and capital gains
- **Wages:** Earned income from labor
- **Transfers:** Government benefits paid for directly by taxes
- **β :** A weighting factor applied to wages ($\beta < 1$)

This formulation has the following distributional shortcomings:

1. **Aggregate Focus:** The EAI measures aggregate income sources without accounting for how these sources are distributed across the population.
2. **Distributional Blindness:** It does not distinguish between scenarios where property ownership is broadly distributed versus concentrated among a few.
3. **Masking Inequality:** High EAI scores could mask severe inequality if property income is highly concentrated.
4. **Incomplete Economic Agency Picture:** True economic agency depends not just on income sources but also on their distribution.

2. Approaches to Incorporating Distributional Components

Based on established methodologies for inequality adjustment in economic indices, I propose three approaches to incorporate distributional issues into the EAI:

2.1 Inequality-Adjusted EAI (IA-EAI)

Drawing from the UNDP's Inequality-adjusted Human Development Index (IHDI) methodology, we can adjust the EAI by discounting each component according to its level of inequality:

$$\text{IA-EAI} = \text{EAI} * (1 - D)$$

Where:

- **D** is a composite measure of inequality across the components

More specifically:

$$IA-EAI = [Property * (1 - D_p) + \beta * Wages * (1 - D_w) - Transfers * (1 - D_t)] / [Property + \beta * Wages - Transfers]$$

Where:

- **D_p** is the inequality in property income distribution (e.g., measured by Gini or Atkinson index)
- **D_w** is the inequality in wage distribution
- **D_t** is the inequality in transfer distribution

This approach penalizes the EAI score when any component has high inequality, with greater penalties for components that constitute a larger share of the index.

2.2 Component-Specific Distributional EAI (CSD-EAI)

This approach modifies the original formula by incorporating distribution-sensitive versions of each component:

$$CSD-EAI = Property * (1 - D_p)^\epsilon + \beta * Wages * (1 - D_w)^\epsilon - Transfers * (1 - D_t)^\epsilon$$

Where:

- **ε** is an inequality aversion parameter (typically between 0.5 and 2)
- Higher values of ε place greater emphasis on equality in the distribution

This formulation gives higher weight to more equally distributed income sources, aligning with the EAI's goal of measuring broad-based economic agency.

2.3 Subgroup Decomposition EAI (SD-EAI)

Drawing from the Atkinson index's decomposability property, we can calculate the EAI for different population subgroups and then aggregate them:

$$SD-EAI = \sum (p_i * EAI_i) - A$$

Where:

- **p_i** is the population share of subgroup i

- **EAI_i** is the EAI calculated for subgroup *i*
- **A** is an adjustment factor that captures between-group inequality

This approach allows for analysis of economic agency across different demographic groups (e.g., by income quintile, geography, race, gender) and penalizes overall scores when there are large disparities between groups.

3. Mathematical Properties and Implementation Considerations

3.1 Inequality-Adjusted EAI (IA-EAI)

Mathematical Properties:

- Bounded below by 0 (when inequality is maximum)
- Upper bound equals the original EAI (when inequality is zero)
- Satisfies the transfer principle (transfers from high to low income improve the score)
- Maintains the directional interpretation of the original EAI

Implementation Considerations:

- Requires distributional data for each component
- Can use established inequality measures like Gini or Atkinson
- More data-intensive than the original EAI

3.2 Component-Specific Distributional EAI (CSD-EAI)

Mathematical Properties:

- Maintains linearity in components
- Allows for different sensitivity to inequality across components
- Preserves the sign convention of the original EAI
- Adjustable inequality aversion through the ϵ parameter

Implementation Considerations:

- Requires choice of appropriate ϵ value
- Can be calibrated to reflect societal preferences regarding inequality
- Allows for sensitivity analysis by varying ϵ

3.3 Subgroup Decomposition EAI (SD-EAI)

Mathematical Properties:

- Decomposable by population subgroups
- Captures both within-group and between-group inequality
- Allows for targeted policy interventions
- Provides more granular insights than aggregate measures

Implementation Considerations:

- Requires detailed subgroup data
- Can be implemented at various levels of granularity
- Particularly useful for county-level analysis as emphasized in the original EAI

4. Practical Example: Calculating the Inequality-Adjusted EAI

Consider a hypothetical county with the following data:

- Property income: \$10 billion (Gini coefficient: 0.8)
- Wage income: \$50 billion (Gini coefficient: 0.4)
- Transfers: \$15 billion (Gini coefficient: 0.3)
- $\beta = 0.7$ (as per original EAI)

Original EAI calculation:

$$\text{EAI} = 10 + 0.7 * 50 - 15 = 10 + 35 - 15 = 30$$

Inequality-Adjusted EAI calculation:

$$\begin{aligned} \text{IA-EAI} &= 10 * (1 - 0.8) + 0.7 * 50 * (1 - 0.4) - 15 * (1 - 0.3) \\ &= 2 + 21 - 10.5 \\ &= 12.5 \end{aligned}$$

The IA-EAI (12.5) is significantly lower than the original EAI (30), reflecting the high inequality in property ownership. This provides a more accurate picture of economic agency across the population.

5. Recommendations for EAI Enhancement

Based on the analysis, I recommend the following enhancements to the EAI:

1. **Adopt the Inequality-Adjusted EAI (IA-EAI)** as the primary enhancement, as it most directly addresses the distributional blindness while maintaining the conceptual framework of the original index.

2. **Implement Subgroup Decomposition** as a complementary analysis, particularly at the county level, to identify disparities across demographic groups and geographic areas.
3. **Develop a Dashboard Approach** that presents both the original EAI and its inequality-adjusted variants, along with component-specific inequality measures, to provide a more comprehensive picture of economic agency.
4. **Establish Empirical Validation** by testing the relationship between the enhanced EAI measures and economic resilience outcomes, particularly in regions experiencing automation-driven transitions.
5. **Create Visualization Tools** that illustrate both the level and distribution of economic agency across populations and geographies.

These enhancements would significantly strengthen the EAI's ability to serve as both a descriptive and prescriptive tool for economic policy in the context of increasing automation, ensuring that the benefits of ownership-based income are broadly shared rather than concentrated.