

**M U N I
E C O N**

**Towards inclusive prosperity and
development in European countries using
the transitioning performance index**

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AIM OF THE STUDY

- The aim of the paper is to analyse the various indicators for the transitioning performance published by the European Commission for the year 2020 using multivariate analysis.
- The main reason is to allow for a break-down of the original four dimensions (economic, social, governance, environment) into more finer components and give a better understanding of the relationships among the indicators.
- Secondly, to first allow for examining and reducing the original 37 indicators whiles keeping the original variation to allow for better understanding of the efforts that go into the performance method

Introducing the TPI data and methodology

- The Transitions Performance Index shortened as (TPI) is a composite indicator that measures the performance of countries along four main transitions, namely, economic, social, environmental and governance.
- Most of the indicators for this index are outcome-oriented to present a combined impact of the policy mix implemented in each country.
- Moreover, the TPI does not present geographical predetermination and hence there is no clear-cut North-South, East-West divide in the final assessment.
- The TPI index indicators for the year 2020 lists 37 indicator scores between 0 to 100.
- All 27 EU countries were used except for Greece, Malta and Luxembourg due to missing data from the set in order to reduce bias from the multivariate analysis.

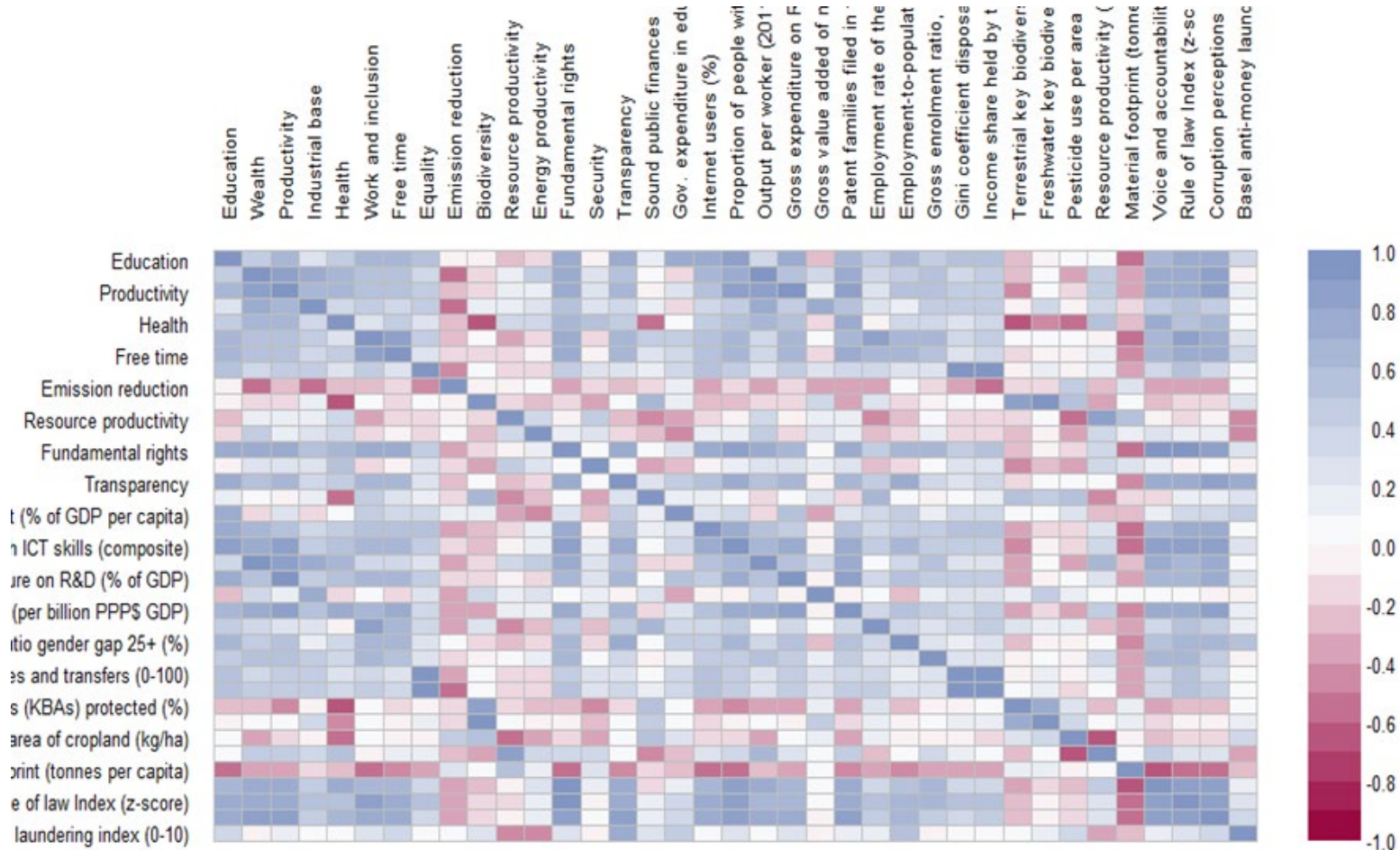
Analysis and Results

The following results are presented:

- Relationship (correlation) matrix for original 37 indicators.
- Relevant new principal components deduced from the variables.
- Original variables that are well represented by relevant new components via correlations.
- Graphical outlook of countries expressed in terms of first component accounting for about 39% total variation and second component accounting for about 16% total variation.

Correlation among indicators

Figure: Correlation matrix color plot for indicators



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Source: Author's own processing

Determining number of new components

- Three methods were used to determine number of new components needed.
- First, is the scree plot (which is a graphical representation).
 - Next, is the number of eigenvalues >1
 - Finally, is the proportion of explained and cumulative variance.
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- The first 8 components account for approximately 89% of the variation while the first 10 components accounted for approximately 93% of the cumulative variation to explain the changes in the sustainability performance according to the TPI methodology.
 - The new components are in descending order according to their weight in influencing the variation, and there is no correlation between the new components, therefore they can be used to fix the issue of multicollinearity in regression studies.

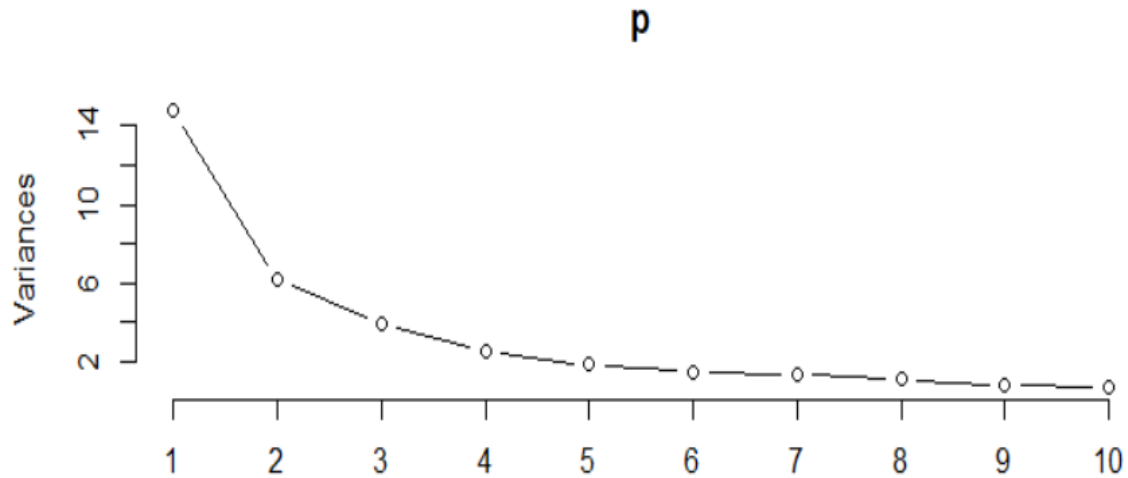
Proportion of explained variances new PCs

Table: Summary Results of Principal Component Analysis

PCA	Standard deviation	Proportion of Variance	Cumulative Proportion
PCA 1	3.8401	0.3985	0.3985
PCA 2	2.4790	0.1661	0.5646
PCA 3	1.9744	0.1054	0.6700
PCA 4	1.57875	0.06736	0.73736
PCA 5	1.34998	0.04926	0.78662
PCA 6	1.21874	0.04014	0.82676
PCA 7	1.14906	0.03568	0.86245
PCA 8	1.04703	0.02963	0.89207
PCA 9	0.89866	0.02183	0.91390
PCA 10	0.80879	0.01768	0.93158
PCA 11	0.78021	0.01645	0.94803
PCA 12	0.7067	0.0135	0.9615
PCA 13	0.62759	0.01065	0.97218
PCA 14	0.54453	0.00801	0.98019
PCA 15	0.49358	0.00658	0.98677
PCA 16	0.39843	0.00429	0.99106
PCA 17	0.33466	0.00303	0.99409
PCA 18	0.3042	0.0025	0.9966
PCA 19	0.21781	0.00128	0.99788
PCA 20	0.19007	0.00098	0.99885
PCA 21	0.16350	0.00072	0.99957
PCA 22	0.11236	0.00034	0.99992
PCA 23	0.05595	0.00008	1.00000
PCA 24	1.358e-15	0.000e+00	1.000e+00

Scree-plot

Figure: Scree-plot for variance of Principal Component Analysis



Source: author's own processing

Correlation between original variables and new PCs

- The following components have particularly higher correlations with original variables and hence represent these variables well.
- PCA 1: has negative correlations with following variables (>-0.7). Educ, wealth, productivity, fund. rights, people with ICT, GERD, patent filed, voice and accountability index, rule of law index, corruption perc. Index, output/worker, internet users, transparency, free time, work and inclusion.

This variables are under dimensions of economic and social.

Correlation between original variables and new PCs

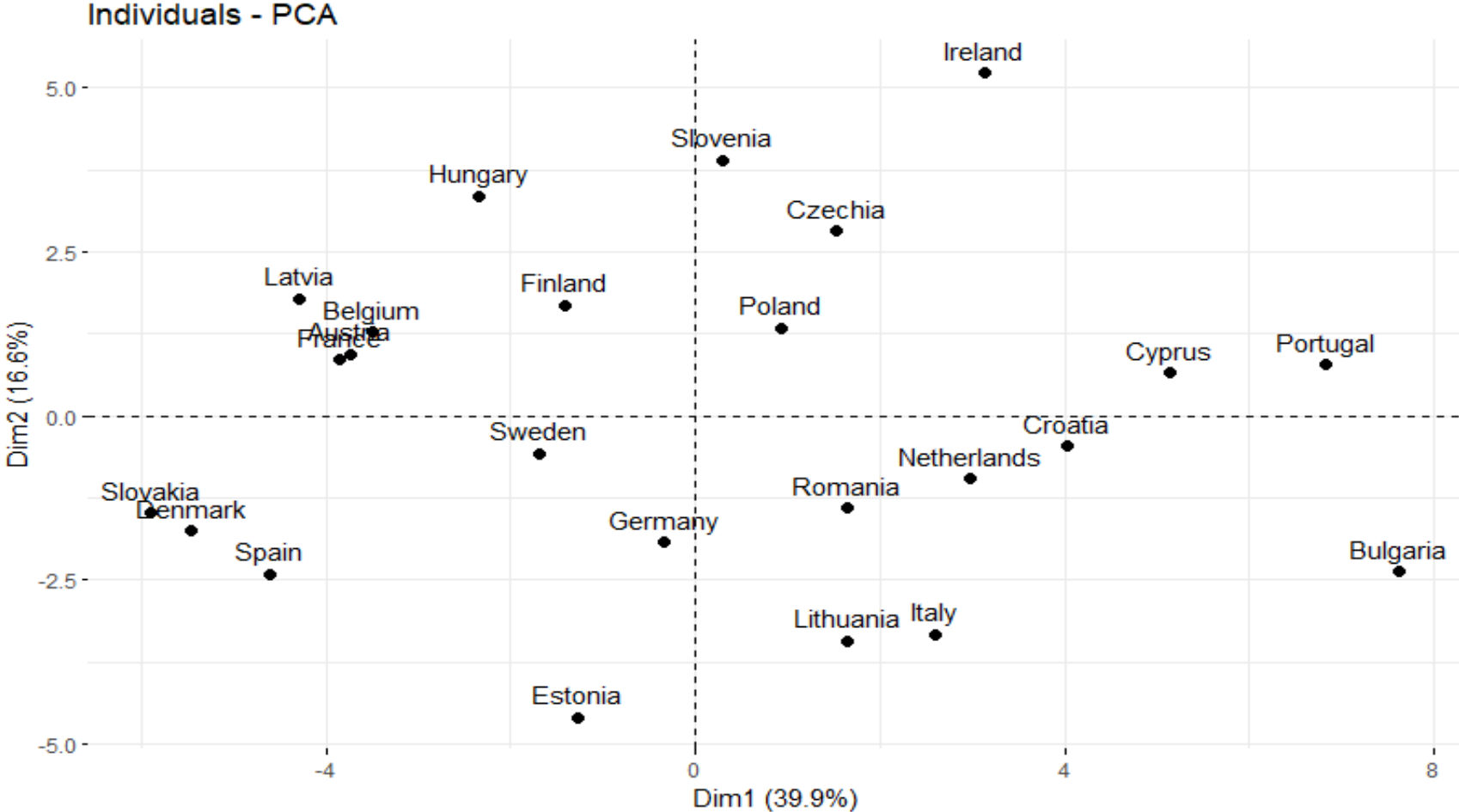
- PCA 2: has positive correlations of > 0.6 with variables resource productivity and health.

It also has negative correlations > -0.6 with variables sound public finance, pesticides use and biodiversity.

- PCA 3: has positive correlations > 0.6 with variables industrial base, protected freshwater, gross value added to manufacturing.
- These 2 PCs highly express variables mainly under environmental.
- PCA 4: has negative correlations > -0.6 with variables equality, income share of poorest quintile, coefficient of disposable income.

Expressing countries in terms of first 2 PCs

Figure: Countries expressed in terms of PCA 1 (Dim1 with 39.9% variation) and PCA 2 (Dim2 with 16.6% variation)



Source: author's own processing

Conclusions

- The results for the paper show that individual countries can use the indicators to determine areas of strengths and weakness by observing the relationships that exist among the original variables.
- Moreover, since there are no correlations between the new components, decisions on which areas (indicators) are better expressed by the new dimensions and hence are more relevant can be determined and examined further by exploring the PCAs.
- These can also provide areas of opportunities to ensure that actions are targeted to what is particularly needed for each individual country, rather bulk geographical expectations by exploring further the components for each country.

Conclusions

- Finally, the results also show that countries are not bound by geographical demarcations in terms of performance. Although majority of countries in similar geographical locations share common socio-economic and cultural characteristics that might influence decisions and performance orientation, ultimately, performance enhancement focus should be based on the individual needs and challenges for the countries.
- This will mean that countries in clear geographical locations will still perform differently as observed for countries falling into dispersed groups, a trend that is observed in most geographical south, north, east, west countries as well.

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