

# 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

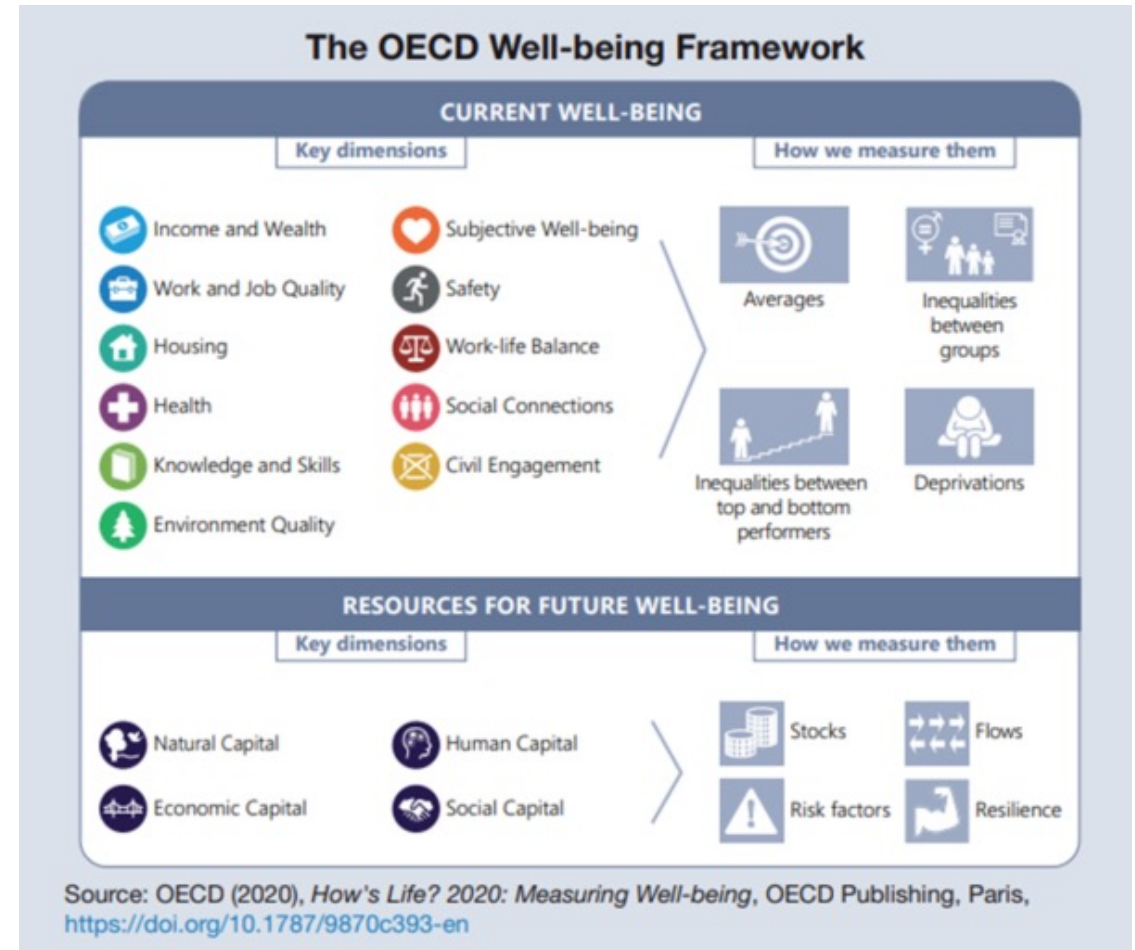
- Identify **patterns of well-being** across different countries and contexts
- Understand the impact of major socio-economic events like the Great Recession and COVID-19 on well-being patterns

## 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

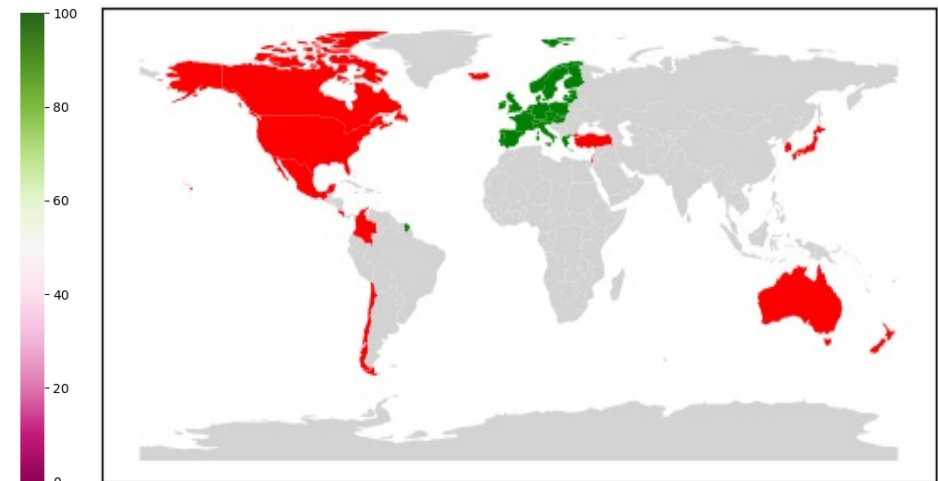
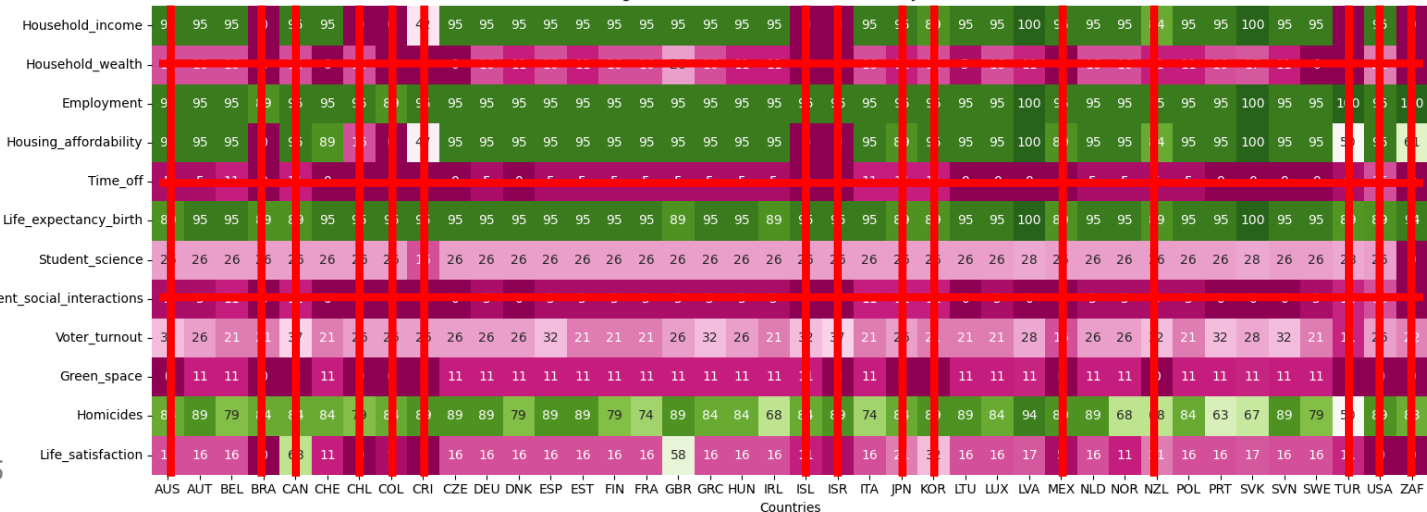
- 11 dimensions
  - **Current well-being averages:** measure how people are doing “here and now”
  - **Current well-being inequalities:** focus on disparities within countries
- Four capitals
  - **Future well-being resources:** consider sustainability for future generations



# OECD Well-being Indicators

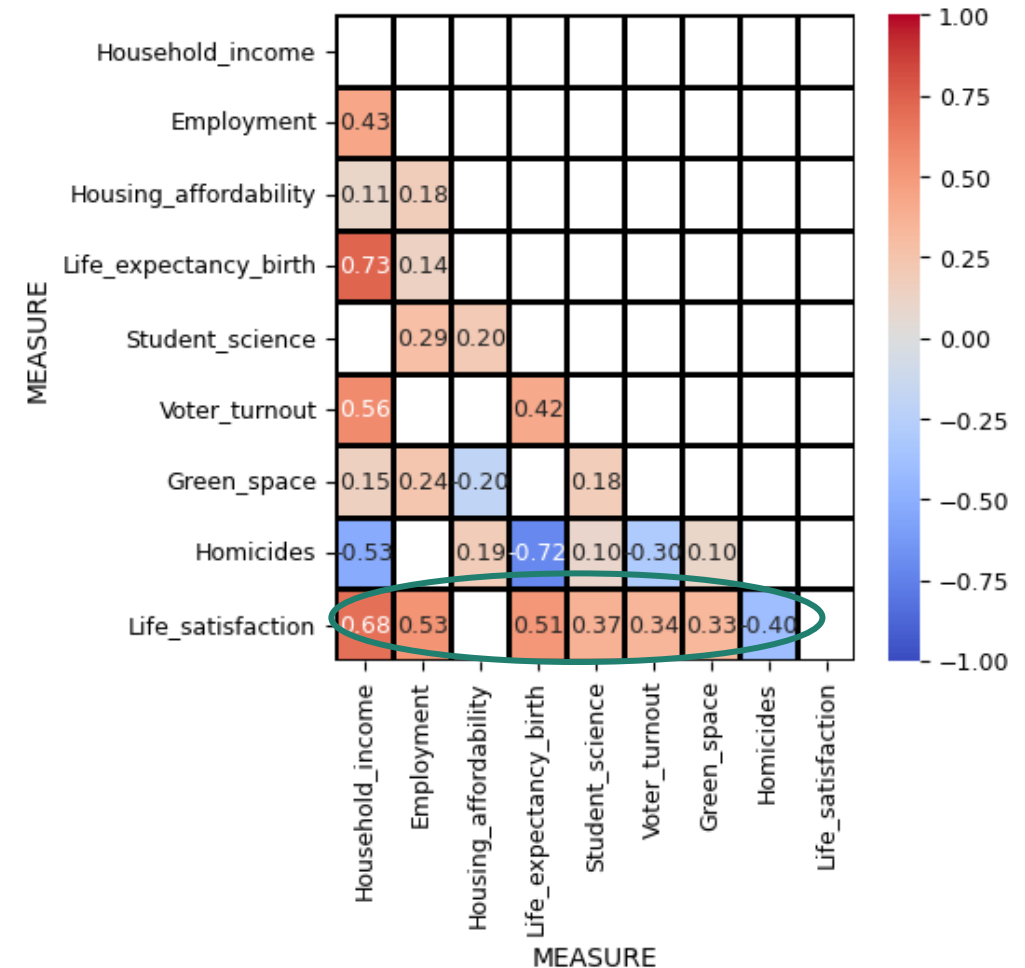
- Over 80 indicators, 67 for current well-being
- **Headline** indicators: 12 for each group
- Overall, more than 57% of data points are missing
- Varying availability for different countries and indicators
- **Linear interpolation** for missing years country-by-country
- Exclusion of countries and indicators with no data
  - 25/40 countries left
  - 9/12 indicators left

Percentage of Years with Data for Each Country and Indicator



# 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**



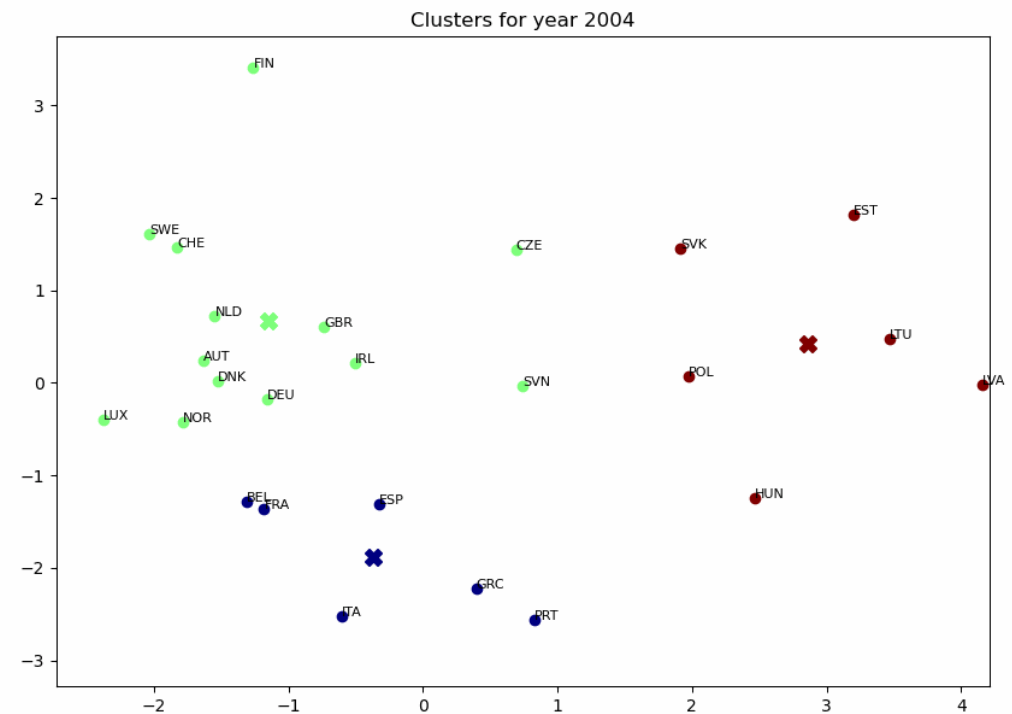
# Panel data clustering

- **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)**

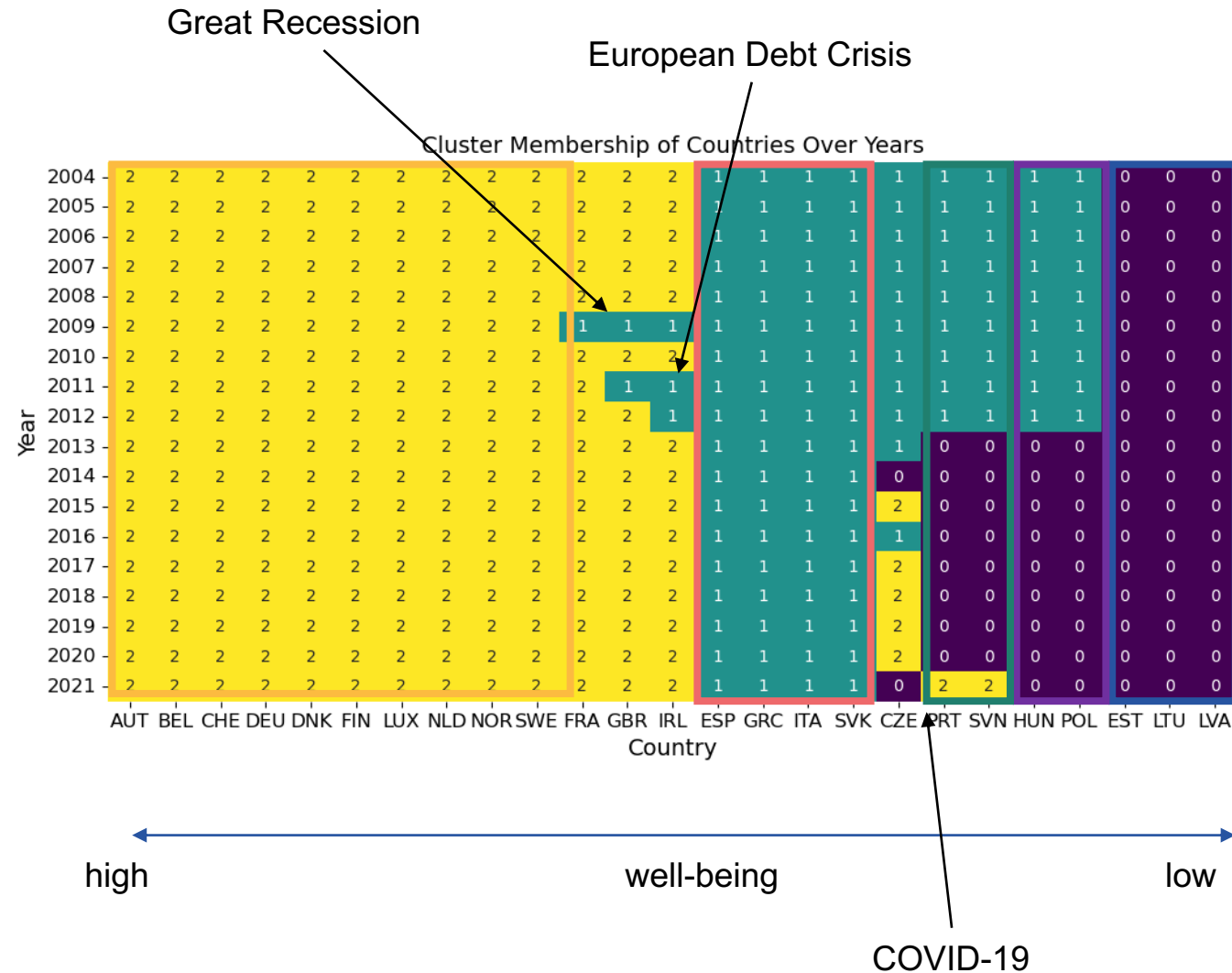
- Data dimensionality reduction
- Ranking of indicators by the explained variance
- Visualization of clusters and their evolution over time



# Evolution of clusters over time

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

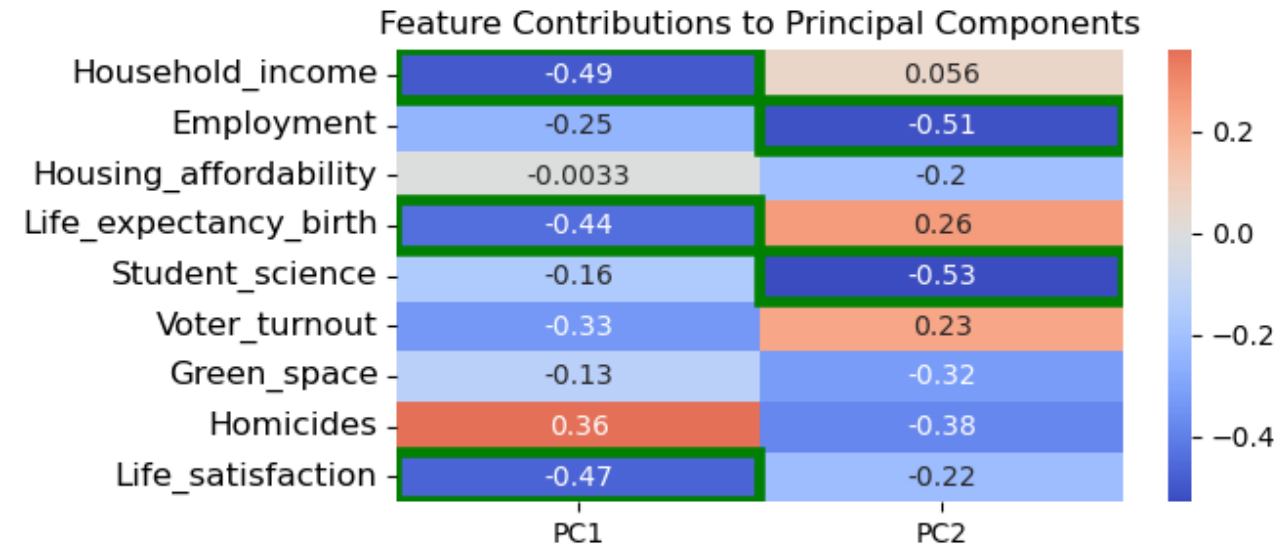
1. AUT, BEL, CHE, DEU, DNK, FIN, LUX, NLD, NOR, SWE
2. ESP, GRC, ITA, SVK
3. PRT, SVN
4. HUN, POL
5. EST, LTU, LVA





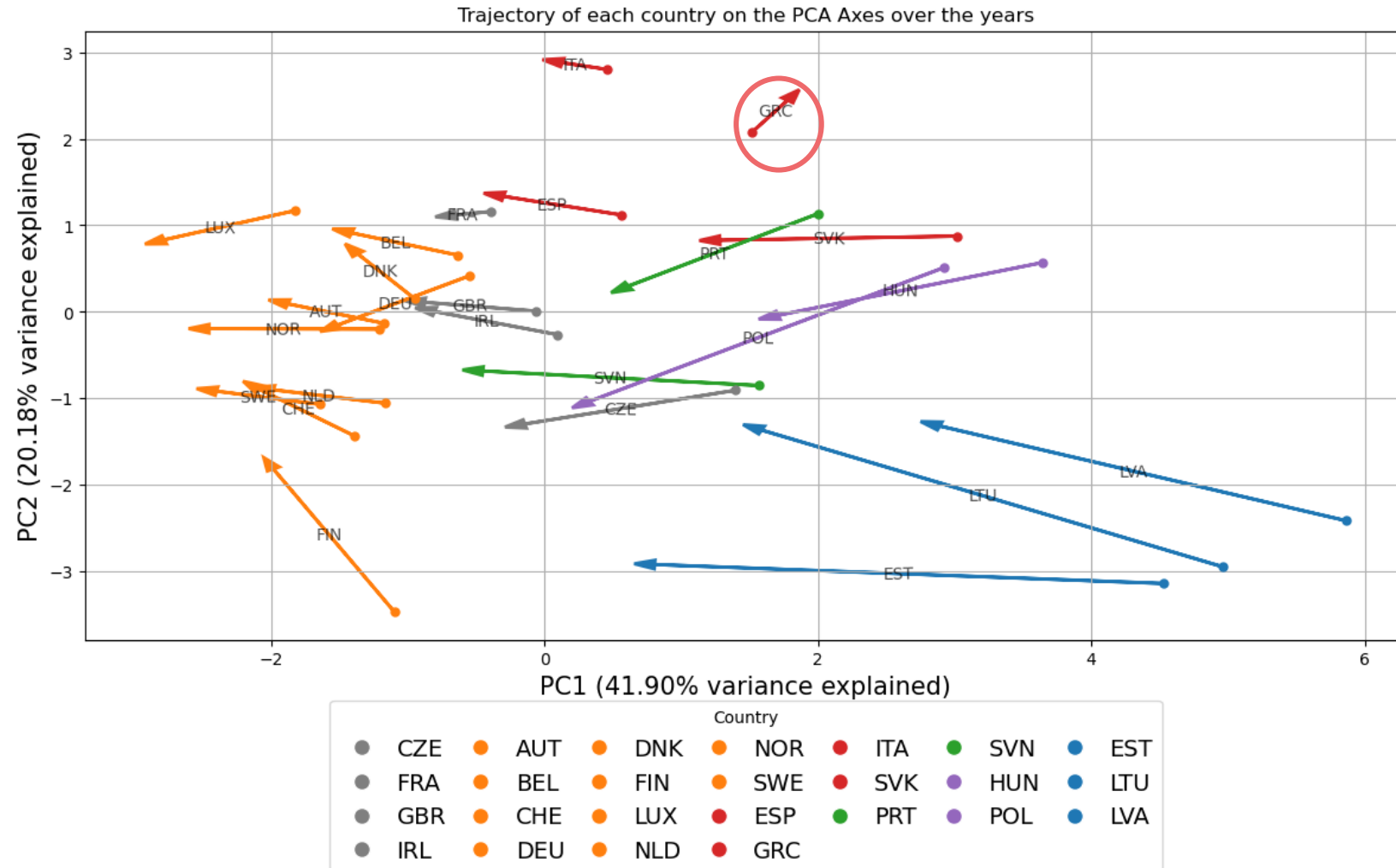
# Principal component analysis

- Total variance explained ~60%
- Key features: loadings  $\geq 0.4$  (Stevens, 1992)
- PC1 – Socio-Economic Well-Being (“Having and being”)
- PC2 – Employment and Education Quality (“Doing”)



# Well-being trajectories of countries

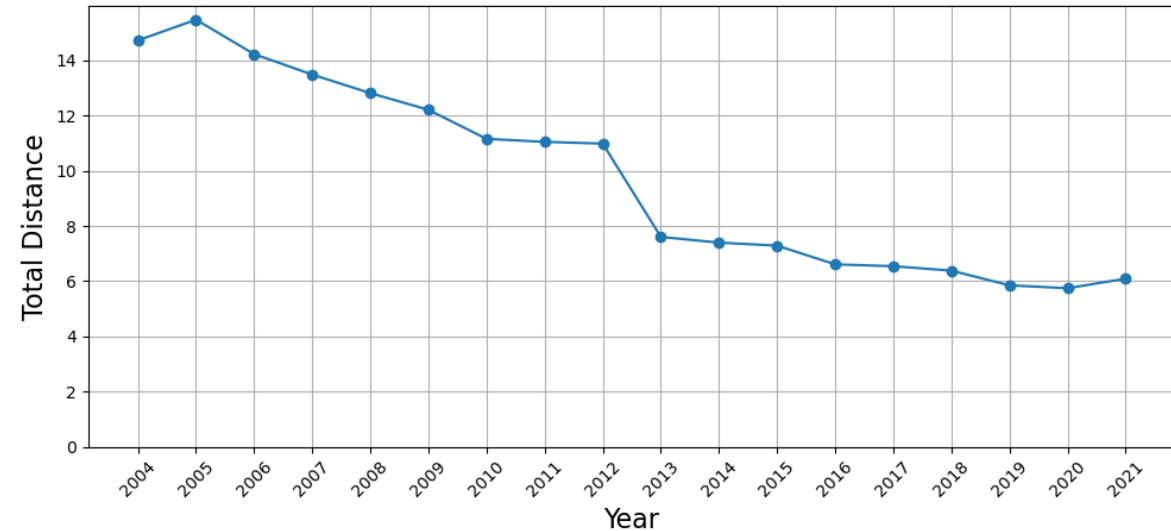
- All countries except Greece, particularly from the clusters with lower well-being, move left on PC1, indicating improvement in income, life expectancy, and life satisfaction
- Several countries move up along PC2, exhibiting challenges with employment and student skills in science



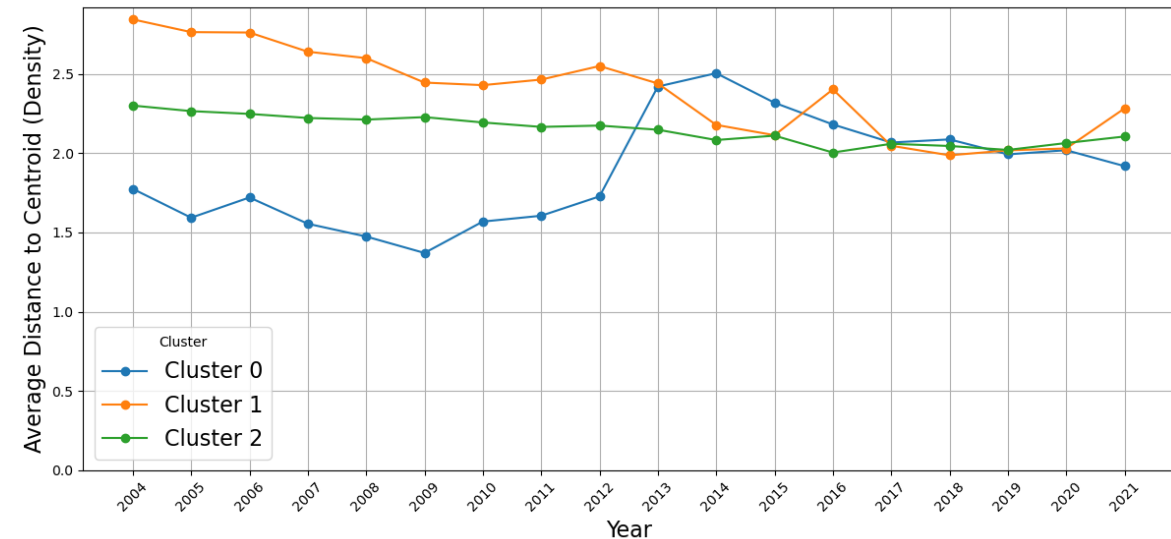
# Well-being discrepancy between and within the clusters

- 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

Total Distance Between All Cluster Centroids Over Time

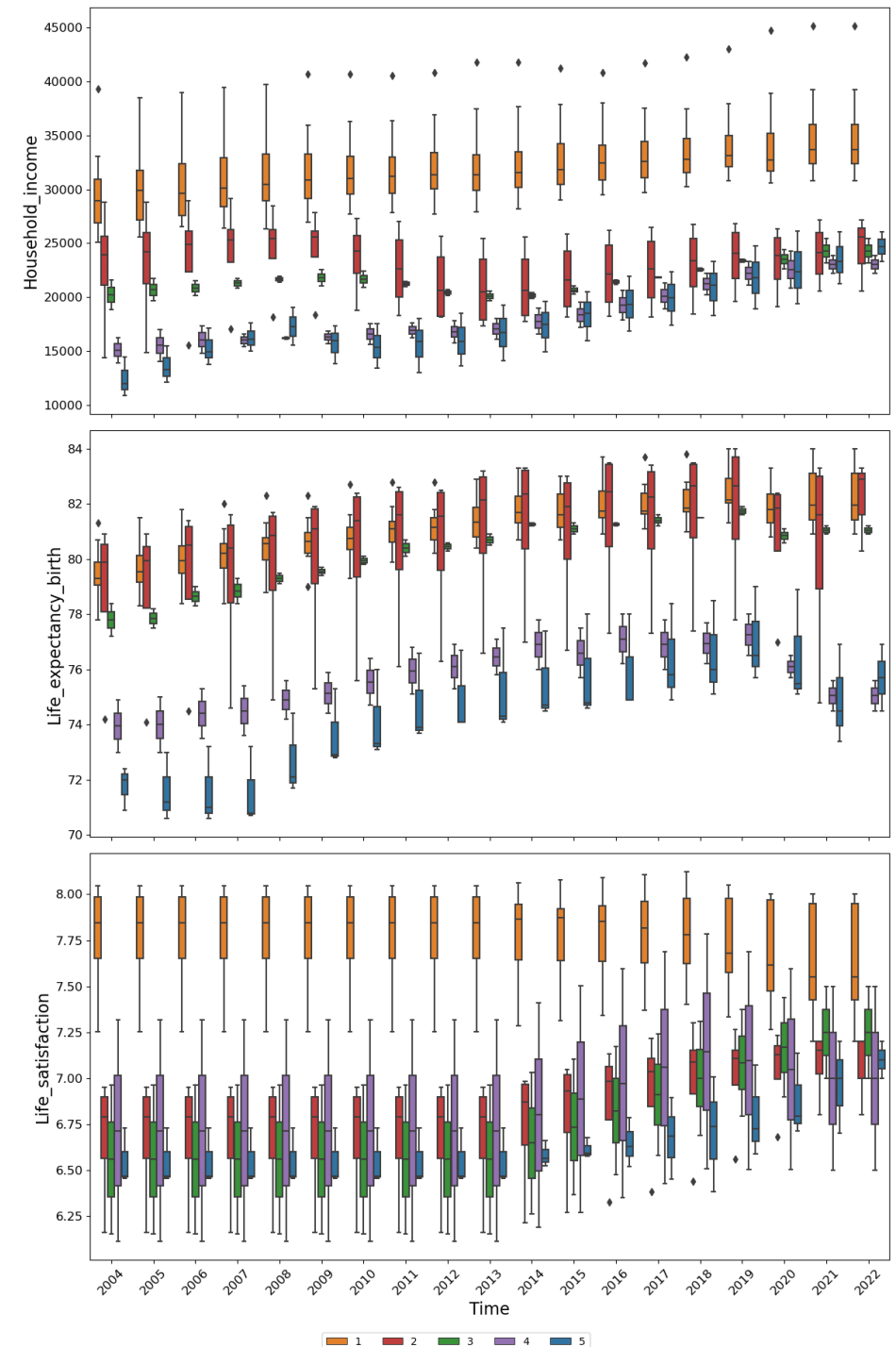


Cluster Densities Over Time



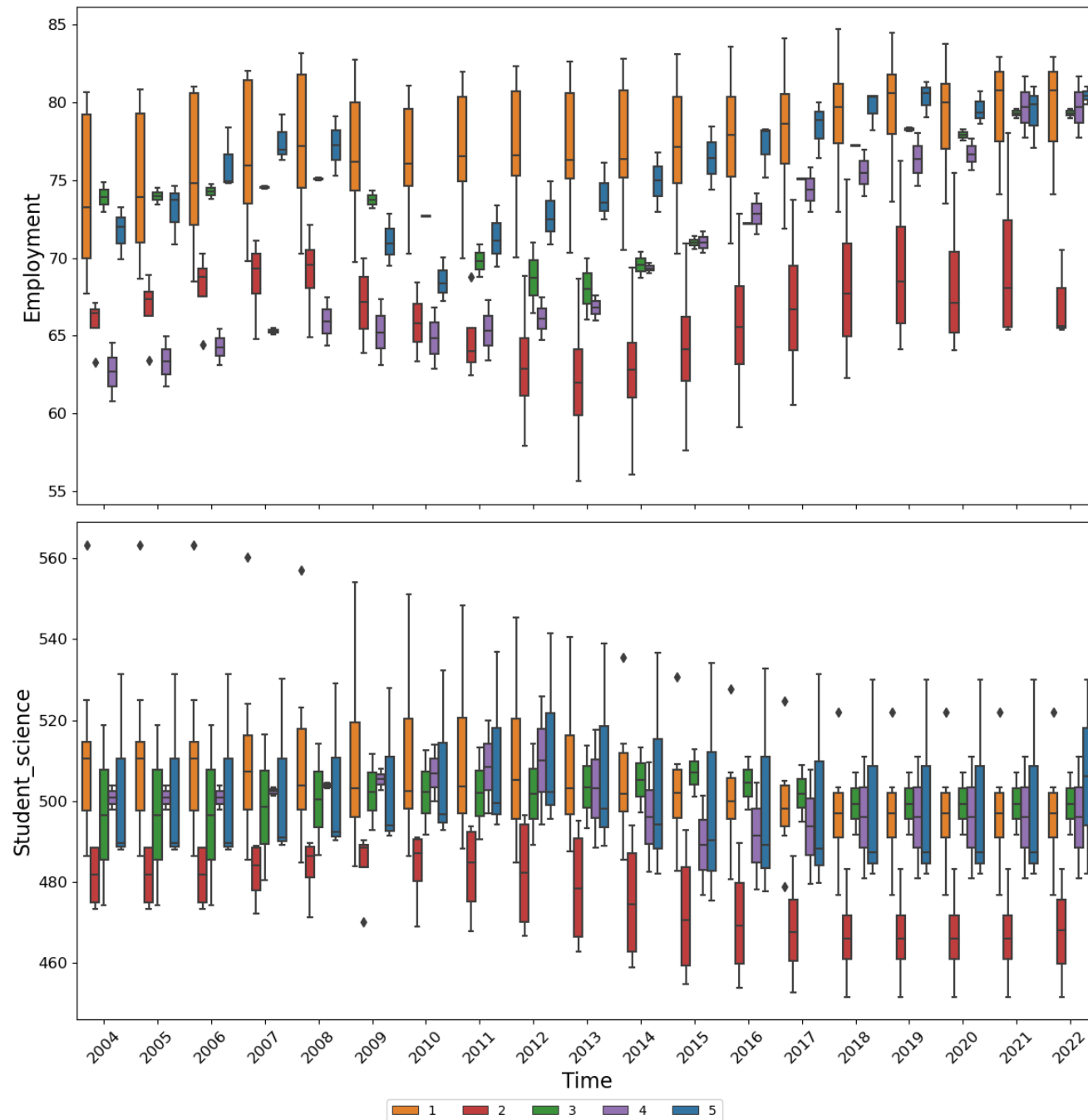
# Key PC1 components

- **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

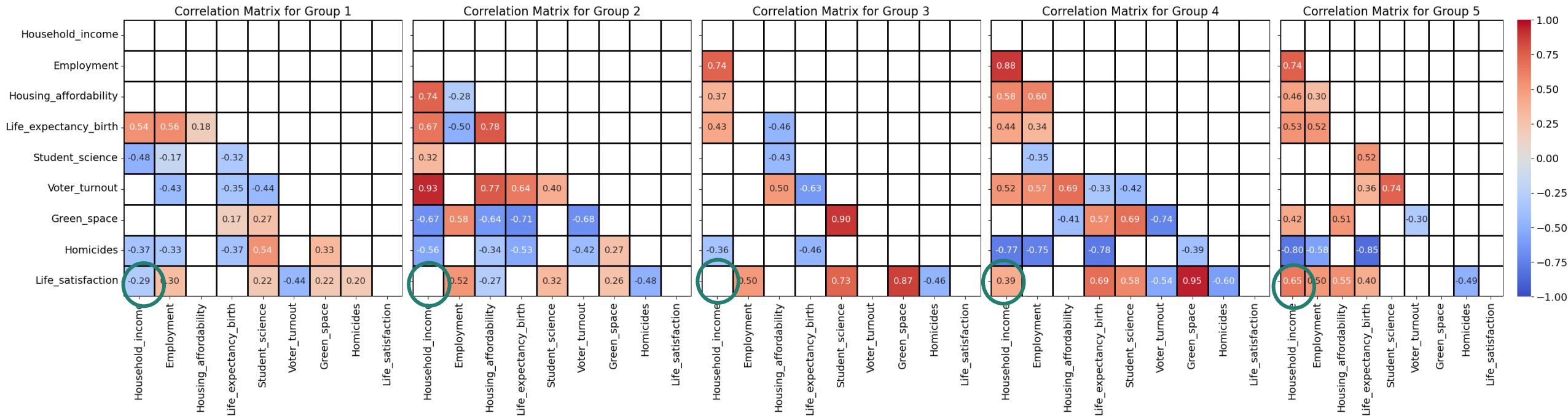


# Key PC2 components

- 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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<https://iiasa.ac.at/projects/mapping-of-national-well-being-systems>