Unpacking National Well-being System: An Exploratory Data Analysis of OECD How’s Life Indicators

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Introduction

- **Multi-dimensional well-being**
  - Encompasses economic, social, natural, and human capital dimensions

- Importance of well-being frameworks
  - Frameworks help measure national progress beyond traditional economic indicators ("well-being dashboards")
  - Global shift towards comprehensive well-being metrics (BLI, HPI, WHI, GNH, etc.)
  - Incorporation of well-being metrics into national policy-making (20+ countries)

- Understanding interconnections
  - Explore interactions among well-being dimensions
  - Aids in developing informed and impactful policies
Research Objective

- Identify **patterns of well-being** across different countries and contexts
- Understand the impact of major socio-economic events like the Great Recession and COVID-19 on well-being patterns

Data and methods

- Data: **OECD Well-being Framework/OECD How’s Life dataset**
- Methods: correlation analysis, **panel data clustering** and panel data analysis
OECD Well-being Framework

- 11 dimensions
  - **Current well-being averages:** measure how people are doing “here and now”
  - **Current well-being inequalities:** focus on disparities within countries
- Four capitals
  - **Future well-being resources:** consider sustainability for future generations

OECD Well-being Indicators

- Over 80 indicators, 67 for current well-being
- **Headline** indicators: 12 for each group
- Overall, more than 57% of data points are missing
- Varying availability for different countries and indicators

- **Linear interpolation** for missing years country-by-country
- Exclusion of countries and indicators with no data
  - 25/40 countries left
  - 9/12 indicators left
Correlation analysis

- Pearson correlations
  - Only significant with p<0.05 are shown
- All indicators except housing affordability are significantly correlated with life satisfaction (positive, except for homicides)
- Household income is strongly correlated with life expectancy, life satisfaction and voter turnout
Panel data clustering

- **K-Means clustering**
  - The data are standardized for each indicator
  - Clustering is repeated for each year separately
  - The optimal number of clusters based on the silhouette score (for most of the years) = 3

- **Principal Component Analysis (PCA)**
  - Data dimensionality reduction
  - Ranking of indicators by the explained variance
  - Visualization of clusters and their evolution over time
Evolution of clusters over time

Several groups of countries stay in the same cluster for the entire time period (“clusters of clusters”):

1. AUT, BEL, CHE, DEU, DNK, FIN, LUX, NLD, NOR, SWE
2. ESP, GRC, ITA, SVK
3. PRT, SVN
4. HUN, POL
5. EST, LTU, LVA
Principal component analysis

- Total variance explained ~60%
- Key features: loadings ≥ 0.4 (Stevens, 1992)
- PC1 – Socio-Economic Well-Being ("Having and being")
- PC2 – Employment and Education Quality ("Doing")
Well-being trajectories of countries

- All countries except Greece, particularly from the clusters with lower well-being, move left on PC1, indicating improvement in income, life expectancy, and life satisfaction.

- Several countries move up along PC2, exhibiting challenges with employment and student skills in science.
Well-being discrepancy between and within the clusters

- The total **centroid distance** can be treated as a measure of the discrepancy between the well-being of different clusters
  - A trend towards convergence, however, no further decrease after 2016
  - Impact of the Great Recession and COVID-19

- **Density** within the clusters indicating discrepancy between the countries in one cluster stabilizes towards the end of the considered time period
Key PC1 components

- **Group 1** (AUT, BEL, CHE, DEU, DNK, FIN, LUX, NLD, NOR, SWE) consistently shows the highest values across all variables.

- **Income** is generally **growing** for Groups 1, 4 and 5 (HUN, POL, EST, LTU, LVA) and **stagnating** for Groups 2 and 3 (ESP, GRC, ITA, SVK, PRT, SVN).

- **Life expectancy** in Groups 1-3 is higher than in Groups 4-5. COVID-19 has affected these groups more severely.

- **Life satisfaction converges** between the different groups – slightly decreasing for Group 1 and increasing for all other groups.
Key PC2 components

- After a decline during the Great Recession, **employment** of Groups 3, 4 and 5 catches up with employment of Group 1, while employment in Group 2 stagnates

- **Students’ skills in science** converge for all groups except Group 2 which stays behind

- Countries of **Group 2** (ESP, GRC, ITA, SVK) face the most significant challenges
Indicator correlations for groups of countries

Group 1: AUT, BEL, CHE, DEU, DNK, FIN, LUX, NLD, NOR, SWE
Group 2: ESP, GRC, ITA, SVK
Group 3: PRT, SVN
Group 4: HUN, POL
Group 5: EST, LTU, LVA
Possible future research directions

• Sensitivity analysis of K-Means results
• Applications to other dimensions of the OECD Well-being Framework (inequalities, future well-being)
• Applications to subnational regions, specific population groups, etc
• Application of specific time series clustering methods, e.g., K-Shape

Preliminary conclusions

• European countries exhibit various well-being trajectories over time
• Clusters of countries can inform cohesion policies
• PCs can be used as a basis for composite well-being indicators (Tomaselli et al., 2021)
Thank you for your time!

Questions?

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