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Analysis of EU Countries' Development through Statis Methodology

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Dissertation

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Abstract

This dissertation aims to study the development evolution of the European Union countries between 2014 and 2019. For this purpose, the study is carried out by analysing 20 socioeconomic development and healthcare indicators extracted from the Data Bank: World Development Indicators database. The approach of this study will be based on the Statis methodology because of its critical role in spotting trends and changes. The methodology is a three-way method of data analysis that identifies similarities and contrasts throughout the given period by integrating many data tables and it is divided into two methods that will be employed in this work: the Statis method, which emphasizes the analysis of the individuals and explains the evolution of the countries described by the variables; and the Dual Statis, which focuses on the variables themselves and it enables us to explain the evolution of the development indicators throughout the studied years.

The Statis approach is a compelling justification for this study since it helps to better understand how the European Union nations have developed throughout the specified period. Because the universe is by definition unpredictable and subject to change, the Statis technique plays a critical role in identifying trends and detecting changes.

Keywords: EU Countries' Development, Statis Methodology, Statis Method, Dual Statis Method, Three-way Data Analysis Methods

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CHAPTER 1

Introduction

The dissertation's initial elements are listed in this section. These include the reasons for selecting the subject and the approach, as well as the primary goals that will be used to build the whole analysis and the problem definition to be solved. It also includes a quick summary of the dissertation structure in the form of a synopsis of each chapter's content.

1.1 Motivation

Knowledge of univariate and bivariate analysis methodologies is required to prepare a data analysis project. The great expertise in data analysis, however, is shown by multivariate analysis. The study of phenomena, particularly the study of evolutionary phenomena, which is the notion on which what I intend to develop in my dissertation is founded, has limitless potentialities that may be explored.

Since reality and all phenomena that come under it are dynamic in nature, no static approach can accurately explain them except at the time the research is created, which is the major justification for the interest in the combined analysis of data frames.

In order to learn everything there is to know about a particular event, one must be able to analyse the phenomenon's progression across time rather than only comprehend it in the here and now. In reality, a method's capacity to recognize change and evolution as a technique of identifying evolutionary tendencies frequently leads to pertinent findings.

Because nature is changeable and what was captured at the time of the study may already be completely out of date in the description of that same reality, using a static model to support decision-making can result in significant analysis errors. Evolutionary data analysis approaches help to capture the pattern and change, which, if appropriately predicted, are an added value in decision making, but the ability for temporal analysis is unquestionably a big challenge offered by their application.

Currently, combining the analyses of numerous data tables is of particular interest. The vast majority of techniques used are advancements of Principal Component Analysis. Besides that, researching the growth and evolution of nations is also a global interest. The

research in this field sheds light on the political, social, and economic aspects that affect a nation's stability and progress. Policymakers, scholars, and corporate executives may use this information to guide their choices and create plans to advance development in their nations and all around the world. Studying development may also aid in attempts to fight poverty, spur economic progress, and raise living standards for people all over the world by enabling one to better grasp the difficulties and possibilities that less developed nations face.

In terms of development, the European Union (EU) countries are a particularly fascinating subject to examine. Understanding its evolution can give insight into the larger trends and problems affecting Europe and the rest of the globe because it is an important global economic and political actor. The EU is a unique example of a supranational organization, with its own institutions and decision-making processes.

Understanding how these institutions behave and how member states interact within the EU can provide valuable lessons for other regional organizations and for the study of international relations more generally. The promotion of economic cooperation and integration among EU member states has a long history. Examining the accomplishments and challenges of these programs might give significant lessons for other areas and nations striving to foster economic integration and cooperation.

1.2 Problem Definition

Understanding the development of the EU countries is a challenging and varied issue. The degrees of development and economic performance of the EU nations range significantly, despite the EU's efforts to encourage economic unity and collaboration among its member states. For instance, although some EU nations have battled with high unemployment and sluggish economic development, others have had good economic growth and low jobless rates. A country's growth can also be impacted by disparities in governance, infrastructure, and other social and political aspects like education levels.

To understand these disparities, it was extracted six data tables, one for each year, from the Databank - World Development Indicators database. There are 20 variables total in each table, with 8 economic variables, 4 health indicators, and the remaining variables spread over indicators for education, technology/innovation, environment, and urbanization.

1.3 Objectives

In order to obtain a common structure that reflects the differences and similarities over the years and to identify trends in the performance of the EU countries in several sectors, Statis, one of the primary techniques for combining analysis of multiple data sets, was selected as the methodology for my dissertation.

This dissertation seeks to advance knowledge of how EU nations have developed. In the chapter on the literature review, the research topic will be further clarified. The main goal is to offer important insights into the economic and social elements that influence the growth of EU members as well as more general trends and concerns in international relations, identifying the nations that are responsible for the discrepancies found between the data tables by using Statis technique to summarize the data information and evaluate the countries trajectories. Later, it will be used Dual Statis method to examine the changing nature of the relationships between the variables.

In terms of the software, I'll conduct the preliminary analysis using IBM SPSS Statistics. I'll use R software and Microsoft Excel to calculate the correlation coefficients between the variables and the compromise axes, compute the trajectory points and perform the graphical representations of the countries and variables' trajectories. To conduct Statis and Dual Statis methods, I will be using SPAD (version 9.2) software to get the remaining outputs. Although SPAD is well known for being a data mining and predictive analytics software, used by companies to anticipate risks, identify opportunities, and optimize various business operations, it is also heavily used in research and education at universities and prestigious higher education establishments for data mining purposes and advanced data analysis methodologies, such as PCA, MCA, clustering, discriminant analyses, and three-way data analysis methods.

1.4 Dissertation Structure

This dissertation consists of six chapters, each of which includes theoretical arguments and a summary of the data I believe are necessary for comprehending the research that will be conducted.

The motivation for selecting the subject and the methodology is discussed in chapter one, along with the problem definition and suggested goals for building the whole study.

The second chapter addresses the literature review and provides an overview of some data analysis strategies used with three-way data as well as some fundamental terminology. This chapter specifically discusses Statis and Dual Statis methods, offers a theoretical framework, and lists various applications resulting from the methodology that was chosen.

The data tables are described in Chapter 3, proving an overview of the indicators used to study the countries' development. Additionally, it explores the univariate and bivariate analysis of the data.

The main findings of using both Statis and Dual Statis methods to variables gathered for the European Union countries between 2014 and 2019 are presented in chapters 4 and 5, with a breakdown by their phases: interstructure; intrastructure; and contributions and trajectories.

Chapter 6 contains the conclusions obtained throughout this research, the main limitations, as well as perspectives for future work that allow a better characterization of the evolution and development of the EU countries.

CHAPTER 2

Literature Review

This chapter first addresses the Principal Component Analysis (PCA), which although not a three-way data analysis method, is the base method for three-way data analysis methods such as Statis methodology, Multiple Factorial Analysis (MFA) and Double Principal Component Analysis (DPCA). Then it is provided some fundamental terminology and a brief overview of the strategies mentioned above. This chapter specifically discusses Statis and Dual Statis methods, offers a theoretical framework, and lists various applications resulting from the methodology that was chosen.

2.1 Principal Component Analysis

Principal Component Analysis is one of the best-known methods of factor analysis, and is particularly important here, as it is the basis of the Statis methodology. PCA was introduced by Pearson (1901), and later developed by Hotelling (1933), and its main goal is to present the maximum amount of information contained in a data table, with special emphasis on graphical representations.

This method measures the similarity between two individuals through the Euclidean distance and the relation between two variables through the linear correlation coefficient. Another aspect to be highlighted is the study of the links between the variables, which aims to present a summary of them through linear combinations, called principal components. In this way, it is possible to reduce the dimension of the problem under analysis, as well as its complexity. Therefore, a principal component can be considered as a way of representing a group of variables linked together.

Geometrically, this method intends to identify a set of new orthogonal axes, in such a way that the coordinates of the observations in each of the new axes constitute the values of the new variables.

Using this technique, it is possible to perceive the structure of the variables, concerning associations and oppositions between them. The method applies to two-dimensional quantitative data tables, which may be represented on the same scale, or on

different scales, in which case they are reduced to the same dimension, with zero mean and unitary variance.

In resume, the principal goal of PCA is to decrease the dimensionality of data with minimal loss of information, reducing a large volume of correlated variables to a smaller number of variables non-correlated, retaining the greatest part of the variability of the original data. This method will be applied in some of the stages of the Statis methodology, so its understanding is of particular importance in the context of this study.

2.2 Three-Way Data Analysis Methods

2.2.1 Statis Methodology

Escoufier (1973) and his team, as well as L'Hermier des Plantes (1976), created the Statis (*Structuration des Tableaux à Trois Indices de la Statistique*) methodology at the Statistics and Probability Laboratory of the University of Montpellier II. Lavit (1988) and Lavit *et al.* later refined it (1994). The methodology enables information extraction from multidimensional data gathered in various contexts or time instants.

The methodology is considered an extension of PCA for the analysis of multiple data tables. Finding a common structure for the data tables, analysing the differences and similarities between the tables, and representing the trajectories of the individuals and the variables are the goals of the methodology. It includes two approaches:

- Statis method, which focuses on the distances between individuals and, even though the variables may differ, it requires that individuals be the same in all data tables.
- Dual Statis method, which focuses on the relations between variables and, even though the individuals may differ, it requires that variables be the same in all tables.

Both Statis and Dual Statis can be used when the tables contain only the same individuals and variables. Three steps are involved in the Statis (and Dual Statis) methods.

The multiple data tables are compared globally in the first step, known as interstructure, to find similarities and discrepancies between them. The representation used in this study, referred to as the centred Interstructure Euclidean image, enables the visualization of object proximity and highlights the contrasts and similarities between the data tables.

The compromise, a common structure of the individuals (variables in the case of Dual Statis) that condenses the data in all the data tables, is defined in the second step, referred to as Intrastructure. Its construction is achieved by linearly combining the representative objects and weighting them according to their coordinates on the Interstructure Euclidean Image's first axis.

The final step of the method involves determining which individuals (or variables in Dual Statis) contribute the most (or least) to the observed differences between the series of data tables, as well as who is responsible for the deviations between the tables.

Although above it was discussed some of the steps and specifics that concern the Statis methodology, it will be covered in more detail in the following two subchapters (2.3 and 2.4).

2.2.2 Multiple Factorial Analysis

This method was introduced by Escofier and Pagès (1985) and, like the Statis methodology, allows studying individuals over a given period. This methodology is specially designed to study a population of individuals characterized by a set of qualitative or quantitative variables. These groups of variables are measurable at different times.

The method allows a comparison of the clouds that represent the set of individuals for different variables, represented in a system of axes common to the set of analysed tables. This comparison of clouds of individuals is carried out using the system of axes common to the set of analysed tables and the representation obtained, the Euclidean image of the compromise, allows a global comparison of the groups of variables, that is, the study of the interstructure.

The analysis of the MFA method consists of performing K analyses on principal components of the tables associated with the set of individuals. The groups of variables can be different, it is just required that the individuals be the same in the various data frames. This method is also based on PCA. The advantage of this method over Statis is that it can be used to treat mixed tables composed of quantitative, qualitative, or even mixed variables.

2.2.3 Double Principal Component Analysis

Double Principal Component Analysis (DPCA) was introduced by Bouroche (1975), and it is applied to cubic-type data, that is, data obtained considering the same set of variables measured on the same individuals at different times.

DPCA is broken down into three stages: in the first stage, the analysis of a global phenomenon is carried out – this stage is based on a PCA carried out on the cloud of points, defined by the centres of gravity of each table; subsequently, the transformation of the cloud of points around the centre of gravity is analysed; finally, the evolution of different individuals in the same space over time is represented. At this stage, the problem lies in finding a space where all the trajectories of individuals can be represented. Associated with this phase, Bouroche defined some procedures to determine a common reference that allows representation.

The main objective of the Double Principal Component Analysis is, as in Statis and MFA, to globally compare the evolution of the relationships between different variables and the evolution of different individuals.

In the Statis methodology, the main axes of the Euclidean image are interpreted from their correlations with the set of variables. In the case of DPCA, the main axes of the Euclidean image are interpreted through their correlations with the mean positions of the variables. In short, DPCA is a simpler method to be implemented, although the interstructure limits this method to frames that cross the same individuals with the same variables over time, making its field of application very restricted.

2.3 Statis Method

An overview of the Statis method was previously explored. This section will provide a more analytical description of the method. The Statis method is applied to K data tables of quantitative data $X_k, k = 1, \dots, K$, obtained on different occasions on the same individuals. At each data frame $(X_k)_{n \times p_k}$, it can be associated with a study (X_k, Q_k, D), where Q_k is the metric in the space of individuals and D is the metric in the space of variables, that is, a diagonal matrix, whose elements are the weights assigned to individuals.

The essential idea of the method is the search for a structure of individuals common to the studies, known as Intrastructure. For the data frame X_k, this structure is described by the distances between individuals, deduced from the matrix of scalar products $W_k = X_k Q_k X_k'$. The aim is to find out if there is a structure of individuals common to the studies, that is, to study whether the distances between individuals are stable from one study to another.

The first stage of the method consists of a global comparison of the studies, which is called interstructure. In this step, it is established the distance between the W_k objects. For this, it is necessary to define a scalar product between the objects,

$$\langle W_k | W_{k\prime} \rangle_{HS} = tr(W_k D W_{k\prime} D), \tag{2.1}$$

called the Hilbert-Schmidt scalar product. In the case of normed objects, the scalar product between these corresponds to the vectorial correlation coefficient between objects, denoted by RV coefficient, proposed by Robert and Escoufier (1976):

$$RV(k,k') = \left\langle \frac{W_k}{\|W_k\|_{HS}} \middle| \frac{W_{k\prime}}{\|W_{k\prime}\|_{HS}} \right\rangle_{HS} = \frac{tr(W_k D W_{k\prime} D),}{\sqrt{tr(W_k D)^2}\sqrt{tr(W_{k\prime} D)^2}}. \tag{2.2}$$

The RV coefficient allows obtaining the distance between two normed objects since

$$D_{HS}\left(\frac{W_k}{\|W_k\|_{HS}}, \frac{W_{k\prime}}{\|W_{k\prime}\|_{HS}}\right) = \left\| \frac{W_k}{\|W_k\|_{HS}} - \frac{W_{k\prime}}{\|W_{k\prime}\|_{HS}} \right\|_{HS} = \sqrt{2 - 2RV(k,k')}. \tag{2.3}$$

Let S be the matrix of RV coefficients and Δ be the diagonal matrix of π_k weights assigned to frames X_k, $(k = 1, \dots, K)$. The Euclidean image of the objects is obtained by performing a PCA on the matrix S. Being τ_k the k-th eigenvalue of $S\Delta$ associated with the eigenvector γ_k $(k = 1, \dots, K)$, the coordinates of the points A_k (associated with the objects W_k) on the i-th axis are the components of the vector $\sqrt{\tau_k}\gamma_k$. If the π_k weights are equal, just diagonalize the matrix S. This representation is identical to the representation of the variables in PCA.

On the other hand, it is possible to build the centred Euclidean image of objects (normed). This allows the visualization of the oppositions and proximities between them.

If, in fact, there is a similarity between the objects, it is convenient to determine the compromise W, i.e., the "summary" object of all the other objects and which corresponds to a weighted average of these (normed):

$$W = \sum_{k=1}^{K} \alpha_k \frac{W_k}{\|W_k\|_{HS}}. \tag{2.4}$$

The coefficients α_k in (2.4) are such that $\|W\|_{HS} = \sum_{k=1}^{K} \pi_k \|W_k\|_{HS}$. In the case of standardized objects $\|W\|_{HS}$ = 1 and

$$\alpha_k = \frac{1}{\sqrt{\tau_1}} \pi_k \gamma_1^{(k)}, \tag{2.5}$$

where $\gamma_1^{(k)}$ is the k-th coordinate of γ_1 (eigenvector of $S\Delta$ associated with the largest eigenvalue τ_1).

Applying a PCA to the matrix W, it is obtained the Euclidean image of the compromise. If μ_i is the eigenvalue of the matrix WD associated with the eigenvector ε_i D-orthonormal (i = 1,…, n) and $B_1, B_2, \ldots, B_N$ the points associated with the individuals in the Euclidean image of the compromise, their coordinates on the k axis are the components of the vector $\sqrt{\mu_k}\varepsilon_k$. As in the PCA, only after analyzing the correlations of the variables with the compromise axes, are the compromise positions interpreted.

Once the compromise is represented, it is necessary to explain the opposition between objects at the individual level. For this, the decomposition of the square of the distance between objects into contributions from individuals is considered:

$$\frac{D(i,i)\sum_{j=1}^{n} D(j,j)[W_k(i,j) - W_{k'}(i,j))]^2}{[d_{HS}(W_k, W_{k'})]^2} \tag{2.6}$$

or the decomposition of the sum of squares of the distances between pairs of objects into contributions from individuals.

In order to visualize these individual deviations graphically, the different positions of each individual for each object in the Euclidean image of the compromise are plotted, called "trajectories". The coordinates of the points B_1^k,…, B_n^k (k = 1, …, K) on the k-axis are

$\frac{1}{\sqrt{\mu_k}} W_k D \varepsilon_k$. The compromise point B_i is an average of the points $B_i^1, \ldots, B_i^k$ weighted by the coefficients $\alpha_1, \ldots, \alpha_K$ defined in (2.6).

2.4 Dual Statis Method

The Dual Statis method concentrates on the correlations between variables rather than the distances between individuals. Each data table has a representative object that describes the structure of the variables and corresponds to either the covariance matrix or correlation matrix (in the case of standardized data). Similar to the Statis method, the Dual Statis method has three steps.

The matrix of the scalar products between the variables, $V_k = X_k' D_k X_k$ $(k = 1, \ldots, K)$, constitutes the representative object of each table and is called the matrix of variances and covariances (or matrix of correlations if the variables are centred and reduced). The scalar product used to induce a distance between objects V_k and $V_{k'}$ is analogous to (2.1):

$$\langle V_k | V_{k'} \rangle_{HS} = tr(Q V_k Q V_{k'}). \tag{2.7}$$

Let Z be the matrix of the scalar products between the objects. The diagonalization $Z\Delta$ allows obtaining the Euclidean image. If there is a similarity between the objects, it is convenient to establish the compromise:

$$V = \frac{\sum_{k=1}^{K} \beta_k V_k}{\sum_{k=1}^{K} \beta_k}, \tag{2.8}$$

whose graphical representation is obtained due to the diagonalization of VQ. The trajectories of each variable are "built" on this representation.

2.5 Related work about Statis Methodology

Over the past few decades, the Statis methodology has been widely used for the joint analysis of data tables to analyse quite different realities and support a wide range of studies.

Soares *et al.* (2021) analysed the evolution of the EU countries in their public, private and financial sectors between 2002 and 2011; In his study, Zambrano (2016) examined the

changes in some OECD-member developed and emerging countries with regard to certain well-being indicators between 2011 and 2015; Soares (2013) examined the Early Warning Systems of EU countries' vulnerability indicators, identifying the primary economic weaknesses that help forecast the occurrence of a crisis within a specific time frame; in order to provide a greater comprehension of the evolution of the Portuguese construction industry, Brás (2012) examined its progression; Figueiredo *et al.* (2012) investigated the Portuguese banking sector's corporate restructuring process' dynamics and evolution from 1989 to 1996, during which time ten banks were privatized; Gudmundsson *et al.* (2011) investigated patterns in Europe's low, medium, and high flows; Gonçalves (2010) examined the performance or development of Portugal's economic activities by examining data gathered over time by the Bank of Portugal, changes in those activities' trends over time; within the Karst aquifer, Fournier *et al.* (2009) investigate transport; in order to examine the stability of species habitats in this coastal zone, Serghini *et al.* (2008) used the Statis methodology to investigate the stability of the spatial structure of the ocean floor in the Moroccan region of the South Atlantic; Amendola *et al.* (2006) investigated the factors that contribute to socioeconomic disparities between European regions; applications of this methodology were also made to several studies on HIV in Portugal by Oliveira *et al.* (2006); in order to obtain groups to characterize electricity consumption according to the time of day, Lera *et al.* (2005) used Statis to conduct a study on the characterization of electricity consumption in a hotel during the seasons when the environment varies the most; Statis was also used by Stanimirova *et al.* (2004) to explore three-way environmental data, and their results were compared to those of alternative approaches; the methodology was used by Chaya *et al.* (2003) to analyse time-intensity profiling data using the sensory characteristics of ranch salad dressing as variables; As Chaya, Meyners *et al.* (2003) also employed Statis methodology to study the evolution of sensor profiles; additionally, Coquet *et al.* (1996), when studying and describing the internal motions and conformations of molecules simulated in a solution using molecular dynamics techniques, modified Statis to obtain significant acceleration.

To identify the factors that most significantly influence the differences between couples' groups, Almeida (2012) applied the Dual Statis method to a dataset containing data on the cycles of couples with infertility diagnoses. Using this method, it was found greater proximity between groups of couples who are not pregnant when compared to groups of couples who become pregnant.

CHAPTER 3

Description of the Data

This chapter first addresses the data description and provides an overview of the indicators used to study the countries' development. Additionally, it explores the univariate and bivariate analysis of the data.

3.1 Countries and Development Indicators

The data was extracted from the Databank - World Development Indicators database and they are displayed in the Annexes section, Annex A. It includes the 28 countries that were part of the European Union during the study period, and their names and ISO codes can be consulted in Table 3.1.

Table 3.1. The EU countries and their ISO codes

Code	Country	Code	Country
AUT	Austria	**ITA**	Italy
BEL	Belgium	**LVA**	Latvia
BGR	Bulgaria	**LTU**	Lithuania
HRV	Croatia	**LUX**	Luxembourg
CYP	Cyprus	**MLT**	Malta
CZE	Czechia	**NLD**	Netherlands
DNK	Denmark	**POL**	Poland
EST	Estonia	**PRT**	Portugal
FIN	Finland	**ROU**	Romania
FRA	France	**SVK**	Slovak Republic
DEU	Germany	**SVN**	Slovenia
GRC	Greece	**ESP**	Spain
HUN	Hungary	**SWE**	Sweden
IRL	Ireland	**GBR**	United Kingdom

Based on research done on the topic to find the most appropriate indicators that measure development in the EU countries, it was extracted from the database twenty variables. Their source data can be found in Annex B. The variables include eight economic indicators: exports, imports and external balance of goods and services, foreign direct investments net inflows and net outflows, and gross domestic savings, being all these six indicators expressed as a percentage of the GDP; inflation and GDP per capita, two of the

most crucial metrics for assessing a nation's level of development, can also be found in the data tables. Table 3.2 contains all the economic variables along with their definitions.

Table 3.2. The Economic Indicators and their definitions

Code	Indicator Name	Definition
EXP	Exports of goods and services (% of GDP)	Represent the value of all goods and other market services provided to the rest of the world expressed as a percentage of GDP. It includes the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services.
EBA	External balance on goods and services (% of GDP)	Formerly resource balance, equals exports of goods and services minus imports of goods and services (previously nonfactor services) expressed as a percentage of GDP.
FII	Foreign direct investment, net inflows (% of GDP)	Value of inward direct investment made by non-resident investors in the reporting economy expressed as a percentage of GDP. It is the sum of equity capital, reinvestment of earnings, other long-term capital, and short-term capital shown in the balance of payments.
FIO	Foreign direct investment, net outflows (% of GDP)	Value of outward direct investment made by the residents of the reporting economy to external economies expressed as a percentage of GDP. It is the sum of equity capital, reinvestment of earnings, and other capital.
GDP	GDP per capita (current US$)	Refers to gross domestic product divided by midyear population. GDP is the sum of gross value added by all resident producers in the economy plus any product taxes and minus any subsidies not included in the value of the products.
GDS	Gross domestic savings (% of GDP)	Indicator calculated as GDP less final consumption expenditure (total consumption) expressed as a percentage of GDP.
IMP	Imports of goods and services (% of GDP)	Represent the value of all goods and other market services received from the rest of the world expressed as a percentage of GDP. They include the value of merchandise, freight, insurance, transport, travel, royalties, license fees, and other services.
INF	Inflation, consumer prices (annual %)	Reflects the annual percentage change in the cost to the average consumer of acquiring a basket of goods and services that may be fixed or changed at specified intervals, such as yearly.

The health indicators, which include the current health expenditure (expressed as a percentage of the GDP), the fertility rate, the life expectancy at birth and the child mortality rate, and their definitions can also be found in Table 3.3. Table 3.4 contains the remaining eight indicators generally used to measure countries' development. Unemployment, although also an economic indicator, together with the wage and salaried workers variable are two indicators that measure the labour market. A country's technological and innovative capability can be evaluated by looking at its high-technology exports and R&D spending. Population density and urban population (as a percentage of the total population) are related to density and urbanization topics. The final two metrics, government spending on education and CO2 emissions, are connected to, respectively, the environment and education subjects.

Table 3.3. The Health Indicators and their definitions

Code	Indicator Name	Definition
HEA	Current health expenditure (% of GDP)	Level of current health expenditure expressed as a percentage of GDP. Estimates of current health expenditures include healthcare goods and services consumed during each year. This indicator does not include capital health expenditures such as buildings, machinery, IT and stocks of vaccines for emergency or outbreaks.
FER	Fertility rate, total (births per woman)	Represents the number of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with age-specific fertility rates of the specified year.
LIF	Life expectancy at birth, total (years)	Indicates the number of years a newborn infant would live if prevailing patterns of mortality at the time of its birth were to stay the same throughout its life.
MOR	Mortality rate, under-5 (per 1,000 live births)	Probability per 1,000 that a newborn baby will die before reaching age five, if subject to age-specific mortality rates of the specified year.

Table 3.4. The remaining Indicators and their definitions

Code	Indicator Name	Definition
UNE	Unemployment, total (% of total labour force) (national estimate)	Refers to the share of the labour force that is without work but available for and seeking employment. Definitions of labour force and unemployment differ by country.
WSW	Wage and salaried workers, total (% of total employment) (modelled ILO estimate)	Wage and salaried workers (employees) are those workers who hold the type of jobs defined as "paid employment jobs," where the incumbents hold explicit (written or oral) or implicit employment contracts that give them a basic remuneration that is not directly dependent upon the revenue of the unit for which they work.
TEC	High-technology exports (% of manufactured exports)	High-technology exports are products with high R&D intensity, such as in aerospace, computers, pharmaceuticals, scientific instruments, and electrical machinery. This indicator is expressed as a percentage of manufactured exports.
RES	Research and development expenditure (% of GDP)	Include both capital and current expenditures in the four main sectors: Business enterprise, Government, Higher education and Private non-profit. R&D covers basic research, applied research, and experimental development. This indicator is expressed as a percentage of GDP.
POP	Population density (people per sq. km of land area)	Refers to midyear population divided by land area in square kilometres. It counts all residents regardless of legal status or citizenship (except for refugees not permanently settled in the country of asylum).
URB	Urban population (% of total population)	Refers to people living in urban areas as defined by national statistical offices divided by the total population. The data are collected and smoothed by United Nations Population Division.
EDU	Government expenditure on education, total (% of GDP)	General government expenditure on education (current, capital, and transfers) expressed as a percentage of GDP. It includes expenditure funded by transfers from international sources to government.
COE	CO2 emissions (metric tons per capita)	Metric tons of emissions stemming from the burning of fossil fuels and the manufacture of cement per capita. They include carbon dioxide produced during consumption of solid, liquid, and gas fuels and gas flaring.

3.2 Preliminary Analysis

Descriptive statistics are shown for all variables in the tables below (Tables 3.5 to Table 3.10), where each table corresponds to a year between 2014 and 2019. First of all, it is clear that the variables' different measurement scales result in different measures of dispersion, requiring standardization of the variables at a later stage before applying the Statis methodology.

Comparing the mean and the median for each variable, for the majority of the variables, the first measure is higher than the second, being life expectancy and wage and salaried workers variables some of the exceptions (for all years). The median is also higher than the mean for the health expenditure and inflation from 2014 to 2016, for the fertility rate from 2016 to 2019, and for the foreign direct investment, net inflows and net outflows in 2018. This means that, apart from these variables and those years, the majority of the observations are concentrated below the mean, and these variables' distributions are positively skewed. By consulting the Skewness values, this can be verified, meaning if we look at distributions for each variable, most of the observations, which have Skewness values greater than 0, are concentrated on the left side.

Moreover, and analysing the coefficient of variation, it can be concluded that some variables, like population density, have high levels of dispersion around the mean when compared to other variables like life expectancy. This means that life expectancy doesn't vary much across the countries, unlike the population density, which differs a lot between them.

Based on the Kurtosis values, it can be stated that variables such as population density, foreign direct investment, net inflows and net outflows have a distribution more elongated compared to the normal distribution. On the other hand, indicators such as health expenditure, fertility rate, life expectancy, urbanization and R&D spending indicators present a Kurtosis excess below 0, which means that its "tails" are lighter than those of the normal distribution.

It is also interesting to notice that, although just in a few variables, some means change considerably from one year to another. Foreign direct investment, net inflows indicator stands out with high mean differences between the last four years (2016: 10.04; 2017: 5.19; 2018: -1.55; 2019: 11.05). Foreign direct investment, net outflows variable also stands out with high mean differences between 2015 and 2016 (from 12.36 to 4.78) and

between the last three years (2017: 3.64; 2018: -5.18; 2019: 5.94). It is also possible to observe that inflation had a considerable mean growth from 2016 (0.11) to 2017 (1.72).

Table 3.5. Descriptive statistics for 2014

Variable	Mean	Median	Std. Deviation	Variance	Variation coefficient (%)	Skewness	Kurtosis	Minimum	Maximum
COE	6.71	6.08	3.07	9.40	50.38	1.95	4.88	3.59	17.35
HEA	8.38	8.68	1.93	3.74	22.26	-0.12	-1.25	5.02	11.54
EXP	65.82	57.88	36.18	1308.76	62.50	1.69	3.44	28.39	182.78
EBA	4.30	3.00	7.25	52.58		2.43	7.54	-2.92	32.14
FER	1.55	1.53	0.20	0.04	13.05	0.50	-0.44	1.23	2.00
FII	12.82	1.99	42.06	1768.85		4.95	25.37	-2.84	222.76
FIO	12.66	1.52	56.94	3241.78		4.21	20.93	-74.95	284.38
GDP	35057.69	26999.81	24172.21	584295534.84	89.53	1.88	5.47	7901.79	123678.70
EDU	5.18	4.94	1.17	1.37	23.67	0.69	-0.16	3.12	7.63
GDS	24.73	24.25	8.10	65.57	33.38	1.30	3.48	10.34	51.23
TEC	14.79	13.23	7.41	54.94	56.01	0.87	0.39	4.88	34.71
IMP	61.52	57.10	30.39	923.43	53.22	1.42	2.33	26.21	150.65
INF	0.21	0.22	0.75	0.56		-0.49	0.53	-1.42	1.61
LIF	79.70	81.11	2.91	8.48	3.59	-0.79	-0.84	74.12	83.23
MOR	4.47	4.10	1.72	2.97	42.05	1.74	3.33	2.60	9.90
POP	177.31	110.41	254.73	64886.90	230.72	4.01	18.16	17.97	1357.99
RES	1.60	1.34	0.87	0.75	64.73	0.55	-0.99	0.38	3.15
UNE	10.44	8.82	5.32	28.29	60.27	1.80	3.32	4.98	26.71
URB	73.00	71.81	12.95	167.59	18.03	0.15	-0.97	53.56	97.83
WSW	84.01	85.08	6.42	41.21	7.55	-1.69	3.28	64.03	91.26

Table 3.6. Descriptive statistics for 2015

Variable	Mean	Median	Std. Deviation	Variance	Variation coefficient (%)	Skewness	Kurtosis	Minimum	Maximum
COE	6.61	6.04	2.78	7.72	45.97	1.65	3.78	3.70	16.03
HEA	8.26	8.28	1.91	3.63	23.00	0.02	-1.23	4.95	11.45
EXP	66.77	57.85	38.10	1451.97	65.87	1.80	3.78	27.63	191.84
EBA	4.85	3.01	8.02	64.31		2.58	6.98	-1.70	32.54
FER	1.55	1.55	0.19	0.03	11.95	0.41	-0.74	1.31	1.96
FII	14.46	1.89	33.70	1135.87		2.86	8.47	-4.22	145.46
FIO	12.36	0.85	46.52	2164.03		3.61	16.20	-59.43	222.23
GDP	30854.52	24204.35	21208.07	449782235.26	87.62	1.73	4.35	7074.68	105462.01
EDU	5.05	4.92	1.08	1.17	21.94	0.51	-0.08	3.11	7.44
GDS	26.16	24.87	9.34	87.20	37.54	1.61	3.65	11.05	54.54
TEC	15.14	12.84	7.08	50.10	55.11	0.69	-0.37	5.08	30.79
IMP	61.91	55.66	32.02	1025.31	57.53	1.61	3.05	26.70	159.30
INF	-0.11	-0.05	0.72	0.52		-0.93	1.32	-2.10	1.10
LIF	79.58	80.96	2.82	7.93	3.48	-0.80	-0.88	74.32	82.83
MOR	4.36	4.05	1.59	2.53	39.31	1.59	2.75	2.50	9.20
POP	179.03	110.33	260.62	67921.63	236.22	4.05	18.42	18.03	1390.79
RES	1.61	1.30	0.85	0.72	65.28	0.63	-0.84	0.48	3.22
UNE	9.64	8.74	4.88	23.85	55.88	1.84	3.50	4.62	24.98
URB	73.18	71.99	12.98	168.46	18.03	0.14	-0.98	53.78	97.88
WSW	84.37	85.04	5.88	34.58	6.91	-1.79	3.81	65.04	91.13

Table 3.7. Descriptive statistics for 2016

Variable	Mean	Median	Std. Deviation	Variance	Variation coefficient (%)	Skewness	Kurtosis	Minimum	Maximum
COE	6.60	5.93	2.77	7.65	46.65	1.33	2.29	2.96	15.21
HEA	8.31	8.39	1.87	3.49	22.27	0.05	-1.12	5.00	11.47
EXP	66.69	56.52	38.27	1464.54	67.71	1.81	3.75	28.65	191.10
EBA	4.98	3.18	7.14	50.95		2.64	9.34	-1.96	33.76
FER	1.57	1.58	0.17	0.03	10.92	0.24	-1.00	1.34	1.92
FII	10.04	3.47	14.54	211.45		1.71	2.28	-7.31	54.18
FIO	4.78	1.57	18.14	328.93		-0.42	5.79	-56.86	51.86
GDP	31398.52	25170.10	21344.61	455592283.39	84.80	1.76	4.51	7569.48	106899.29
EDU	4.95	4.78	1.17	1.38	24.57	0.65	0.14	2.98	7.62
GDS	26.38	24.65	9.10	82.82	36.91	1.63	3.64	11.39	53.48
TEC	15.15	14.06	6.64	44.09	47.24	0.88	0.51	5.81	32.83
IMP	61.70	53.77	32.38	1048.44	60.22	1.59	2.68	26.04	157.34
INF	0.11	0.22	0.79	0.63		-0.23	0.32	-1.54	1.97
LIF	79.90	81.14	2.81	7.90	3.46	-0.80	-0.75	74.58	83.33
MOR	4.24	4.05	1.48	2.19	36.50	1.40	2.04	2.40	8.50
POP	180.70	110.13	266.41	70972.85	241.91	4.08	18.66	18.08	1422.99
RES	1.54	1.25	0.88	0.78	70.20	0.68	-0.79	0.44	3.25
UNE	8.67	7.70	4.45	19.80	57.78	1.96	4.40	3.95	23.51
URB	73.35	72.17	13.01	169.16	18.02	0.13	-0.99	53.81	97.92
WSW	84.73	85.84	5.54	30.74	6.46	-1.84	4.20	65.91	91.21

Table 3.8. Descriptive statistics for 2017

Variable	Mean	Median	Std. Deviation	Variance	Variation coefficient (%)	Skewness	Kurtosis	Minimum	Maximum
COE	6.65	6.13	2.72	7.42	44.42	1.41	2.55	3.25	15.09
HEA	8.23	8.14	1.86	3.46	22.85	0.15	-1.18	5.15	11.33
EXP	68.44	58.33	37.74	1424.49	64.70	1.78	3.79	30.67	192.75
EBA	5.12	2.85	7.71	59.41		2.11	4.86	-2.49	31.70
FER	1.56	1.57	0.17	0.03	10.67	-0.05	-0.85	1.26	1.89
FII	5.19	3.10	16.23	263.25		0.99	7.57	-41.65	62.78
FIO	3.64	1.72	16.99	288.81		0.35	7.92	-51.44	60.26
GDP	33373.63	27441.25	22066.83	486944880.41	80.41	1.72	4.19	8366.29	110193.21
EDU	4.80	4.63	1.17	1.37	25.27	1.01	0.83	3.10	7.75
GDS	26.96	24.63	9.39	88.19	38.12	1.57	3.41	10.51	55.87
TEC	14.35	12.54	6.72	45.15	53.59	0.98	0.28	5.99	30.38
IMP	63.32	56.55	31.26	977.30	55.28	1.54	2.86	27.87	161.05
INF	1.72	1.47	0.80	0.64	54.62	0.73	0.50	0.34	3.72
LIF	79.95	81.27	2.76	7.61	3.39	-0.82	-0.82	74.63	83.28
MOR	4.13	4.00	1.39	1.92	34.67	1.26	1.49	2.40	7.90
POP	182.64	109.85	273.47	74786.22	248.95	4.12	18.97	18.12	1462.50
RES	1.58	1.30	0.87	0.76	67.04	0.69	-0.72	0.50	3.36
UNE	7.60	6.64	4.06	16.46	61.10	1.97	4.64	2.89	21.41
URB	73.54	72.37	13.03	169.70	18.00	0.13	-1.00	53.75	97.96
WSW	85.03	86.26	5.52	30.51	6.40	-1.92	4.60	65.93	91.66

Table 3.9. Descriptive statistics for 2018

Variable	Mean	Median	Std. Deviation	Variance	Variation coefficient (%)	Skewness	Kurtosis	Minimum	Maximum
COE	6.52	5.86	2.66	7.10	45.43	1.53	3.26	3.20	15.33
HEA	8.25	8.12	1.84	3.38	22.65	0.21	-1.24	5.29	11.45
EXP	68.76	59.01	37.37	1396.24	63.32	1.87	4.43	31.23	197.50
EBA	4.71	2.32	8.48	71.97		2.30	5.25	-3.39	32.58
FER	1.54	1.57	0.17	0.03	10.80	-0.16	-0.76	1.23	1.87
FII	-1.55	2.27	14.58	212.53		-1.42	3.26	-40.09	29.18
FIO	-5.18	0.61	16.13	260.04		-1.40	1.60	-46.52	24.58
GDP	36240.73	29899.33	23406.77	547877072.71	78.29	1.72	4.04	9446.72	116786.51
EDU	4.80	4.65	1.04	1.09	22.41	0.93	0.84	3.34	7.64
GDS	27.06	24.55	9.36	87.61	38.13	1.65	3.95	10.99	57.37
TEC	14.54	12.23	6.91	47.76	56.52	0.88	0.30	5.28	33.07
IMP	64.05	57.29	30.40	924.14	53.06	1.63	3.56	28.95	164.92
INF	1.90	1.78	0.89	0.79	49.99	1.03	2.06	0.49	4.63
LIF	80.07	81.35	2.76	7.62	3.39	-0.78	-0.85	74.78	83.43
MOR	4.03	3.95	1.32	1.74	33.36	1.13	1.09	2.30	7.40
POP	184.99	109.70	282.71	79927.60	257.72	4.17	19.38	18.15	1514.47
RES	1.63	1.38	0.87	0.75	62.71	0.65	-0.80	0.50	3.32
UNE	6.56	5.66	3.60	12.98	63.59	2.15	5.47	2.25	19.18
URB	73.73	72.57	13.04	170.03	17.97	0.12	-1.01	53.73	98.00
WSW	85.31	86.35	5.43	29.49	6.29	-1.88	4.52	66.52	91.86

Table 3.10. Descriptive statistics for 2019

Variable	Mean	Median	Std. Deviation	Variance	Variation coefficient (%)	Skewness	Kurtosis	Minimum	Maximum
COE	6.16	5.60	2.44	5.93	43.47	2.00	6.34	3.29	15.31
HEA	8.32	8.03	1.80	3.24	22.44	0.25	-1.19	5.37	11.70
EXP	68.98	59.23	38.31	1467.80	64.68	2.02	5.09	31.26	204.32
EBA	4.08	3.28	6.72	45.13		2.63	9.07	-4.10	30.80
FER	1.53	1.57	0.18	0.03	11.17	-0.38	-0.40	1.14	1.86
FII	11.05	2.93	32.18	1035.40		4.21	19.24	-11.68	161.87
FIO	5.94	1.03	34.54	1192.94		3.67	16.64	-42.00	162.35
GDP	35712.83	29499.33	22675.39	514173453.98	76.87	1.71	3.87	9879.33	112621.82
EDU	4.83	4.65	1.03	1.06	22.14	1.00	1.00	3.29	7.64
GDS	27.25	24.24	9.41	88.55	38.83	1.71	4.44	10.77	58.72
TEC	14.59	12.28	6.63	43.99	54.03	0.75	-0.41	6.57	29.62
IMP	64.90	56.30	33.02	1090.09	58.64	1.72	3.50	28.28	173.52
INF	1.71	1.64	0.98	0.97	60.09	0.34	-0.72	0.25	3.83
LIF	80.37	81.49	2.73	7.44	3.35	-0.75	-0.84	75.11	83.83
MOR	3.93	3.70	1.27	1.62	34.41	1.06	0.81	2.30	7.10
POP	187.66	109.95	293.52	86156.23	266.96	4.23	19.85	18.17	1575.19
RES	1.68	1.43	0.88	0.77	61.52	0.64	-0.76	0.48	3.39
UNE	5.95	5.19	3.25	10.55	62.59	2.10	5.09	2.02	17.04
URB	73.92	72.78	13.04	170.17	17.92	0.11	-1.01	53.73	98.04
WSW	85.37	86.34	5.11	26.14	5.92	-1.73	3.91	68.10	91.66

Still looking at the above tables, it can be observed a decrease in the mean of the CO2 emissions, child mortality rate and unemployment throughout the years. With opposite

behaviour, the exportations, importations, gross domestic savings, salaried workers, population density and urbanization variables have seen growth during the study period.

Figure 3.1 displays the boxplots of the economic indicators, each of which has at least one outlier country. Variables like exports, imports, and gross domestic savings, in contrast to what is observed in their mean, do not exhibit stable growth in the median, as demonstrated by the boxplots.

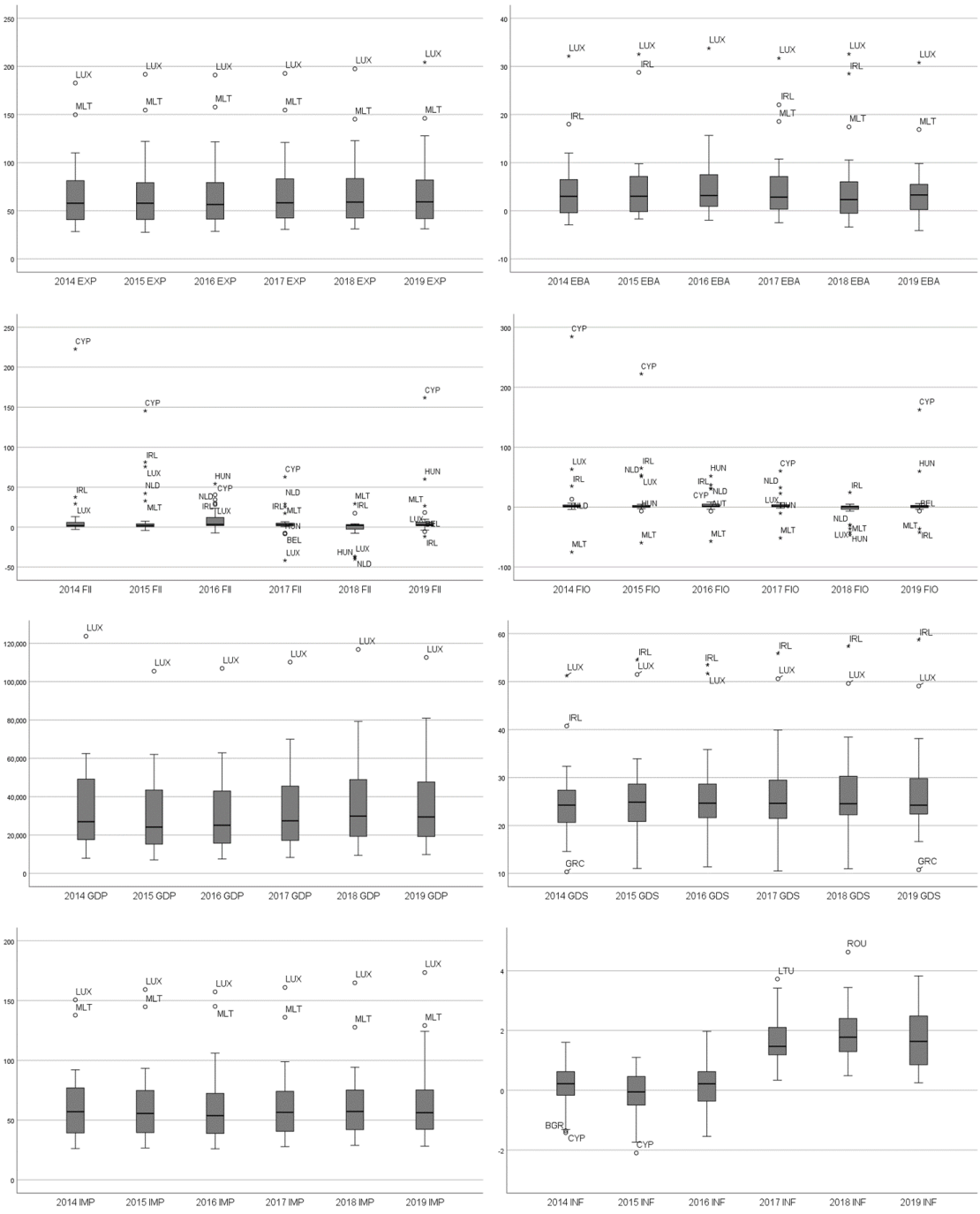

Figure 3.1. Boxplots of the Economic Indicators

Being an outlier for all years and all economic variables with the exception of inflation, Luxembourg stands out among the nations as the one with the highest number of outliers.

It is interesting to note that there are a high number of outliers in foreign direct investment, net inflows and net outflows, but what is even more intriguing is that countries like Luxembourg are upper and lower outliers depending on the year. For instance, net foreign direct investment inflows to Luxembourg were negative in both 2017 and 2018. This might be the result of fewer new foreign investments than divestments or withdrawals, alterations in the state of the world economy, modifications in investment trends, or policy changes. The statistics may also be impacted by Eurostat's statistical corrections and may be connected to a particular occurrence, such as a company moving its operations.

The boxplots for the health indicators can be seen in Figure 3.2, with the child mortality rate being the only variable with outliers. For this indicator, Malta is an upper outlier in the last three years, along with Romania and Bulgaria, which are outliers for the entire study period.

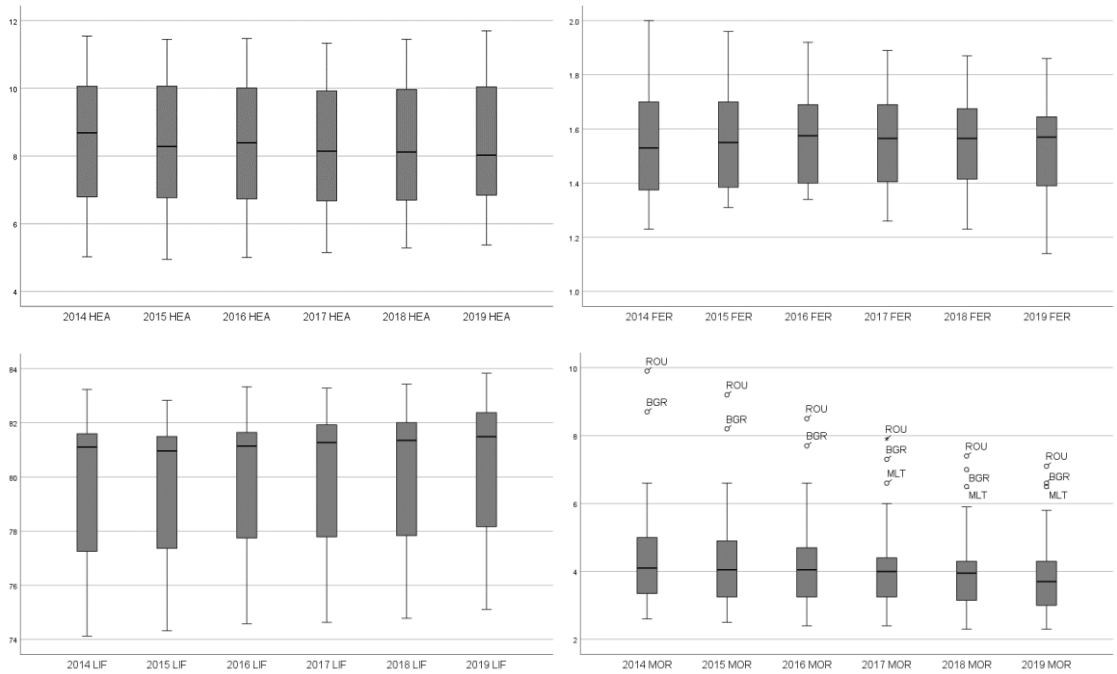

Figure 3.2. Boxplots of the Health Indicators

Figure 3.3 contains boxplots of the remaining eight indicators generally used to measure countries' development.

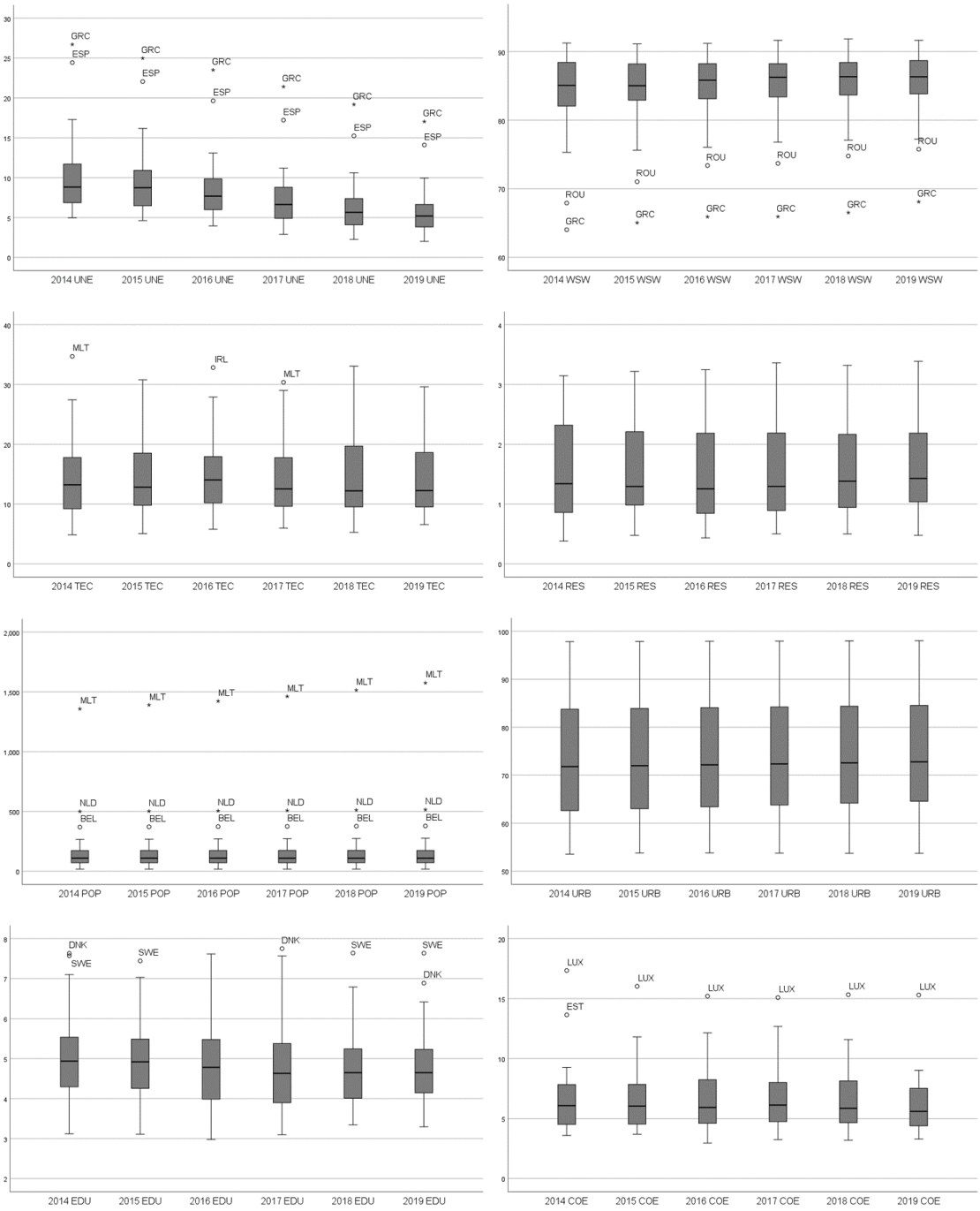

Figure 3.3. Boxplots of the remaining Indicators

As already observed for the mean, the unemployment indicator exhibits stable growth in the median, something that can be observed in the boxplots. Contrarily to the other labour-related indicator, this variable contains two upper outlier countries, Greece and Spain, for all the study years, while the wage and salaried workers (as a percentage of the total employment) indicator has 2 lower outliers for all the years, Romania and Greece.

Looking at the technological and innovation indicators, only the high-technology exports variable has outliers in 2014, 2016 and 2017 (Ireland in 2016 and Malta in the other 2 years). Although the urbanization variable does not contain any outliers, Belgium shows to be a moderate upper outlier and Malta and the Netherlands are severe upper outliers of the population density indicator for all the years.

The boxplots also show that Sweden in 2014, 2015, 2018 and 2019, and Denmark in 2014, 2017 and 2019, were the countries with higher government expenditure on education (as a percentage of the GDP), being moderate upper outliers for this variable in those years. Regarding the CO2 emissions, Luxembourg shows to be an upper outlier for the entire study period and Estonia was an outlier too only in 2014.

Finally, the analysis of linear correlation coefficients between various variables, as presented in Table 3.11 for the first year studied and in Table 3.12 for the last studied year, reveals several interesting patterns. In both tables, it is observed that the variables imports (IMP) and exports (EXP) of goods and services exhibit an almost perfect positive correlation of 0.99. This strong association can be attributed to the inherent relationship between imports and exports. As countries engage in international trade, a rise in imports often leads to a corresponding increase in exports, and vice versa. This positive correlation suggests that when a nation's imports grow, it tends to export more as well, indicating a healthy trade balance. Additionally, there is a strong positive correlation between IMP and EXP variables and the external balance on goods and services (EBA) and gross domestic savings (GDS).

Table 3.11. Linear correlation coefficients among variables in 2014

	COE	HEA	EXP	EBA	FER	FII	FIO	GDP	EDU	GDS	TEC	IMP	INF	LIF	MOR	POP	RES	UNE	URB
HEA	-0.09																		
EXP	**0.54**	-0.29																	
EBA	**0.65**	-0.05	**0.83**																
FER	0.01	0.42	-0.04	0.05															
FII	0.05	-0.17	0.12	0.07	-0.19														
FIO	0.12	-0.20	0.05	0.07	-0.15	**0.96**													
GDP	**0.62**	0.35	0.40	**0.70**	0.36	0.04	0.12												
EDU	-0.14	**0.58**	-0.06	-0.09	0.37	0.16	0.06	0.28											
GDS	**0.65**	-0.10	**0.78**	**0.89**	0.25	-0.10	-0.06	**0.61**	-0.14										
TEC	0.03	0.35	0.24	0.13	0.45	0.02	-0.15	0.08	0.37	0.19									
IMP	0.49	-0.33	**0.99**	**0.76**	-0.06	0.13	0.04	0.31	-0.04	**0.71**	0.25								
INF	0.19	0.29	0.01	0.17	0.41	-0.39	-0.37	0.41	0.12	0.32	0.25	-0.03							
LIF	0.25	**0.71**	-0.01	0.31	0.10	0.10	0.07	**0.61**	0.41	0.08	0.17	-0.09	0.19						
MOR	-0.40	-0.38	0.01	-0.24	-0.11	-0.22	-0.28	-0.49	-0.35	-0.15	-0.01	0.07	-0.08	**-0.65**					
POP	0.05	0.22	0.48	0.30	-0.11	-0.05	-0.26	0.09	0.31	0.12	**0.55**	0.50	0.16	0.30	0.17				
RES	0.20	**0.76**	-0.19	0.06	0.50	-0.26	-0.20	0.49	**0.54**	0.19	0.14	-0.25	0.49	0.49	**-0.54**	-0.11			
UNE	-0.32	-0.12	-0.35	-0.30	-0.40	0.20	0.22	-0.32	-0.21	**-0.53**	-0.36	-0.35	**-0.64**	0.11	-0.08	-0.26	-0.41		
URB	0.31	0.48	0.23	0.26	0.33	-0.09	-0.13	**0.54**	**0.51**	0.16	0.35	0.21	0.13	0.48	-0.24	0.49	0.35	-0.17	
WSW	0.26	0.20	0.36	0.29	0.39	-0.03	-0.02	0.37	0.40	0.44	0.33	0.35	0.21	-0.04	-0.24	0.07	0.40	**-0.51**	0.32

Table 3.12. Linear correlation coefficients among variables in 2019

	COE	HEA	EXP	EBA	FER	FII	FIO	GDP	EDU	GDS	TEC	IMP	INF	LIF	MOR	POP	RES	UNE	URB
HEA	-0.13																		
EXP	**0.57**	-0.43																	
EBA	**0.64**	-0.15	**0.82**																
FER	-0.10	0.11	-0.19	-0.31															
FII	-0.05	-0.27	0.15	0.02	-0.30														
FIO	-0.05	-0.16	-0.12	-0.19	-0.11	**0.92**													
GDP	**0.64**	0.20	**0.55**	**0.62**	-0.01	-0.12	-0.19												
EDU	-0.09	**0.67**	-0.23	-0.04	0.19	0.02	0.09	0.20											
GDS	**0.51**	-0.20	**0.78**	**0.65**	0.08	-0.08	-0.29	**0.68**	-0.10										
TEC	-0.14	0.17	0.17	0.00	0.27	0.17	-0.01	0.12	0.11	0.31									
IMP	**0.53**	-0.47	**0.99**	**0.75**	-0.15	0.17	-0.10	**0.51**	-0.26	**0.77**	0.20								
INF	0.03	-0.38	0.15	0.03	0.44	-0.14	-0.12	-0.28	-0.17	0.10	0.11	0.16							
LIF	0.22	0.60	0.09	0.30	-0.34	-0.04	-0.11	**0.61**	0.36	0.24	0.14	0.04	**-0.73**						
MOR	-0.37	-0.21	0.00	-0.17	0.06	-0.12	-0.23	-0.40	-0.30	-0.19	0.15	0.03	0.46	-0.47					
POP	-0.06	0.13	0.43	0.45	-0.42	0.06	-0.27	0.10	0.07	0.25	0.50	0.41	-0.01	0.29	0.38				
RES	0.20	**0.80**	-0.25	-0.01	0.26	-0.29	-0.13	0.39	**0.76**	0.05	-0.01	-0.29	-0.22	0.47	-0.45	-0.12			
UNE	-0.21	0.06	-0.31	-0.23	-0.40	0.00	0.07	-0.09	-0.17	-0.40	-0.29	-0.31	**-0.58**	0.34	-0.16	-0.21	-0.13		
URB	0.23	0.46	0.21	0.40	-0.16	-0.07	-0.17	0.48	0.49	0.16	0.32	0.16	-0.17	0.49	-0.09	0.47	0.39	0.09	
WSW	0.16	0.15	0.30	0.33	0.26	0.10	0.10	0.35	0.41	0.41	0.08	0.28	0.12	-0.05	-0.25	-0.06	0.32	-0.48	0.17

The external balance on goods and services (EBA) shows high positive correlations with the gross domestic savings (GDS) and the GDP per capita (GDP) in 2014 and moderate positive correlations in 2019. This result suggests that a favourable trade balance (EBA) influences savings as well as people's economic well-being in the preceding year. The correlation, however, weakened in 2019, suggesting potential adjustments to economic dynamics, such as changing consumption habits or revised trade laws.

Foreign direct investment variables, the net inflows (FII) and net outflows (FIO) show also to be highly correlated with each other, with a coefficient of 0.96 in 2014 and 0.92 in 2019. This significant positive correlation suggests that countries with high levels of foreign direct investment have a propensity to attract foreign investments (inflows) and invest abroad (outflows).

Finally, health expenditure (HEA) shows also a high positive correlation with research and development expenditure (RES) for both years and a strong positive correlation with life expectancy (LIF) in 2014, being these two variables moderately correlated in 2019. These show that nations that invest more in healthcare also tend to invest in research and development and that countries that prioritize healthcare spending may see better results in terms of life expectancy.

CHAPTER 4

Results of the Statis Method

The results of the Statis method applied to the EU countries during the study period are introduced in this chapter. The results are presented under the main steps of the methodology, allowing analysis of a potential common structure for the data tables that best represents the similarities between the years and, more importantly, the evolution of the countries described by the variables taken into consideration in the study.

Data standardization was done to ensure that the variables, which have different units, can be compared. Additionally, it was decided to exclude Luxembourg from the analysis due to the existence of a significant number of severe outliers across various variables and years. Severe outliers can have a significant impact on the principal components because they significantly increase the data's variability. The compromise is calculated based on the variance-covariance matrix or the correlation matrix of the data. Severe outliers can have an unbalanced impact on the variance, direction, and magnitude of the principal components, which can change how those components should be interpreted. Subsequently, the method was conducted with all the countries except Luxembourg, as well as other countries with severe outliers being removed. It was concluded that the exclusion of Luxembourg alone yielded improved results, so it was decided to show the Statis method application only without this country.

4.1 Interstructure

The first phase of Statis consists of the global comparison of the data frames, through the calculation of the RV coefficients, the Euclidean distances, and the eigenvalues, together with the representation of the Centred Interstructure Euclidean Image.

Looking at Table 4.1, it can be stated that the pair of years 2014-2018 is the most dissimilar, with an RV coefficient of 0.87 and a Euclidean distance between these years of 0.51, suggesting significant differences in the development indicators across the EU countries in the years of 2014 and 2018 when compared to the other pairs of years. Besides that, the pairs of years 2014-2015 and 2015-2017 are the closest, with an RV coefficient of 0.97 and 0.95, respectively, and a distance between these years of 0.26 and 0.31, respectively.

Table 4.1. Matrices of the RV coefficients and Euclidean Distances

Years	RV Coefficients						Euclidean Distances					
	2014	2015	2016	2017	2018	2019	2014	2015	2016	2017	2018	2019
2014	1						0					
2015	**0.97**	1					**0.26**	0				
2016	0.91	0.94	1				0.42	0.34	0			
2017	0.92	**0.95**	0.94	1			0.40	**0.31**	0.35	0		
2018	**0.87**	0.90	0.94	0.94	1		**0.51**	0.45	0.36	0.34	0	
2019	0.92	0.93	0.92	0.94	0.94	1	0.41	0.39	0.40	0.34	0.34	0

A similar conclusion can be done through the representation of the Centred Interstructure Euclidean Image. Before that, it was obtained a system of axes associated with four eigenvalues by diagonalizing the matrix of RV coefficients, as well as the percentage of inertia explained by each axis and the cumulative inertia (Table 4.2). Since the first three components explain 81.9% of the total variance, from Pearson's and Cattel's criteria, it was selected the first three axes to represent in the Centred Interstructure Euclidean Image (Figure 4.1).

Table 4.2. Eigenvalues, Inertia and Cumulative Inertia of the Interstructure

Axes	Eigenvalues	Inertia Explained (%)	Cumulative Inertia (%)
1	0.163	44.5%	44.5%
2	0.082	22.5%	67.0%
3	0.054	14.9%	81.9%
4	0.037	10.2%	92.1%
5	0.023	6.3%	98.5%
6	0.006	1.5%	100.0%

In the below graphical representation, and looking at the coordinates in the first axis, which explains 44.5% of the total inertia, it can be seen short distance between the pair of years 2014-2015, which indicates proximity or similarity between these years, while the years 2014 and 2018 are more distanced between them, as was observed in the matrix of Euclidean distances. The short distance between the years 2015 and 2017, which is also consistent with what was seen in the Matrix of the Euclidean distances, can be seen in the second axis, which accounts for 22.5% of the total variance.

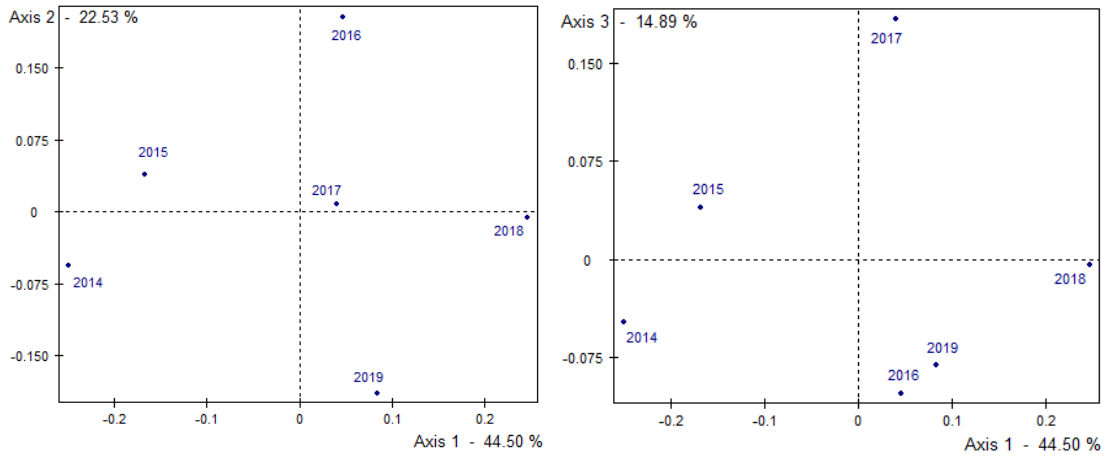

Figure 4.1. Centred Interstructure Euclidean Image in the plans [1,2] and [1,3]

4.2 Intrastructure

In this step, it is obtained a compromise object that is a linear combination of the representative normed objects from each year, weighted by the coordinates of the objects on the first axis of the Interstructure Euclidean image. It is possible to visually represent the countries in the plan if the compromise sufficiently describes the data. The correlations between the compromise axes and the variables are then calculated to be able to interpret the meaning of the individual positions.

Since distances are typically short and scalar products are high, it can be said that the years are strongly correlated with the compromise, indicating that it is possible to identify a common structure. In addition, the year 2017 is revealed to have the highest correlation and the smallest Euclidean distance with the compromise, while the year 2014 has the lowest correlation and the greatest distance.

Table 4.3. Scalar products and distances to the compromise object

	2014	2015	2016	2017	2018	2019
Scalar Products	0.959	0.977	0.971	**0.979**	0.961	0.970
Euclidean Distances	0.285	0.215	0.243	**0.203**	0.281	0.243

Table 4.4 displays the first 10 eigenvalues associated with each axis, the inertia explained for each axis, and the cumulative inertia after PCA is applied to the compromise object. Using Pearson's and Cattel's criteria, it was taken into account the first six axes because they account for 82.2% of the total inertia. The linear correlation coefficients between the variables and the compromise axes were computed and can be found in the

Annexes section, Annex C. Besides that, in Annex D can also be found the coordinates and absolute and relative contributions of the countries to the compromise axes.

Table 4.4. Eigenvalues, Inertia and Cumulative Inertia of the first ten axes

Axes	Eigenvalues	Inertia Explained (%)	Cumulative Inertia (%)
1	0.702	27.3%	27.3%
2	0.500	19.4%	46.7%
3	0.337	13.1%	59.8%
4	0.259	10.1%	69.9%
5	0.180	7.0%	76.9%
6	0.137	5.3%	82.2%
7	0.093	3.6%	85.8%
8	0.084	3.3%	89.1%
9	0.060	2.3%	91.4%
10	0.047	1.8%	93.2%

Therefore, Figure 4.2 shows the countries' compromise Euclidean image in the plan defined by the first and second axes [1,2]. The farthest countries from the centre are the countries that most contribute to the formation of the axis. It is important to analyse the coordinates and the absolute and relative contributions, in order to determine which countries are responsible for the formation of the axes.

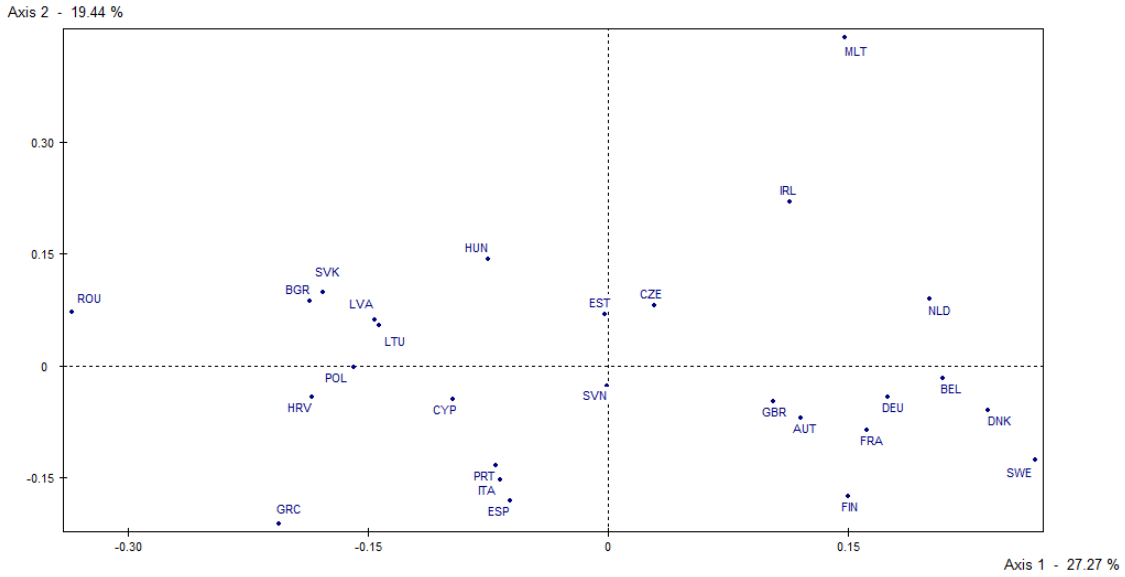

Figure 4.2. Countries' compromise Euclidean image in the plan [1,2]

The findings suggest that the first axis, which accounts for 27.3% of the total variance, is important in identifying Romania, Denmark, and Sweden. On the first axis,

Romania displays negative coordinates, whereas Sweden and Denmark display positive coordinates, being the relative contributions of the three countries above 0.60. Based on the information provided in Annex C, the first axis exhibits a strong positive correlation with government spending on education (EDU), research and development (RES), health expenditure (HEA), and GDP per capita (GDP). On the other hand, it shows a moderate negative correlation with child mortality (MOR).

So, this suggests that the first axis represents a contrast between the socioeconomic development and healthcare indicators of Romania, Denmark, and Sweden. Denmark and Sweden demonstrate higher levels of health expenditure, GDP per capita, research and development expenditure, government expenditure on education, and lower child mortality rates. In contrast, Romania exhibits lower values in the first areas and higher values of child mortality, indicating a less developed and potentially more challenging socioeconomic and healthcare situation.

Still looking at Figure 4.2, it reveals that the second axis plays a significant role in distinguishing between Greece, Ireland, and Malta. Greece has negative coordinates on the second axis, while Ireland and Malta have positive coordinates. Among these countries, Malta has the highest absolute contribution, accounting for 39% of the axis. The variables imports and exports of goods and services (IMP and EXP, respectively) are positively correlated with the second axis. This component also shows a moderate negative correlation with unemployment (UNE).

Therefore, the second axis highlights the differences in economic performance and labour market conditions among these countries. Malta and Ireland showcase strong external trade activities and relatively low unemployment rates, indicating a favourable economic situation. On the other hand, Greece displays lower levels of imports and exports of goods and services, along with a higher unemployment rate, suggesting a less robust economic performance.

Figure 4.3 shows the countries' compromise Euclidean image in the plan defined by the third and fourth axes [3,4]. It can be seen that the countries with the greatest importance and highest absolute contribution on the third axis are Malta, Greece, Spain, Cyprus and Italy, all with positive coordinates. The variables population density (POP), life expectancy (LIF) and unemployment (UNE) show a moderate positive correlation with the third axis.

This component also shows a moderate negative correlation with the fertility rate (FER) in the first studied years, being a strong negative correlation in the last ones. So, the third axis highlights Malta, Greece, Spain, Cyprus and Italy with high population density, life expectancy and unemployment but low fertility rates.

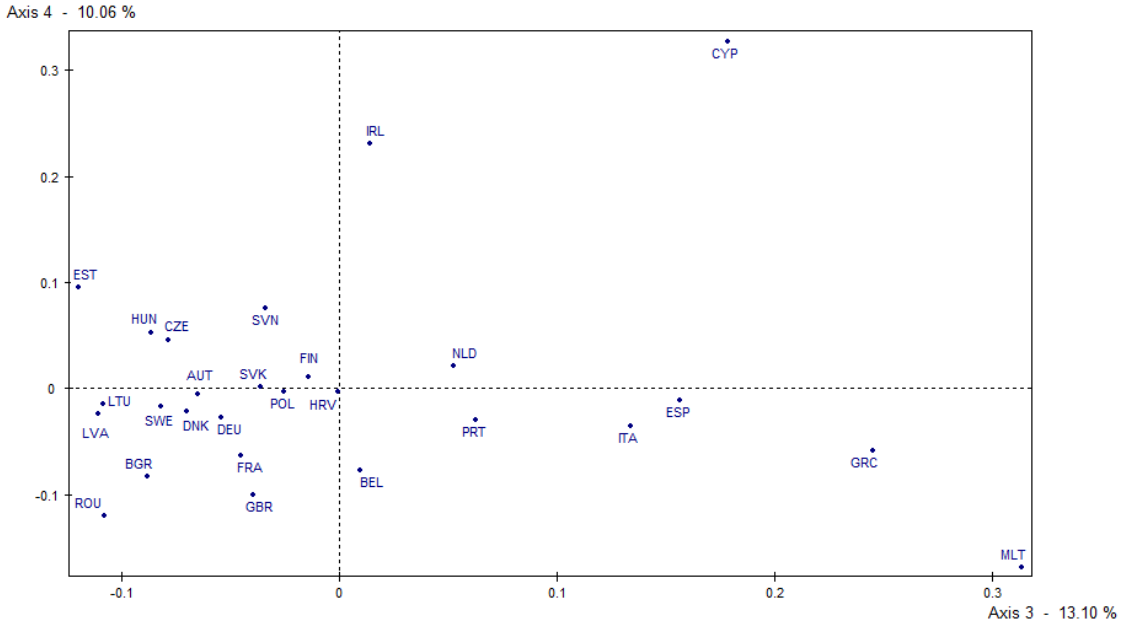

Figure 4.3. Countries' compromise Euclidean image in the plan [3,4]

Still looking at Figure 4.3, it reveals that the fourth axis plays a significant role in distinguishing between Malta, Ireland, and Cyprus. Malta has negative coordinates on the fourth axis, while Ireland and Cyprus have positive coordinates. Among these countries, Cyprus has the highest absolute and relative contributions, 0.41 and 0.50, respectively. This component shows a moderate negative correlation with child mortality (MOR) and a positive correlation with foreign direct investment variables, net inflows (FII) and net outflows (FIO) for all the years, except for 2018.

Therefore, the fourth axis highlights the differences in child mortality rates and foreign direct investment patterns among Malta, Ireland, and Cyprus. Malta, with its negative coordinates, suggests a relatively higher child mortality rate compared to Ireland and Cyprus. On the other hand, Ireland and Cyprus, with their positive coordinates, indicate lower child mortality rates. Furthermore, the positive correlation between the fourth axis and FDI net inflows and outflows suggests that countries with higher coordinates on this axis have greater involvement in foreign direct investment activities in 2014, 2015, 2016, 2017 and 2019. This indicates that Ireland and Cyprus, in particular, have experienced significant inflows and

outflows of foreign direct investment over these years, contributing to their positive positioning on the fourth axis.

Figure 4.4 shows the countries' compromise Euclidean image in the plan defined by the fifth and sixth axes [5,6], which are not so relevant when compared to the first four axes since they only explain 7.0% and 5.3% of the total inertia, respectively.

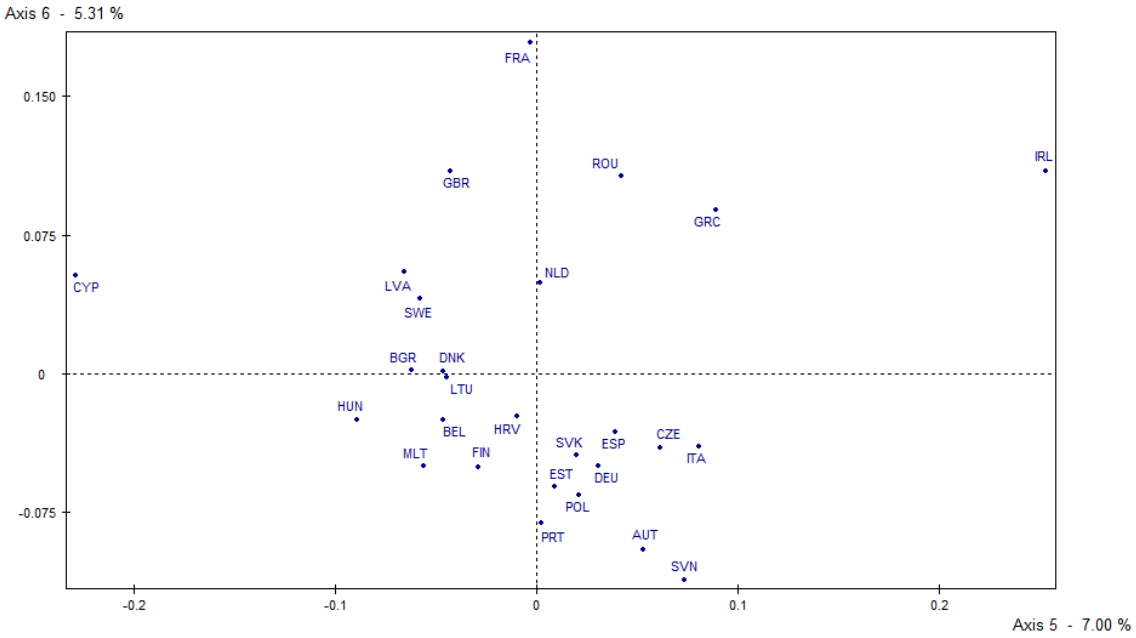

Figure 4.4. Countries' compromise Euclidean image in the plan [5,6]

The countries with the greatest importance on the fifth axis are Cyprus and Ireland. So, the fifth axis makes a distinction between Cyprus (with a negative coordinate) and Ireland (with a positive coordinate). The country with the greatest importance on the sixth axis is France, with positive coordinates. Both axes don't show any strong negative and positive correlation (only weak and moderate correlations) with any variable. Besides that, the countries' relative contributions for these axes are also low when compared to the first four axes.

4.3 Contributions and Trajectories

The countries that are the cause of the variations between the various years must be highlighted in this phase. It is possible to determine which countries contributed more to the differences throughout the period from 2014 to 2019 by decomposing the sum of squared distances (Table 4.5) between all pairs of objects into percentages of contributions from each

country. Cyprus (26.8%), Hungary (9.7%), Ireland (9.4%), Malta (8.1%) and Netherlands (5.0%) are the countries that contributed the most.

Table 4.5. Decomposition of the sum of squared distances

Country	Decomposition of the sum of squared distances (%)	Country	Decomposition of the sum of squared distances (%)	Country	Decomposition of the sum of squared distances (%)
AUT	2.1%	FRA	1.5%	NLD	**5.0%**
BEL	1.8%	DEU	0.8%	POL	1.2%
BGR	2.6%	GRC	4.1%	PRT	1.6%
HRV	1.1%	HUN	**9.7%**	ROU	4.0%
CYP	**26.8%**	IRL	**9.4%**	SVK	1.1%
CZE	1.8%	ITA	2.0%	SVN	0.7%
DNK	1.6%	LVA	1.1%	ESP	1.8%
EST	2.1%	LTU	1.8%	SWE	1.7%
FIN	2.6%	MLT	**8.1%**	GBR	2.0%

The decomposition of the squared distances between pairs of normed objects (Table 4.6) enables the identification of the countries that have made the largest contributions to the variations between the pairs of years. The trajectories in the plan [1,2], which account for 46.7% of the total variance, were computed and are displayed in Figures 4.5 and 4.6. The countries' trajectories in the plans [1,3] and [1,4] can be found in the Annexes section, Annex E. The trajectories are represented roughly, but their irregularities are displayed.

Cyprus was the country that most contributed to the differences between the pairs of years. This country is responsible for more than half (53.3%) of the differences between the last two studied years (2018 and 2019). As seen in the interstructure, the pair of years that differ the most is 2014-2018, being Cyprus the main responsible (35.0%) for this difference. This country also contributes considerably to the differences between the pair of years 2015-2016 (38.0%), 2015-2018 (35.9%), 2014-2016 (34.5%), 2016-2019 (28.7%), 2017-2018 (27.1%) and 2017-2019 (26.9%). Looking at the trajectories, Cyprus also stands out, mainly in the first axis, where it shows a long trajectory evolution from the left to the right side between 2014 and 2018, returning to a value in 2019 closer to the compromise.

Additionally, Hungary is also responsible for the differences for some couple of years here considered, with the highest contribution between 2016 and 2017 (22.1%), and between 2015 and 2016 (20.3%), but less significant between 2014 and 2016 (1.1%). This country has

some years with uncertainty, as can be concluded by the analysis of the squared distances decomposition and the trajectories.

Table 4.6. Decomposition of the squared distances into percentage of individuals' contributions

Country	2014 and 2015	'14 and '16	'14 and '17	'14 and '18	'14 and '19	'15 and '16	'15 and '17	'15 and '18	'15 and '19	'16 and '17	'16 and '18	'16 and '19	'17 and '18	'17 and '19	'18 and '19
AUT	3.2	2.5	3.1	2.2	2.9	2.0	2.9	1.8	2.0	1.9	3.0	1.3	0.4	0.6	0.8
BEL	2.0	2.3	1.7	1.2	1.4	2.8	1.5	1.0	1.1	3.3	3.3	2.3	1.0	1.3	1.7
BGR	**7.0**	2.4	4.1	2.6	**6.5**	1.5	0.8	0.7	2.5	2.5	1.9	3.5	0.8	1.7	1.4
HRV	0.6	1.2	0.9	0.6	1.5	1.5	0.9	0.8	1.6	1.2	1.8	1.8	0.7	1.0	0.3
CYP	**12.7**	**34.5**	**20.9**	**35.0**	**10.7**	**38.0**	**19.3**	**35.9**	**17.6**	**16.9**	**8.8**	**28.7**	**27.1**	**26.9**	**53.3**
CZE	3.1	1.2	1.2	0.9	2.3	0.3	4.3	1.7	3.0	2.8	2.0	2.6	1.0	1.3	1.3
DNK	2.0	1.2	2.1	1.1	2.3	0.9	3.4	1.5	2.4	1.3	1.3	1.1	1.2	1.7	0.7
EST	2.1	1.3	2.4	1.7	3.1	0.4	3.7	1.4	1.3	3.1	2.1	1.2	2.9	4.6	2.0
FIN	**5.0**	2.9	**5.6**	3.3	**5.1**	0.5	4.0	1.6	2.3	2.3	1.3	1.2	1.3	1.7	0.3
FRA	1.2	1.1	1.8	1.9	3.2	0.8	2.3	1.4	2.4	1.0	1.0	1.1	1.2	1.3	0.3
DEU	1.1	0.7	1.1	0.9	1.5	0.6	1.2	0.9	1.2	0.4	0.4	0.4	0.4	0.5	0.5
GRC	4.9	3.2	**5.1**	4.5	**8.0**	2.8	**5.3**	4.8	**7.4**	1.1	3.6	3.3	1.9	2.0	0.7
HUN	1.1	**11.9**	1.8	**5.9**	**6.4**	**20.3**	1.6	**8.5**	**9.9**	**22.1**	**11.4**	**9.1**	**15.7**	**14.2**	**8.9**
IRL	**27.7**	**9.4**	**10.5**	**10.8**	**8.9**	**5.4**	**6.2**	**6.7**	**7.8**	**8.6**	**18.8**	**8.2**	**8.5**	**5.4**	**5.5**
LVA	0.7	1.2	1.5	2.1	4.3	1.0	1.7	2.3	4.0	0.9	2.5	2.6	1.2	1.8	0.4
LTU	0.4	0.5	1.4	0.5	0.9	0.8	3.0	0.9	1.3	2.0	0.8	1.1	1.7	1.9	0.7
MLT	1.4	0.7	2.9	0.3	0.3	1.9	**5.5**	0.6	1.3	3.5	1.6	1.4	4.1	**5.0**	1.0
NLD	3.8	**5.7**	**13.6**	**9.0**	**7.4**	**6.6**	**16.6**	**10.7**	**6.9**	**7.9**	**9.4**	3.2	**7.4**	**6.4**	**5.0**
POL	3.6	**5.2**	**5.0**	4.3	2.3	4.9	2.4	4.3	3.1	**5.3**	**5.2**	**6.5**	**8.9**	**7.3**	**8.4**
PRT	0.8	0.5	0.8	0.5	1.6	0.6	2.4	1.1	2.5	2.0	1.3	1.9	0.5	0.7	0.7
ROU	3.8	1.6	1.9	1.6	3.1	0.6	1.5	1.1	2.1	1.0	1.5	1.6	0.8	1.1	0.4
SVK	4.1	3.1	1.6	2.4	3.3	2.0	2.0	4.8	**5.3**	3.1	**8.4**	**6.3**	**7.6**	4.4	3.2
SVN	0.8	0.8	0.9	0.6	1.5	1.0	0.8	0.9	1.8	0.7	1.2	1.9	1.0	1.7	0.6
ESP	0.7	0.5	0.4	0.4	0.7	0.6	0.7	0.6	1.2	0.8	1.3	1.0	0.3	0.5	0.4
SWE	0.8	0.9	1.5	1.4	4.4	0.5	1.4	1.4	4.0	0.8	1.4	2.8	0.9	2.4	0.9
GBR	2.7	2.0	2.6	1.8	3.0	0.9	2.3	1.1	1.8	2.0	1.8	1.8	0.5	1.2	0.3
IRL	2.4	1.4	3.4	2.5	3.4	0.8	2.4	1.6	2.2	1.6	2.8	2.2	1.1	1.5	0.4

Other countries that also generally contribute to the structural differences are Ireland, between the pair of years 2014-2015 (27.7%) and 2016-2018 (18.8%), and Malta, in particular, between 2015 and 2017 (16.6%) and between 2014 and 2017 (13.6%). For Malta, most of the trajectory points in the second and third axis deviate significantly from the compromise. In the second axis, the trajectory points for Ireland are close to the compromise between

2015 and 2019 but the trajectory point in 2014 is far. This axis is positively correlated with the variables imports and exports of goods and services and show a moderate negative correlation with unemployment. This means that the external trade activities were lower and the unemployment higher in 2014 for Ireland when compared to the other studied years (but still the external trade activities were higher for Ireland when compared to the average of the countries in that year).

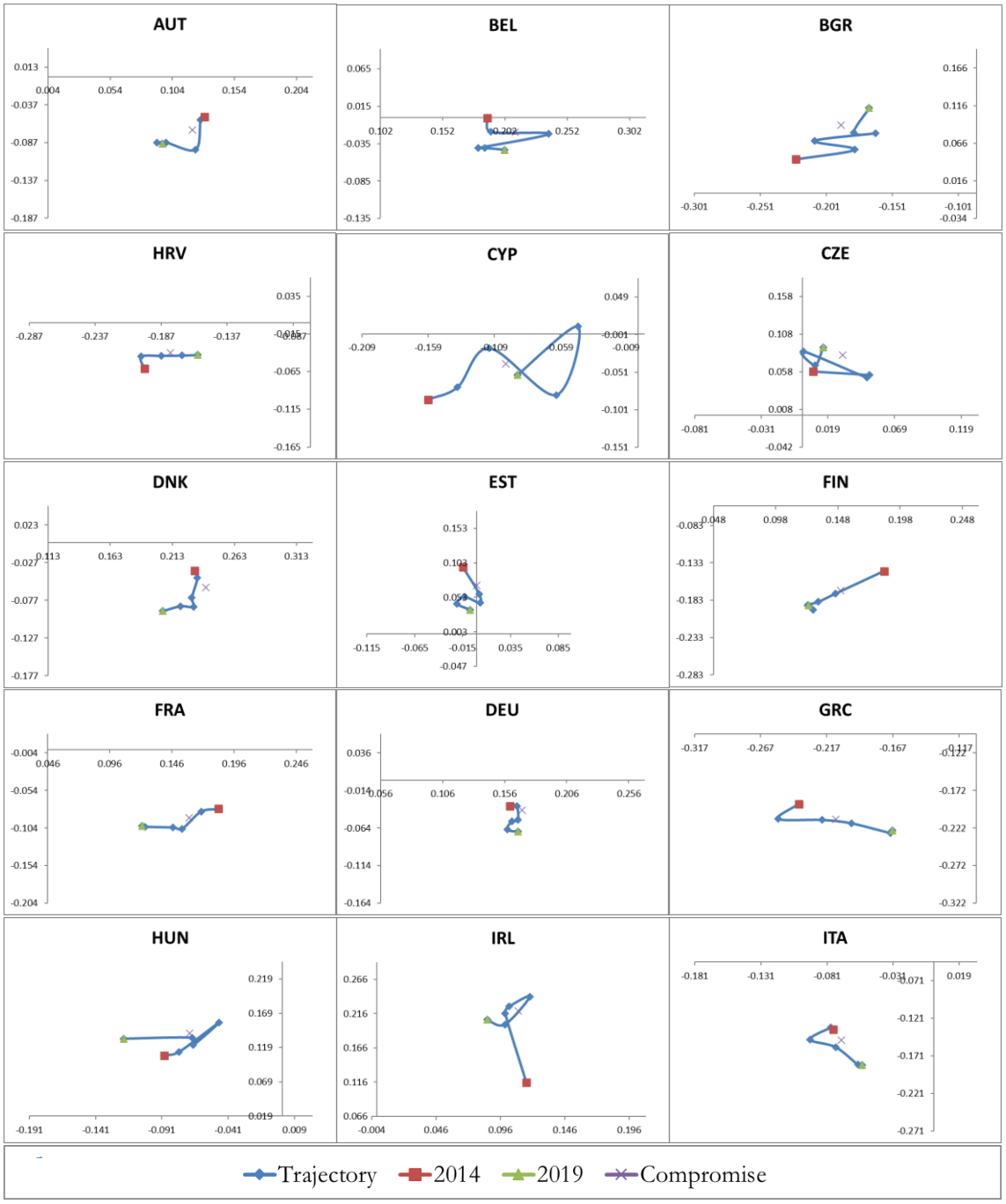

Figure 4.5. Countries' trajectories in the plan [1,2]

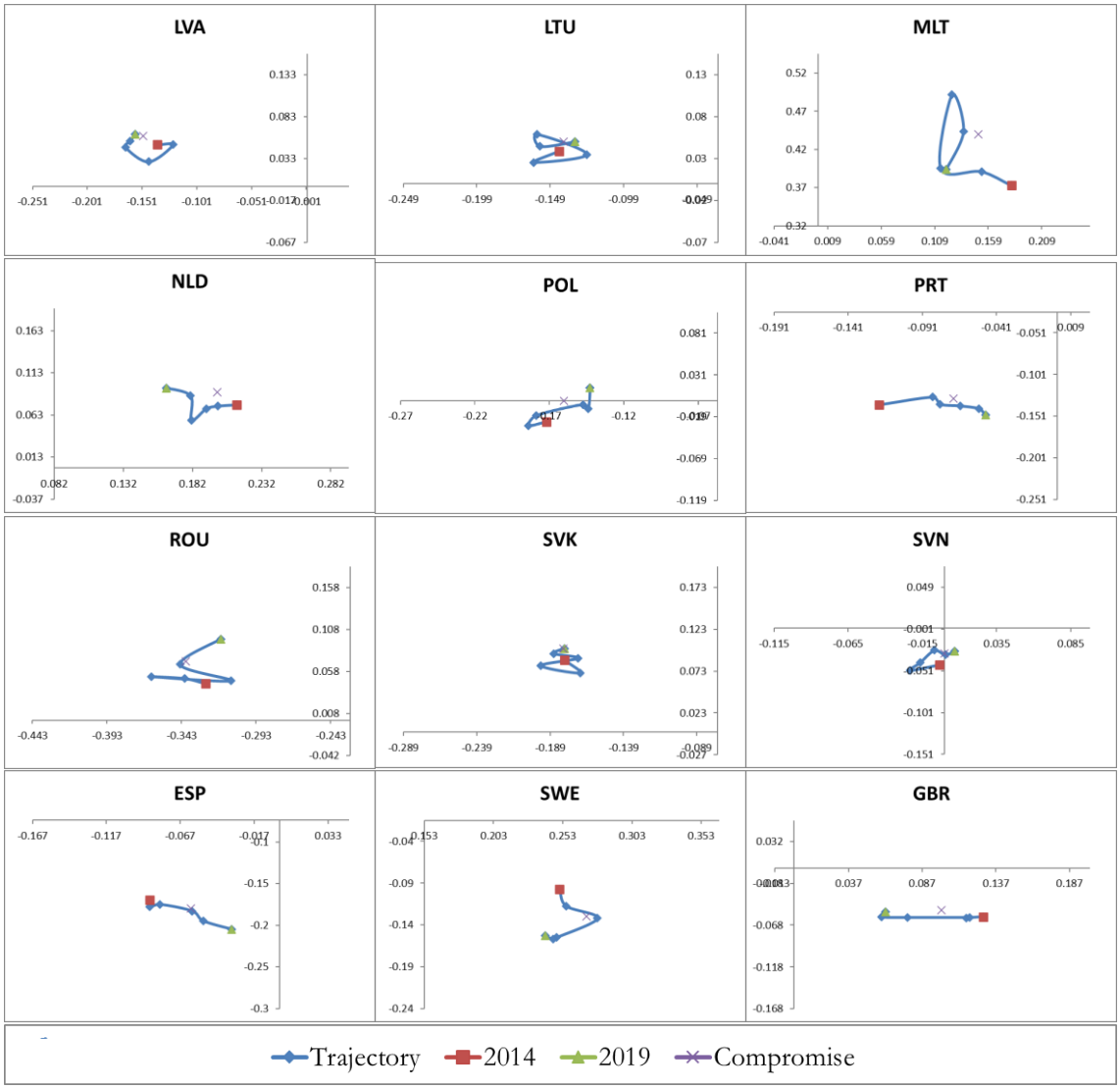

Figure 4.6. Countries' trajectories in the plan [1,2] (cont.)

Looking at the trajectories, it also stands out that Spain, Portugal, Croatia and Greece's trajectories are from left to right in the first axis, while Finland, France, Great Britain, the Netherlands and Austria are from right to left. Since the first axis exhibits a strong positive correlation with government spending on education (EDU), research and development (RES), health expenditure (HEA), and GDP per capita (GDP), this means that there was an increase in the values for those variables for Spain, Portugal, Croatia and Greece and a decrease for the other group of countries. Despite that, in 2019 those variables present still higher values for Finland, France, Great Britain, Netherlands and Austria when compared to the other four countries, meaning that was a convergence from 2014 to 2019 in these development indicators, implying progress and improvement across Spain, Portugal,

Croatia and Greece in terms of government spending on education, research and development, health expenditure, and GDP per capita.

Among the countries with reduced contributions stand out Slovenia, Deutschland, Slovak Republic, Latvia and Poland, which are simply more regular and closer to the compromise object, as can also be seen by their reduced contributions to the sum of squared distances' decomposition (which range between 0.7% and 1.2%) and their trajectories. Countries like Belgium, Bulgaria, Czech Republic and Lithuania also present low contributions but their trajectories are more irregular, particularly when looking at their path around the component with higher inertia explained.

CHAPTER 5

Results of the Dual Statis Method

This approach is similar to the Statis method, but instead of emphasising the analysis of the individuals, it focuses on the variables. For the purpose of the dissertation, although it may not offer as significant insights as the previous method, it complements the first method and enables us to identify a common structure and explain the evolution of the development indicators throughout the studied years. For the same reasons as the ones clarified at the beginning of the previous chapter, to perform the Dual Statis method, it was also removed Luxembourg as an individual.

5.1 Interstructure

As in the first method employed, the first phase of the Dual Statis method consists of the global comparison of the data frames. Here, the representative object of each data table is the correlation matrix.

Looking at Table 5.1, it can be stated that the pairs of years 2014-2015, 2015-2016 and 2017-2018 are the closest, with a distance between these years of 2.11, 2.09 and 1.92, respectively; while the pairs of years 2016-2018 and 2016-2019 are the most distant, with a Euclidean distance between these years of 4.28 and 4.31, respectively.

Table 5.1. Matrix of the distances between years' representative objects.

Years	2014	2015	2016	2017	2018	2019
2014	0					
2015	**2.11**	0				
2016	3.04	**2.09**	0			
2017	3.50	3.34	3.36	0		
2018	4.22	4.22	4.28	**1.92**	0	
2019	3.86	4.04	4.31	2.54	2.66	0

Identical conclusions can be done through the representation of the Centred Interstructure Euclidean Image (Figure 5.1). This representation was done in the plan [1,2], since the first two components explain, approximately, 80% of the total inertia. So, from Pearson's and Cattel's criteria, it was selected the first two components.

Table 5.2. Eigenvalues, Inertia and Cumulative Inertia of the Interstructure

Axes	Eigenvalues	Inertia Explained (%)	Cumulative Inertia (%)
1	17.713	61.2%	61.2%
2	5.428	18.7%	79.9%
3	3.145	10.9%	90.8%
4	1.373	4.7%	95.5%
5	1.299	4.5%	100.0%

In the below graphical representation, and looking at the coordinates in the first axis, which explains 61.2% of the total inertia, it can be seen a short distance between the pair of years 2014-2015 and 2015-2016, which indicates proximity or similarity between these years, while the years 2016-2018 and 2016-2019 are more distanced between them, as was observed in the matrix of Euclidean distances. The short distance between the years 2017 and 2018, which is also consistent with what was seen in the Matrix of the Euclidean distances, can be seen in the second axis.

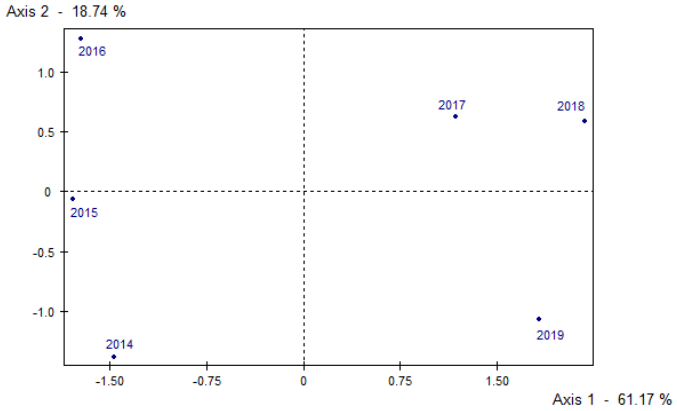

Figure 5.1. Centred Interstructure Euclidean Image in the plan [1,2]

5.2 Intrastructure

In this step, it is obtained a compromise object that is a linear combination of the representative normed objects from each year, weighted by the coordinates of the objects on the first axis of the Interstructure Euclidean image. It is possible to visually represent the variables in the plan if the compromise sufficiently describes the data.

The scalar products and distances between the compromise and the representative objects for each year are listed in Table 5.3. The year 2017 is the one that has the lowest Euclidean distance with the compromise, while 2018 is the one with the highest distance.

Table 5.3. Scalar products and distances to the compromise object

	2014	2015	2016	2017	2018	2019
Scalar Products	61.389	61.274	60.956	60.534	58.589	57.671
Euclidean Distances	2.200	**2.019**	2.314	**1.646**	2.469	2.425

Table 5.4 displays the first 10 eigenvalues associated with each axis, the inertia explained for each axis, and the cumulative inertia after PCA is applied to the compromise object. Using Pearson's and Cattel's criteria, it was taken into account the first six axes because they account for 81.7% of the total inertia.

Table 5.4. Eigenvalues, Inertia and Cumulative Inertia of the first ten axes

Axes	Eigenvalues	Inertia Explained (%)	Cumulative Inertia (%)
1	5.233	26.2%	26.2%
2	4.216	21.1%	47.3%
3	2.412	12.1%	59.3%
4	2.080	10.4%	69.7%
5	1.391	7.0%	76.7%
6	0.999	5.0%	81.7%
7	0.869	4.3%	86.0%
8	0.623	3.1%	89.1%
9	0.559	2.8%	91.9%
10	0.391	2.0%	93.9%

Therefore, Figures 5.2, 5.3 and 5.4 show the variables' compromise Euclidean image in the plans defined by the first and second axes [1,2], third and fourth axes [3,4], and fifth and sixth axes [5,6], respectively. The farthest variables from the centre are the indicators that most contribute to the formation of the axis. In the Annexes section, Annex F can be found the coordinates and absolute and relative contributions of the variables to the compromise axes.

In the first axis, which explains 26.2% of the total inertia, the variables unemployment (UNE) and child mortality (MOR) (negative coordinates) are opposed to the

GDP per capita (GDP), research and development expenditure (RES), government spending on education (EDU), health expenditure (HEA) and gross domestic savings (GDS) (positive coordinates).

Although these variables are highlighted in the graphic representation, it is important to analyse the coordinates and the absolute and relative contributions, in order to determine whether all the previously mentioned variables are responsible for the formation of the first axis. In fact, the five mentioned variables with positive coordinates have a considerable contribution, totalizing 46% of the absolute contribution and each one of them with relative contributions above 0.40. These five variables, which represent economic output, innovation, human capital development, and domestic investment, play a crucial role in enhancing productivity, technological advancements, and overall economic growth, whereas in the first axis, countries with higher income, savings, innovation, and health and education expenditure are opposed to those whose these indicators are lower. On the other hand, the variables with negative coordinates, unemployment and child mortality, show a low contribution to the axis.

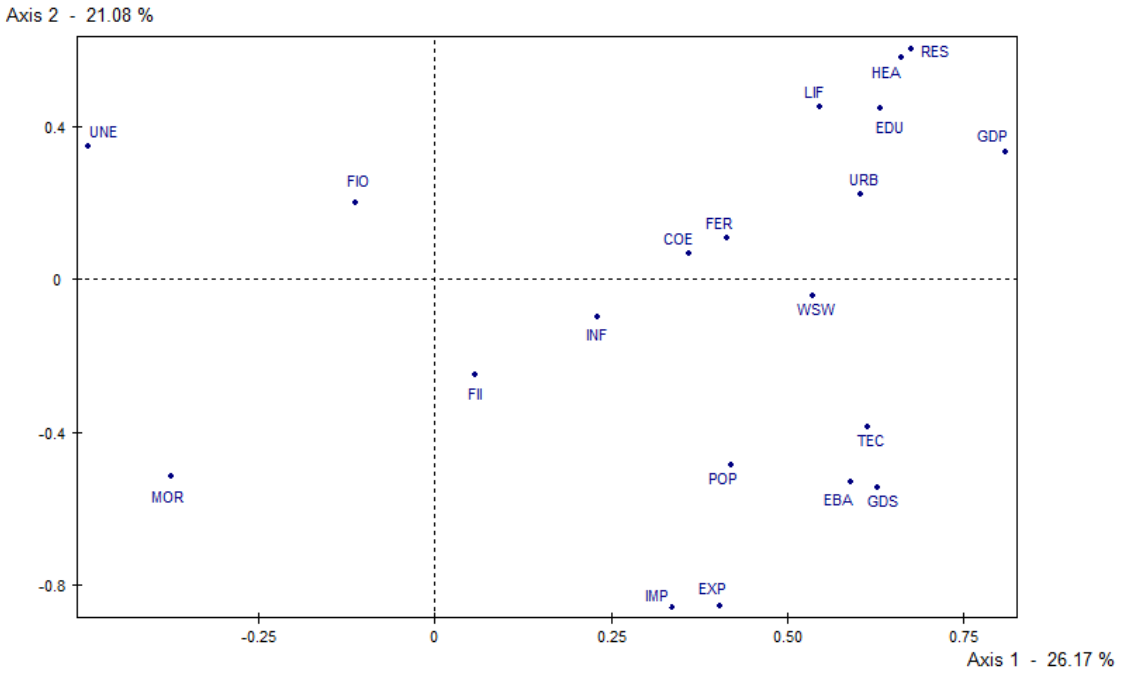

Figure 5.2. Variables' compromise Euclidean image in the plan [1,2]

Still looking to Figure 5.2, in the second axis, which explains 21.1% of the total inertia, the variables exports (EXP) and imports (IMP) of goods and services (negative coordinates) are opposed to the variables health expenditure (HEA) and research and

development expenditure (RES) (positive coordinates). In fact, the exports and imports together contribute 35% for the formation of the second axis, having each of them a relative contribution of 0.73 and 0.74, respectively. So, countries with higher external trade are opposed to those whose external activity is lower. The health expenditure and research and development expenditure variables present lower absolute (8% and 9%, respectively) and relative contributions (0.34 and 0.37, respectively) when compared with the external activity variables.

Moreover, in the third axis (see Figure 5.3), the variables inflation (INF) and fertility rate (FER) (negative coordinates) are opposed to the variables foreign direct investment, net inflows (FII), life expectancy (LIF) and unemployment (UNE) (positive coordinates). These five variables present considerable contributions, totalizing 73% of the absolute contribution for the third axis, having each of them a relative contribution above 0.30.

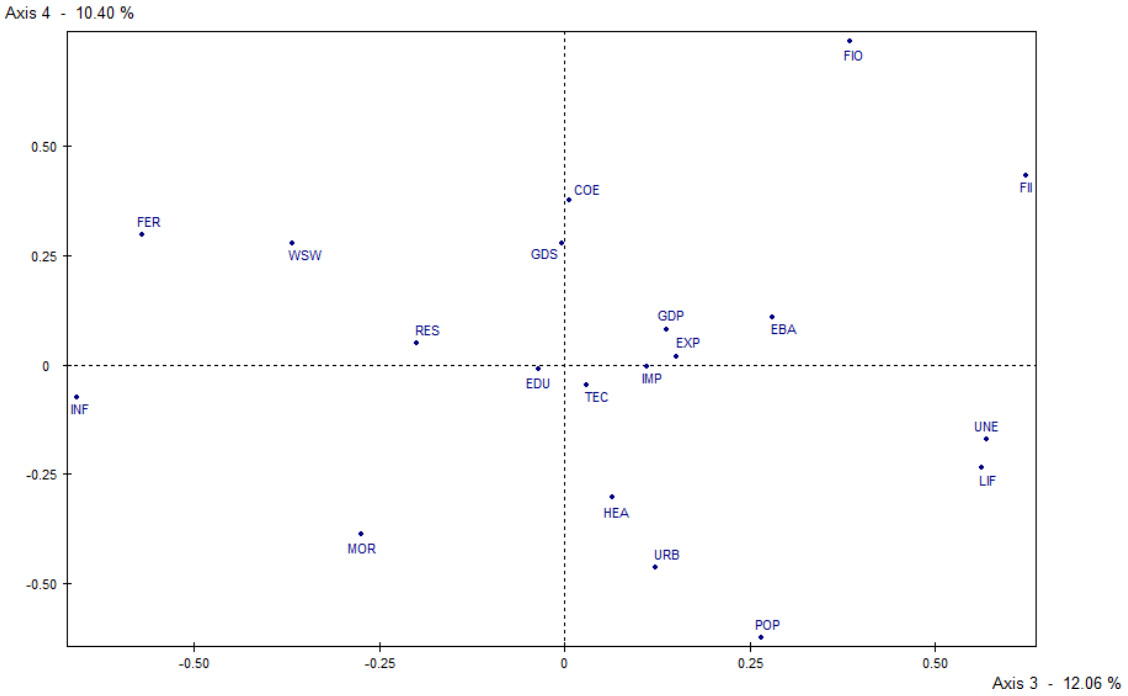

Figure 5.3. Variables' compromise Euclidean image in the plan [3,4]

Additionally, in the fourth axis (see Figure 5.3), the variables population density (POP) and urban population (URB) (negative coordinates) are opposed to the variables foreign direct investment, net inflows (FII) and outflows (FIO). Therefore, the fourth axis contradistinguishes the density and urbanization with the foreign direct investment of the countries. The population density and the net outflows in foreign direct investment present

high absolute (19% and 26%, respectively) and relative contributions (0.39 and 0.55, respectively). Although not that high, the urban population and the net outflows in foreign direct investment present significant absolute (10% and 9%, respectively) and relative contributions (0.22 and 0.19, respectively).

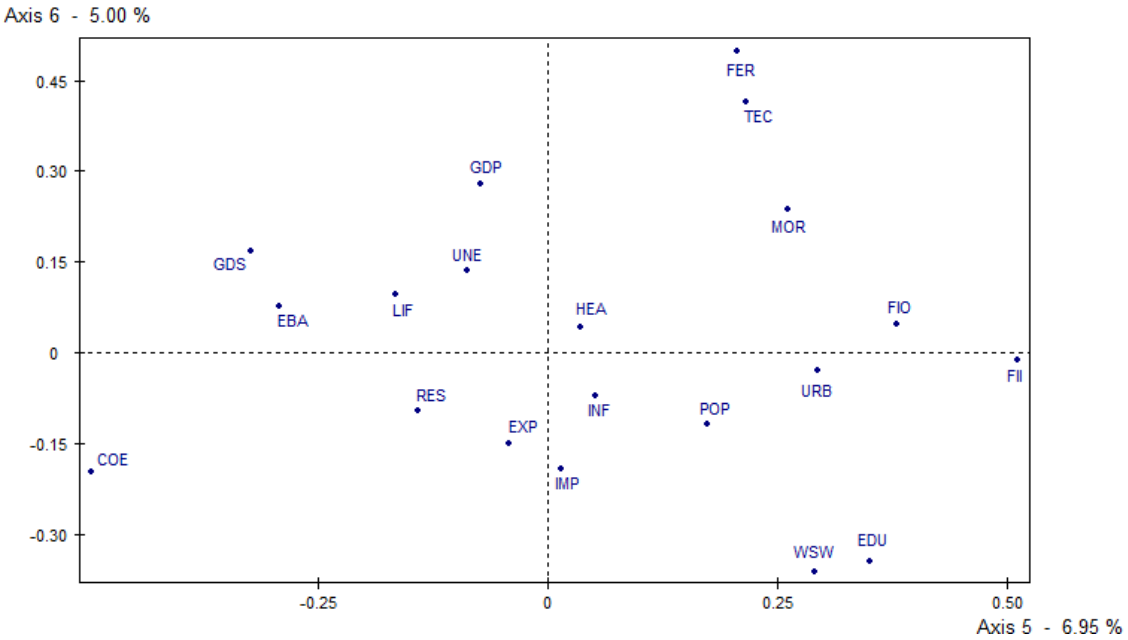

Figure 5.4. Variables' compromise Euclidean image in the plan [5,6]

Thereafter, in the fifth component the CO2 emissions (COE) variable (negative coordinate) is opposed to the variables foreign direct investment, net inflows (FII) and outflows (FIO), and government expenditure on education (EDU) (positive coordinates). Within the axis, the CO2 emissions and the net inflows in foreign direct investment present high absolute contributions (18% and 29%, respectively), and the net inflows in foreign direct investment and government expenditure on education present significant absolute contributions (10% and 9%, respectively). The relative contributions for these four variables are lower (between 0.12 and 0.26) when compared to other variables in different axes.

Finally, in the sixth axis, the variables government expenditure on education (EDU) and total wage and salaried workers (WSW) (negative coordinates) are opposed to the variables fertility rate (FER) and high-technology exports (TEC) (positive coordinates). Besides the fact that this axis only explains 5% of the total inertia, the relative contributions are also lower when compared to other variables in different axes.

5.3 Contributions and Trajectories

The variables that are the cause of the variations between the various years must be highlighted in this phase. It is possible to determine which indicators contributed more to the differences throughout the period from 2014 to 2019 by decomposing the sum of squared distances (Table 5.5) between all pairs of normed objects into percentages of contributions from each variable. Inflation (25.5%), foreign direct investment, net outflows and inflows (7.8% and 6.9%, respectively), GDP per capita (6.6%), life expectancy (5.6%) and health expenditure (5.4%) are the indicators that contributed the most.

Table 5.5. Decomposition of the sum of squared distances

Variable	Decomposition of the sum of squared distances (%)	Variable	Decomposition of the sum of squared distances (%)	Variable	Decomposition of the sum of squared distances (%)
COE	1.3%	GDP	**6.6%**	MOR	2.9%
HEA	**5.4%**	EDU	3.6%	POP	3.4%
EXP	2.0%	GDS	3.6%	RES	4.2%
EBA	4.9%	TEC	3.5%	UNE	1.8%
FER	4.5%	IMP	2.1%	URB	3.5%
FII	**6.9%**	INF	**25.5%**	WSW	1.1%
FIO	**7.8%**	LIF	**5.6%**		

The decomposition of the squared distances between pairs of normed objects (Table 5.6) enables the identification of the variables that have made the largest contributions to the variations between the pairs of years. The trajectories in plan the [1,2], which account for 47.3% of the total variance, were computed and are displayed in Figures 5.5 and 5.6. The variables' trajectories in the plans [1,3] and [1,4] can be found in Annex G.

Inflation was the most unstable and the indicator that most contributed to the differences between the pairs of years. As seen in the interstructure, the pairs of years that differ the most are 2016-2018 and 2016-2019, being inflation the main responsible (35.3% and 29.4%, respectively) for this difference. This indicator also contributes considerably to the differences between the pair of years 2016-2017 (36.1%), 2015-2017 (31.8%), 2015-2018 (31.6%), 2015-2019 (26.4%), 2014-2018 (24.8%) and 2014-2019 (24.1%). The last two studied years (2018 and 2019) were the pair of years to which this variable contributed the least, but it still contributed with a higher percentage than the average (7.4%) in those years. Inflation also stands out when looking at the trajectories, particularly in the first axis, where

it exhibits a long trajectory evolution with high amplitude from the right to the left side between 2016 and 2018, with any of the six years points being close to the compromise. Despite having irregular trajectories, the other axes also display elongated curves.

Table 5.6. Decomposition of the squared distances into percentage of variables' contributions.

Variable	2014 and 2015	'14 and '16	'14 and '17	'14 and '18	'14 and '19	'15 and '16	'15 and '17	'15 and '18	'15 and '19	'16 and '17	'16 and '18	'16 and '19	'17 and '18	'17 and '19	'18 and '19
COE	2.4	2.4	2.1	1.7	1.3	1.3	0.9	0.8	0.7	0.6	0.8	1.1	2.1	2.5	1.2
HEA	4.1	2.6	4.9	5.8	**7.0**	0.5	5.8	6.0	6.8	6.3	6.2	6.4	1.7	2.5	2.0
EXP	5.8	4.1	2.5	1.5	2.0	2.0	1.9	2.0	0.7	1.2	1.8	1.2	1.9	2.8	2.5
EBA	**10.1**	4.6	3.5	3.1	3.2	5.0	6.1	3.0	**7.8**	3.9	2.6	4.5	4.2	**10.1**	**13.1**
FER	2.0	3.0	4.1	5.7	**7.9**	3.0	2.9	4.2	6.3	2.2	2.4	4.4	6.9	5.8	6.3
FII	**14.9**	**20.1**	**8.0**	5.2	2.1	**13.7**	2.9	3.8	4.9	4.3	4.9	**7.1**	**13.2**	**13.0**	**11.0**
FIO	4.7	**10.1**	6.8	**8.8**	1.7	**17.4**	**9.7**	**9.7**	4.2	6.0	4.4	4.8	**16.1**	**12.5**	**23.2**
GDP	4.1	1.8	**8.1**	**7.9**	**9.9**	1.6	6.2	5.8	**7.8**	**7.3**	6.6	6.7	2.3	6.1	5.1
EDU	**7.9**	4.6	4.2	3.9	3.7	2.8	2.2	2.9	2.8	4.1	3.4	3.4	**7.0**	2.3	3.1
GDS	**7.7**	**7.4**	5.3	3.9	3.1	2.6	3.4	2.0	2.9	3.1	1.4	3.4	2.3	5.3	5.8
TEC	3.0	5.2	3.8	3.3	2.9	4.2	2.9	3.5	2.0	4.3	5.1	2.6	4.2	2.7	3.2
IMP	5.1	4.1	2.5	1.7	2.8	2.7	1.6	1.9	1.0	0.8	1.8	1.3	3.0	3.1	3.5
INF	**12.2**	**10.3**	**22.4**	**24.8**	**24.1**	**17.2**	**31.8**	**31.6**	**26.4**	**36.1**	**35.3**	**29.4**	**14.7**	**12.6**	**7.4**
LIF	1.4	1.7	5.4	5.8	**8.4**	3.7	5.5	5.7	**7.8**	6.9	6.0	6.4	2.0	3.5	1.1
MOR	1.0	2.3	1.4	3.1	3.5	5.2	1.1	2.2	2.4	2.0	4.1	4.6	**7.4**	4.0	1.2
POP	6.7	4.5	4.1	3.0	2.6	6.0	5.4	4.2	3.7	2.0	1.9	2.2	1.6	3.3	4.1
RES	1.7	2.2	5.4	5.8	5.8	2.4	4.4	4.5	4.0	4.4	4.3	4.3	1.5	2.2	1.9
UNE	0.7	3.6	2.7	1.8	2.8	5.2	2.2	1.3	1.9	0.8	0.9	0.9	1.3	2.5	1.4
URB	2.9	3.7	1.7	2.4	3.4	2.3	2.6	3.9	4.5	3.2	5.0	4.5	4.7	2.3	1.6
WSW	1.9	1.7	1.0	0.8	1.6	1.1	0.8	1.1	1.4	0.6	1.2	0.8	1.8	0.7	1.4

Furthermore, foreign direct investment, net outflows and inflows were also unstable and responsible for the differences for some couple of years here considered. FIO shows the highest contributions between 2018 and 2019 (23.2%), 2015 and 2016 (17.4%), and 2017 and 2018 (16.1%). FII shows the highest contributions between 2014 and 2016 (20.1%) and between 2014 and 2015 (14.9%). These variables had some years with uncertainty, as can be concluded by the analysis of the squared distances decomposition and the trajectories.

Other variables that also generally contribute to the structural differences are external balance on goods and services, between the pair of years 2018-2019 (13.1%), 2017-2019

(10.1%) and 2014-2015 (10.1%), GDP per capita, between the pair of years 2014-2019 (9.9%) and 2014-2017 (8.1%), and life expectancy, in particular, between 2014 and 2019 (8.4%).

In addition, for GDP per capita and life expectancy, most of the trajectory points in the third axis deviate significantly from the compromise and present a trajectory bottom-up. The variables research and development expenditure, urban population, current health expenditure (from 2015 to 2019) and gross domestic savings (from 2014 to 2016) also present the same trajectory behaviour. In the fourth axis, the trajectory points in 2015 and 2019 for external balance on goods and services are also far from the compromise and with opposed coordinates. In the first axis also stands out the fertility rate's trajectories, which are from right to left.

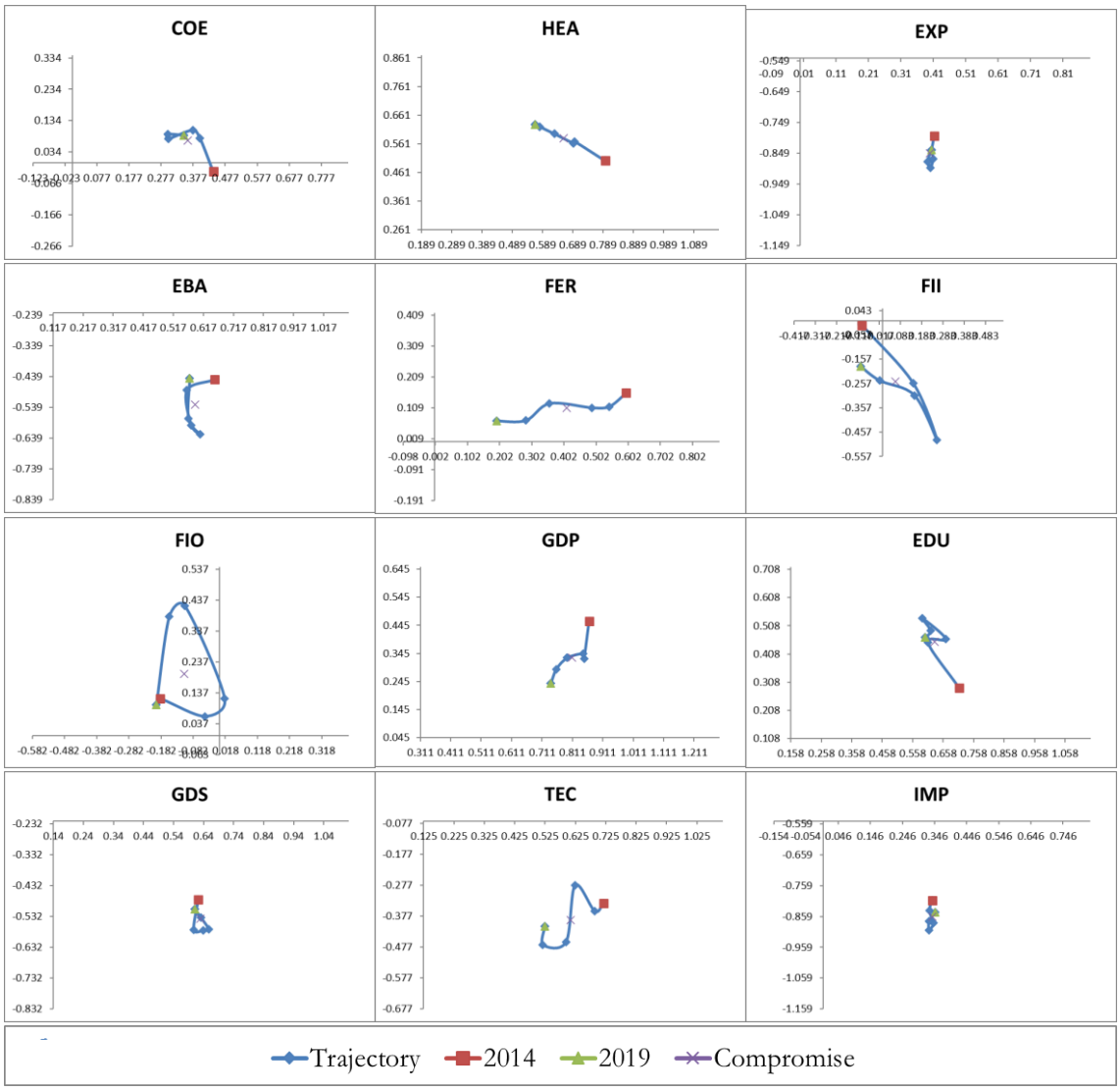

Figure 5.5. Variables' trajectories in the plan [1,2]

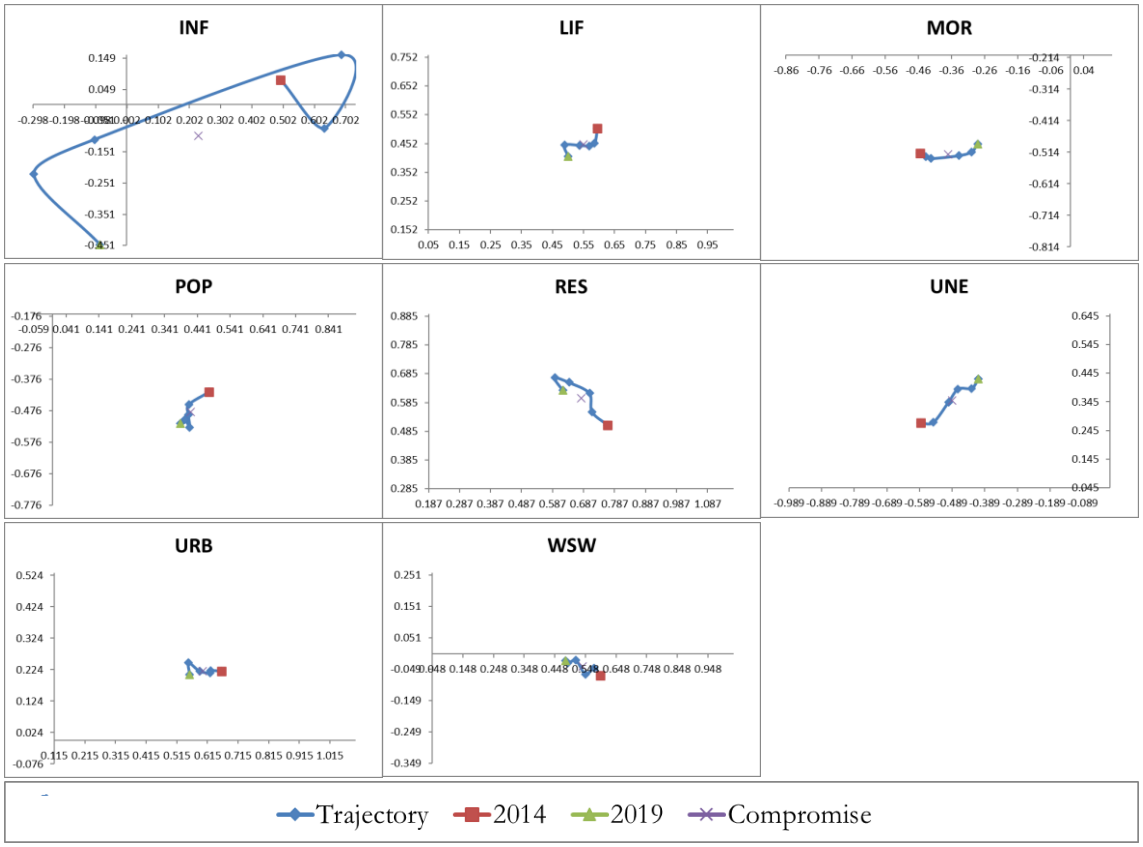

Figure 5.6. Variables' trajectories in the plan [1,2] (cont.)

Among the variables with reduced contributions stand out C02 emissions, the total wage and salaried workers (as a percentage of the total employment), unemployment and imports and exports of goods and services, which are simply more regular and closer to the compromise object, as it can also be seen by their reduced contributions to the sum of squared distances' decomposition (which range between 1.1% and 2.1%) and their trajectories.

CHAPTER 6

Conclusions

In this chapter are provided the conclusions obtained throughout this research, the main limitations, as well as perspectives for future work that allow a better characterization of the evolution and development of the EU countries.

6.1 Concluding Remarks

This study was carried out based on the Statis method, complemented by the Dual Statis one. The objective of this study was to analyse the development of the EU countries between 2014 and 2019, using data provided by the Data Bank: World Development Indicators database, and the Statis methodology presents arguments that contribute to a better joint analysis of the characteristics of the countries over the defined time. It was decided to exclude Luxembourg from the analysis due to the existence of a significant number of extreme outliers across various variables and years.

From the Statis method, it was concluded that the pair of years 2014-2018 showed to be the most dissimilar, suggesting significant differences in the development indicators across the EU countries in those years, while the pairs of years 2014-2015 and 2015-2017 were the closest.

Denmark and Sweden demonstrated higher levels of health expenditure, GDP per capita, research and development expenditure, government expenditure on education, and lower child mortality rate, opposing Romania, which exhibited lower values in the first areas and higher values of child mortality, indicating a less developed and potentially more challenging socioeconomic and healthcare situation.

Furthermore, Malta and Ireland showcased strong external trade activities and relatively low unemployment rates, opposing Greece, which displayed lower levels of imports and exports of goods and services, along with a higher unemployment rate, suggesting a less robust economic performance. It was also highlighted that Malta, Greece, Spain, Cyprus and Italy present high population density, life expectancy and unemployment but low fertility rates. Malta suggested a relatively higher child mortality rate compared to Ireland and Cyprus,

having these two countries experienced significant inflows and outflows of foreign direct investment in 2014, 2015, 2016, 2017 and 2019.

Cyprus was the country that most contributed to the differences between the pairs of years. This country was responsible for more than half of the differences between the last two studied years (2018 and 2019). This country also contributes considerably to the differences between the pair of years 2015-2016, 2015-2018, 2014-2016, 2016-2019, 2017-2018 and 2017-2019. Cyprus also showed a positive evolution in government spending on education, research and development, health expenditure, and GDP per capita between 2014 and 2018.

Additionally, Hungary was also responsible for the differences for some couple of years here considered, with the highest contribution between 2016 and 2017 and between 2015 and 2016. Other countries that also contributed to the structural differences were Ireland, between the pair of years 2014-2015 and 2016-2018, and Malta, in particular, between 2015 and 2017 and between 2014 and 2017. The external trade activities were lower and unemployment higher in 2014 for Ireland when compared to the other studied years (but still the external trade activities were higher for Ireland when compared to the average of the countries in that year).

Even though countries such as Finland, France, Great Britain, the Netherlands, and Austria still had higher government spending on education, research and development, health care and GDP per capita in 2019, Spain, Portugal, Croatia, and Greece converged on those indicators during the studied period. Among the countries with reduced contributions stand out Slovenia, Deutschland, Slovak Republic, Latvia and Poland, which were simply more regular and didn't see high changes in the development indicators studied.

With the Dual Statis method was possible to determine which indicators contributed more to the differences throughout the period from 2014 to 2019. Inflation was the most unstable and the indicator that most contributed to the differences between the pairs of years. This indicator contributed considerably to the differences between the pair of years 2016-2018, 2016-2017, 2016-2019, 2015-2017, 2015-2018, 2015-2019, 2014-2018 and 2014-2019.

In addition, foreign direct investment, net outflows and inflows were also unstable and responsible for the differences for some couple of years here considered. The net outflows of the foreign direct investment variable showed its highest contributions between

2018 and 2019, 2015 and 2016, and 2017 and 2018, while the net inflows indicator shows its highest contributions between 2014 and 2016 and between 2014 and 2015.

Other variables that also contributed to the structural differences were the external balance on goods and services, between the pair of years 2018-2019, 2017-2019 and 2014-2015, GDP per capita, between the pair of years 2014-2019 and 2014-2017, and life expectancy, in particular, between 2014 and 2019. Among the variables with reduced contributions stand out C02 emissions, the total wage and salaried workers (as a percentage of the total employment), unemployment and imports and exports of goods and services, which were simply more regular.

6.2 Limitations and Future Work

It is important to first highlight the important contribution of the Statis methodology to economics in the sense that it allows the joint analysis of information collected at different moments. It also has the great advantage of reducing the dimension of the initial data set and provides a set of graphical representations, indicative of the relationships between the variables and the positions of individuals, as well as their evolution. For that, the SPAD version 9.2 data analysis software was employed to obtain most of the analysis outputs. However, certain graphical representations, such as trajectories, and computations, such as correlation coefficients between variables and each compromise axis and the coordinates of the countries and variables for the trajectories, were not supported by SPAD. As a result, some steps presented with the theoretical exposition of the methodology were carried out using alternative software tools like the R programming language and Microsoft Excel. The creation of an extensive package in SPAD that automates all the calculations and graphical representations required for the methodology would be very advantageous. For researchers using this methodology, this package would increase productivity and usability.

The study carried out in this dissertation covers a period of six years, between 2014 and 2019. However, it is essential to acknowledge certain limitations that have influenced the scope and findings of this study. One primary limitation concerns the lack of reliable data beyond 2019 for a majority of variables across European Union countries. Consequently, this analysis is restricted to the available data until 2019, given the presence of data gaps and variations in variable measures. Furthermore, even within this six-year timeframe, it was not

possible to obtain complete data for variables, such as income per capita, for all 28 studied countries.

To address these limitations and enhance future research, it would be advantageous to incorporate additional development indicators, if accessible, while substituting certain variables, such as foreign direct investments net inflows and net outflows, that demonstrated unstable behaviour during the study period. This approach would mitigate potential impacts on the results and ensuing conclusions. Additionally, conducting a study on the countries' evolution during the COVID-19 pandemic period is both pertinent and opportune. Employing the methodology employed in this dissertation, as well as implementing other data analysis methodologies, would yield valuable insights. Moreover, segmenting the analysis according to different variable sectors, such as macroeconomic, competitiveness, social-demographic, and health areas, would provide a more nuanced understanding of EU countries' development.

Lastly, considering the European Union's status as one of the world's largest economies and a developed region, it would be compelling to explore the evolution of other developed countries beyond this group. Comparing the development trajectories of nations such as Switzerland, Australia, and the United States of America with those of EU countries would enrich the analysis and contribute to a broader understanding of global development trends.

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Annexes

Annex A – Data Tables

Data for the year 2014

Country	COE	HEA	EXP	EBA	FER	FII	FIO	GDP	EDU	GDS
AUT	7.26	10.37	53.39	3.27	1.46	0.39	-0.20	51786.38	5.45	26.80
BEL	8.04	10.59	79.80	0.82	1.74	-2.84	-0.08	47764.07	6.59	23.95
BGR	5.82	7.71	64.60	-1.09	1.53	1.92	1.55	7901.79	4.08	20.42
HRV	3.83	6.70	42.69	-0.39	1.46	5.46	3.84	13784.48	4.94	18.34
CYP	5.79	6.95	65.95	1.06	1.32	222.76	284.38	27245.37	6.44	14.58
CZE	9.26	7.60	81.95	6.33	1.53	3.86	1.95	19890.92	3.97	32.34
DNK	6.35	10.17	54.61	6.96	1.69	1.86	2.81	62548.98	7.63	27.05
EST	13.65	6.08	81.87	3.49	1.54	6.69	4.26	20261.07	4.39	30.64
FIN	8.45	9.78	36.48	-1.15	1.71	6.38	0.15	50327.24	7.10	20.97
FRA	4.62	11.54	29.67	-1.15	2.00	0.20	1.86	43068.55	5.51	21.56
DEU	9.09	11.02	45.62	6.62	1.47	0.50	2.76	48023.87	4.92	26.99
GRC	6.39	7.91	32.49	-1.56	1.30	1.15	1.28	21616.71	4.29	10.34
HUN	4.12	7.06	87.12	5.85	1.44	9.26	6.55	14294.26	4.60	29.91
IRL	7.63	9.53	110.12	18.00	1.89	37.57	34.97	55643.06	4.88	40.74
ITA	5.39	8.87	29.11	2.90	1.37	0.79	0.95	35565.72	4.06	19.85
LVA	3.65	5.47	61.15	-2.92	1.65	3.33	2.21	15742.39	5.28	20.88
LTU	3.70	6.19	72.27	1.82	1.63	0.74	1.12	16551.02	4.49	21.44
LUX	17.35	5.44	182.78	32.14	1.50	29.16	63.11	123678.70	3.86	51.23
MLT	5.43	9.09	149.81	11.98	1.38	1.34	-74.95	26754.26	7.00	27.65
NLD	8.88	10.57	80.58	11.10	1.71	13.18	13.27	52900.54	5.46	29.01
POL	7.52	6.39	46.49	0.41	1.32	3.67	1.26	14182.14	4.94	21.38
PRT	4.42	9.34	40.22	0.15	1.23	5.24	1.49	22103.70	5.12	15.47
ROU	3.59	5.02	41.48	-0.42	1.56	1.94	0.13	10031.27	3.12	24.55
SVK	5.62	6.89	91.40	4.77	1.37	-0.36	0.28	18719.99	4.23	26.63
SVN	6.36	8.50	76.15	6.75	1.58	2.04	0.43	24247.17	5.29	26.13
ESP	5.18	9.09	33.47	3.10	1.32	2.40	3.35	29513.65	4.30	20.99
SWE	4.03	10.95	43.27	3.60	1.88	-1.48	-0.65	60020.36	7.57	27.10
GBR	6.43	9.95	28.39	-2.08	1.81	1.92	-3.72	47447.59	5.56	15.53

Country	TEC	IMP	INF	LIF	MOR	POP	RES	UNE	URB	WSW
AUT	15.49	50.12	1.61	81.49	3.80	103.57	3.08	5.67	57.53	86.71
BEL	11.94	78.98	0.34	81.29	4.10	370.18	2.37	8.52	97.83	85.39
BGR	7.56	65.69	-1.42	74.47	8.70	66.54	0.79	11.42	73.65	87.51
HRV	10.44	43.08	-0.22	77.48	5.00	75.73	0.77	17.29	55.92	84.38
CYP	14.53	64.89	-1.35	80.77	2.90	127.38	0.51	16.28	67.03	82.11
CZE	17.37	75.62	0.34	78.82	3.10	136.30	1.96	6.11	73.38	82.01
DNK	15.72	47.65	0.56	80.70	4.10	141.09	2.91	6.93	87.41	91.03
EST	23.65	78.38	-0.11	77.03	3.30	30.24	1.43	7.35	68.27	90.89
FIN	10.05	37.63	1.04	81.18	2.60	17.97	3.15	8.66	85.18	86.00
FRA	27.44	30.81	0.51	82.72	4.10	121.11	2.28	10.27	79.39	88.39
DEU	17.21	39.00	0.91	81.09	4.00	232.11	2.88	4.98	77.19	89.04
GRC	11.50	34.04	-1.31	81.39	4.30	84.50	0.84	26.71	77.70	64.03
HUN	16.69	81.27	-0.23	75.76	5.40	108.11	1.34	7.73	70.23	89.05
IRL	24.93	92.12	0.18	81.35	3.80	67.61	1.52	11.86	62.34	83.19
ITA	7.74	26.21	0.24	83.09	3.60	205.56	1.34	12.68	69.27	75.32
LVA	17.73	64.08	0.62	74.12	5.50	32.04	0.69	10.85	67.95	88.46
LTU	11.14	70.45	0.10	74.52	4.90	46.81	1.03	10.70	67.11	87.90
LUX	5.97	150.65	0.63	82.23	2.80	216.09	1.22	5.85	89.88	91.26
MLT	34.71	137.83	0.31	82.05	6.60	1357.99	0.69	5.72	94.35	86.43
NLD	24.53	69.48	0.98	81.71	4.10	500.59	2.17	7.42	89.69	83.39
POL	10.07	46.08	0.05	77.60	5.00	124.14	0.94	8.99	60.40	78.65
PRT	4.88	40.07	-0.28	81.12	3.60	113.54	1.29	13.90	62.94	80.25
ROU	8.41	41.90	1.07	74.91	9.90	86.53	0.38	6.80	53.90	67.92
SVK	11.15	86.63	-0.08	76.81	6.40	112.70	0.88	11.54	54.00	84.55
SVN	6.42	69.40	0.20	81.08	2.70	102.38	2.37	9.72	53.56	81.43
ESP	6.91	30.37	-0.15	83.23	3.40	92.92	1.24	24.44	79.37	82.41
SWE	17.87	39.67	-0.18	82.25	2.90	23.80	3.10	7.95	86.25	89.67
GBR	22.19	30.47	1.45	81.30	4.50	267.03	1.63	6.11	82.37	84.77

Data for the year 2015

Country	COE	HEA	EXP	EBA	FER	FII	FIO	GDP	EDU	GDS
AUT	7.32	10.37	53.09	3.75	1.49	-2.09	-0.56	44195.82	5.46	27.56
BEL	8.44	10.43	77.81	1.42	1.70	-4.22	1.59	41008.30	6.45	25.05
BGR	6.21	7.41	63.80	0.90	1.53	4.37	0.24	7074.68	3.92	21.89
HRV	3.95	6.79	45.68	0.19	1.41	0.09	-0.37	11952.31	4.93	20.55
CYP	5.77	6.75	70.02	2.76	1.33	145.46	222.23	23487.13	6.33	16.39
CZE	9.40	7.20	80.56	5.94	1.57	0.90	1.98	17829.70	5.75	33.93
DNK	5.93	10.23	55.42	6.79	1.71	0.61	2.40	53254.86	7.01	27.42
EST	11.81	6.35	77.44	3.93	1.58	-3.13	-2.51	17402.04	5.14	29.03
FIN	7.81	9.65	35.41	-0.57	1.65	7.46	-0.32	42801.91	7.03	21.14
FRA	4.68	11.45	30.59	-0.57	1.96	1.76	2.10	36652.92	5.46	22.15
DEU	9.09	11.18	46.92	7.60	1.50	1.86	3.90	41103.26	4.86	27.34
GRC	6.29	8.07	32.13	-1.02	1.33	0.65	0.81	18083.88	3.66	11.05
HUN	4.41	6.86	87.53	7.73	1.45	-4.21	-6.52	12717.04	4.49	31.24
IRL	7.88	7.32	122.10	28.76	1.85	81.25	64.99	62053.98	3.76	54.54
ITA	5.56	8.86	29.72	3.01	1.35	0.72	0.84	30242.39	4.07	20.12
LVA	3.70	5.65	60.28	-1.70	1.70	2.98	0.53	13786.46	5.28	21.96
LTU	3.81	6.49	68.78	-1.00	1.70	2.50	0.86	14263.96	4.23	20.27
LUX	16.03	5.28	191.84	32.54	1.47	75.63	53.14	105462.01	3.77	51.50
MLT	3.73	8.90	154.62	9.77	1.37	32.82	-59.43	24921.58	5.02	33.91
NLD	9.29	10.32	82.66	7.50	1.66	42.13	51.12	45193.40	5.35	29.98
POL	7.61	6.39	47.45	2.08	1.32	3.16	1.03	12560.05	4.81	23.07
PRT	4.81	9.32	40.62	0.74	1.31	0.64	-0.56	19250.11	4.89	16.59
ROU	3.70	4.95	41.35	-0.82	1.62	2.43	0.58	8976.88	3.11	24.70
SVK	5.67	6.79	91.60	3.01	1.40	1.71	1.60	16390.88	4.59	27.64
SVN	6.37	8.50	77.15	8.00	1.57	4.01	0.76	20890.17	4.91	27.17
ESP	5.52	9.13	33.61	3.04	1.33	1.93	4.71	25754.36	4.29	22.03
SWE	4.00	10.80	43.77	3.81	1.85	2.03	2.95	51545.48	7.44	28.24
GBR	6.16	9.90	27.63	-1.65	1.80	1.54	-2.05	45071.07	5.51	16.11

Country	TEC	IMP	INF	LIF	MOR	POP	RES	UNE	URB	WSW
AUT	15.03	49.34	0.90	81.19	3.70	104.73	3.05	5.80	57.72	87.00
BEL	12.33	76.39	0.56	80.99	4.10	372.33	2.43	8.48	97.88	84.82
BGR	8.43	62.90	-0.10	74.61	8.20	66.12	0.95	9.14	73.99	87.97
HRV	10.71	45.49	-0.46	77.28	4.90	75.11	0.83	16.18	56.16	84.33
CYP	12.71	67.26	-2.10	80.97	2.90	128.49	0.48	15.03	66.95	85.07
CZE	17.73	74.62	0.31	78.58	3.20	136.59	1.92	5.05	73.48	82.66
DNK	17.17	48.63	0.45	80.70	4.10	142.09	3.05	6.28	87.53	91.13
EST	22.71	73.50	-0.49	77.59	3.10	30.26	1.47	6.19	68.42	90.58
FIN	10.18	35.98	-0.21	81.48	2.50	18.03	2.87	9.38	85.23	85.78
FRA	28.18	31.16	0.04	82.32	4.20	121.54	2.23	10.35	79.66	88.47
DEU	17.82	39.33	0.51	80.64	3.90	234.15	2.93	4.62	77.20	89.25
GRC	12.91	33.15	-1.74	81.04	4.40	83.95	0.97	24.98	78.05	65.04
HUN	17.08	79.79	-0.06	75.57	5.10	107.86	1.34	6.81	70.50	89.15
IRL	28.34	93.33	-0.29	81.45	3.70	68.25	1.18	9.91	62.54	83.52
ITA	8.15	26.70	0.04	82.54	3.50	205.37	1.34	11.90	69.57	75.62
LVA	18.92	61.98	0.17	74.48	5.00	31.78	0.62	9.87	67.98	87.39
LTU	12.78	69.77	-0.88	74.32	4.90	46.37	1.04	9.12	67.23	87.73
LUX	7.11	159.30	0.47	82.29	2.80	221.25	1.25	6.67	90.18	90.24
MLT	30.79	144.85	1.10	81.90	6.60	1390.79	0.72	5.38	94.41	86.10
NLD	24.05	75.16	0.60	81.51	4.00	503.12	2.15	6.87	90.17	83.16
POL	10.77	45.37	-0.87	77.45	4.90	124.06	1.00	7.50	60.28	78.77
PRT	5.08	39.88	0.49	81.12	3.60	113.07	1.24	12.45	63.51	81.58
ROU	9.41	42.17	-0.59	74.91	9.20	86.12	0.49	6.81	53.89	71.03
SVK	11.16	88.59	-0.33	76.56	6.20	112.80	1.16	11.49	53.89	84.85
SVN	7.01	69.15	-0.53	80.78	2.60	102.45	2.20	9.00	53.78	83.50
ESP	6.89	30.57	-0.50	82.83	3.30	92.95	1.22	22.06	79.60	82.72
SWE	18.13	39.96	-0.05	82.20	2.90	24.06	3.22	7.43	86.55	89.75
GBR	22.32	29.28	0.37	80.96	4.50	269.15	1.63	5.30	82.63	85.01

Data for the year 2016

Country	COE	HEA	EXP	EBA	FER	FII	FIO	GDP	EDU	GDS
AUT	7.29	10.35	52.41	3.83	1.53	-7.31	-6.80	45307.59	5.48	28.09
BEL	8.31	10.77	79.43	1.19	1.68	12.09	7.26	42012.62	6.46	25.45
BGR	5.83	7.48	63.87	4.91	1.54	2.76	1.53	7569.48	3.40	23.86
HRV	4.04	6.83	46.86	1.10	1.43	0.82	-3.40	12552.26	4.72	21.86
CYP	6.03	6.62	70.48	1.95	1.36	40.42	30.51	24715.73	6.15	19.31
CZE	9.63	7.11	79.11	7.63	1.63	5.53	1.60	18575.23	5.55	33.65
DNK	6.17	10.14	53.43	6.68	1.79	2.49	5.75	54664.00	7.48	28.46
EST	12.15	6.43	77.01	3.61	1.60	3.85	1.52	18295.34	5.16	28.81
FIN	8.32	9.38	34.81	-1.28	1.57	2.13	8.56	43814.03	6.85	22.00
FRA	4.70	11.47	30.25	-0.61	1.92	1.33	3.02	37062.53	5.42	22.00
DEU	9.07	11.24	46.07	7.38	1.60	1.86	3.22	42136.12	4.84	27.34
GRC	6.20	8.32	31.29	-1.44	1.38	1.40	-0.91	17923.97	3.97	11.39
HUN	4.51	7.00	86.40	8.41	1.53	54.18	51.86	13104.70	4.61	29.95
IRL	8.16	7.42	121.70	15.65	1.81	34.41	31.33	62895.91	3.74	53.48
ITA	5.50	8.73	29.33	3.29	1.34	1.37	0.73	30960.73	3.82	20.85
LVA	3.65	6.14	59.61	0.35	1.74	1.19	0.87	14331.75	4.66	21.41
LTU	3.90	6.64	67.59	0.72	1.69	2.74	2.12	15008.31	4.00	19.93
LUX	15.21	5.19	191.10	33.76	1.41	28.26	-1.99	106899.29	3.49	51.69
MLT	2.96	8.94	157.80	12.59	1.37	23.79	-56.86	25624.46	5.08	35.85
NLD	9.31	10.29	79.54	10.21	1.66	29.76	37.09	46039.11	5.48	30.70
POL	7.90	6.53	50.27	3.00	1.39	3.90	2.96	12378.76	4.63	23.22
PRT	4.72	9.39	40.21	1.15	1.36	3.56	1.54	19991.97	4.77	16.98
ROU	3.63	5.00	42.42	-1.06	1.69	3.37	0.68	9404.34	2.98	22.68
SVK	5.80	7.11	93.47	2.90	1.48	5.27	4.53	16563.44	3.91	26.17
SVN	6.73	8.46	77.60	8.54	1.58	3.23	1.07	21678.36	4.79	26.97
ESP	5.31	8.95	33.86	3.99	1.34	3.59	4.59	26537.16	4.23	22.73
SWE	3.91	10.85	42.69	3.06	1.85	3.03	0.25	51965.16	7.62	27.78
GBR	5.80	9.87	28.65	-1.96	1.79	12.03	1.22	41146.08	5.38	15.98

Country	TEC	IMP	INF	LIF	MOR	POP	RES	UNE	URB	WSW
AUT	14.45	48.58	0.89	81.64	3.60	105.87	3.12	6.06	57.91	87.28
BEL	13.33	78.24	1.97	81.44	4.10	374.22	2.52	7.83	97.92	85.16
BGR	8.98	58.96	-0.80	74.81	7.70	65.66	0.77	7.57	74.33	88.27
HRV	14.40	45.77	-1.13	78.02	4.80	74.59	0.85	13.10	56.40	86.09
CYP	13.33	68.54	-1.43	81.06	2.90	129.64	0.52	13.01	66.88	85.72
CZE	16.87	71.48	0.68	79.03	3.20	136.85	1.67	3.95	73.57	82.84
DNK	14.88	46.74	0.25	80.85	4.10	143.20	3.09	5.99	87.64	91.21
EST	21.89	73.40	0.15	77.64	2.80	30.27	1.24	6.76	68.56	90.43
FIN	10.05	36.09	0.36	81.43	2.40	18.08	2.72	8.82	85.28	85.97
FRA	27.91	30.85	0.18	82.57	4.20	121.86	2.22	10.06	79.92	88.23
DEU	18.08	38.70	0.49	80.99	3.90	235.71	2.94	4.12	77.22	89.58
GRC	13.71	32.73	-0.83	81.39	4.40	83.60	1.01	23.51	78.39	65.91
HUN	17.56	78.00	0.39	76.06	4.70	107.54	1.18	5.11	70.78	89.26
IRL	32.83	106.04	0.01	81.65	3.60	69.03	1.18	8.37	62.74	83.77
ITA	8.29	26.04	-0.09	83.24	3.40	205.02	1.37	11.69	69.86	76.06
LVA	17.24	59.26	0.14	74.58	4.70	31.49	0.44	9.64	68.02	87.12
LTU	12.64	66.87	0.91	74.67	4.80	45.79	0.84	7.86	67.37	87.67
LUX	7.97	157.34	0.29	82.69	2.80	226.07	1.27	6.29	90.46	89.96
MLT	21.93	145.21	0.64	82.45	6.60	1422.99	0.55	4.69	94.48	85.88
NLD	23.99	69.32	0.32	81.56	4.00	505.80	2.15	6.01	90.64	83.19
POL	10.71	47.27	-0.66	77.85	4.70	124.01	0.96	6.16	60.18	79.28
PRT	5.81	39.06	0.61	81.12	3.60	112.72	1.28	11.07	64.09	82.24
ROU	10.39	43.48	-1.54	75.21	8.50	85.63	0.48	5.90	53.90	73.39
SVK	10.74	90.57	-0.52	77.17	6.10	112.95	0.79	9.68	53.81	84.57
SVN	7.14	69.06	-0.05	81.18	2.50	102.52	2.01	8.02	54.02	85.81
ESP	7.80	29.88	-0.20	83.33	3.30	93.05	1.19	19.64	79.84	83.06
SWE	17.83	39.63	0.98	82.31	2.80	24.36	3.25	6.99	86.85	90.01
GBR	23.55	30.61	1.01	81.16	4.40	271.20	1.64	4.81	82.89	84.56

Data for the year 2017

Country	COE	HEA	EXP	EBA	FER	FII	FIO	GDP	EDU	GDS
AUT	7.49	10.38	54.05	3.16	1.52	3.24	2.42	47429.16	5.37	28.00
BEL	8.15	10.78	83.18	1.04	1.65	-7.42	-1.05	44198.48	6.43	25.50
BGR	6.20	7.52	66.99	4.31	1.56	3.39	0.84	8366.29	4.08	24.12
HRV	4.22	6.76	49.11	0.59	1.42	0.82	-1.48	13655.82	3.85	22.30
CYP	6.09	6.60	73.84	-0.34	1.32	62.78	60.26	26697.17	5.72	20.30
CZE	9.61	7.14	79.03	7.52	1.69	5.14	4.30	20636.20	3.81	33.89
DNK	5.75	10.04	55.08	7.18	1.75	1.09	2.84	57610.10	7.75	29.23
EST	12.68	6.59	75.81	4.06	1.59	6.45	2.42	20437.77	4.96	30.52
FIN	7.81	9.13	37.55	0.05	1.49	6.71	5.35	46412.14	6.36	24.05
FRA	4.75	11.33	30.95	-1.06	1.89	1.38	1.87	38781.05	5.45	22.37
DEU	8.86	11.33	47.16	7.09	1.57	2.97	3.95	44652.59	4.87	28.05
GRC	6.21	8.10	35.03	-1.51	1.35	1.72	0.08	18582.09	3.48	10.51
HUN	4.74	6.76	85.92	6.61	1.54	-8.48	-10.14	14621.24	4.61	29.71
IRL	7.86	7.06	121.02	22.03	1.77	17.33	0.88	69970.95	3.51	55.87
ITA	5.44	8.68	30.73	2.86	1.32	0.57	0.60	32406.72	4.04	20.92
LVA	3.67	5.97	61.59	-0.63	1.69	3.78	1.88	15695.12	4.37	21.28
LTU	3.97	6.48	73.60	2.32	1.63	2.90	0.94	16885.41	3.81	21.50
LUX	15.09	5.26	192.75	31.70	1.39	-41.65	22.86	110193.21	3.49	50.59
MLT	3.25	8.89	154.67	18.57	1.26	28.84	-51.44	28823.53	4.65	39.90
NLD	9.09	10.11	83.39	10.76	1.62	25.35	32.53	48675.22	5.18	31.35
POL	8.24	6.56	52.06	2.83	1.48	2.24	0.75	13815.62	4.56	22.85
PRT	5.18	9.31	42.72	1.01	1.38	4.83	1.03	21490.43	5.02	18.24
ROU	3.79	5.15	42.33	-2.49	1.71	2.83	0.18	10727.95	3.10	21.45
SVK	6.17	6.77	95.07	2.09	1.52	4.42	1.57	17585.20	3.94	25.15
SVN	6.83	8.19	83.13	8.98	1.62	2.46	1.30	23514.03	4.78	29.01
ESP	5.65	8.96	35.13	3.60	1.31	2.40	3.51	28185.32	4.21	23.00
SWE	3.81	10.79	43.73	2.53	1.78	4.54	7.36	53791.51	7.57	28.26
GBR	5.56	9.81	30.67	-1.45	1.74	4.67	6.41	40621.33	5.38	16.90

Country	TEC	IMP	INF	LIF	MOR	POP	RES	UNE	URB	WSW
AUT	12.88	50.89	2.08	81.64	3.60	106.61	3.06	5.56	58.09	87.62
BEL	11.49	82.14	2.13	81.49	4.10	375.67	2.67	7.09	97.96	85.71
BGR	9.63	62.68	2.06	74.81	7.30	65.18	0.74	6.16	74.67	88.10
HRV	8.73	48.52	1.13	77.83	4.80	73.70	0.85	11.21	56.67	87.63
CYP	13.35	74.18	0.53	81.33	2.80	130.79	0.54	11.16	66.84	86.81
CZE	17.82	71.51	2.45	78.98	3.20	137.22	1.77	2.89	73.68	82.88
DNK	12.50	47.90	1.15	81.10	4.00	144.12	2.93	5.83	87.76	91.66
EST	17.93	71.75	3.42	78.09	2.60	30.82	1.28	5.76	68.72	89.80
FIN	9.66	37.50	0.75	81.63	2.40	18.12	2.73	8.64	85.33	86.82
FRA	26.00	32.01	1.03	82.58	4.30	122.21	2.20	9.41	80.18	88.39
DEU	15.81	40.07	1.51	80.99	3.90	236.59	3.05	3.75	77.26	89.80
GRC	12.11	36.54	1.12	81.29	4.30	83.43	1.15	21.41	78.72	65.93
HUN	17.18	79.31	2.35	75.82	4.40	107.25	1.32	4.16	71.06	89.67
IRL	29.03	98.99	0.34	82.16	3.40	69.78	1.26	6.71	62.95	84.55
ITA	7.80	27.87	1.23	82.95	3.30	204.71	1.37	11.21	70.14	76.80
LVA	17.72	62.22	2.93	74.63	4.40	31.21	0.51	8.72	68.08	87.34
LTU	12.58	71.28	3.72	75.48	4.40	45.15	0.90	7.07	67.52	87.99
LUX	6.97	161.05	1.73	82.10	2.80	231.64	1.24	5.52	90.73	90.15
MLT	30.38	136.10	1.36	82.35	6.60	1462.50	0.56	4.00	94.55	85.07
NLD	22.90	72.64	1.38	81.76	4.00	508.80	2.18	4.84	91.08	83.27
POL	10.67	49.23	2.08	77.75	4.60	124.02	1.03	4.89	60.11	79.59
PRT	5.99	41.71	1.37	81.42	3.60	112.44	1.32	8.87	64.65	83.02
ROU	9.78	44.82	1.34	75.31	7.90	85.14	0.50	4.93	53.94	73.70
SVK	11.77	92.98	1.31	77.17	6.00	113.13	0.89	8.14	53.75	84.74
SVN	6.51	74.15	1.43	81.03	2.40	102.61	1.87	6.57	54.27	85.42
ESP	7.00	31.53	1.96	83.28	3.30	93.27	1.21	17.22	80.08	83.51
SWE	15.11	41.20	1.79	82.41	2.80	24.69	3.36	6.72	87.15	90.14
GBR	22.61	32.13	2.56	81.26	4.40	273.05	1.66	4.33	83.14	84.63

Data for the year 2018

Country	COE	HEA	EXP	EBA	FER	FII	FIO	GDP	EDU	GDS
AUT	7.13	10.32	55.46	3.00	1.47	-6.29	-5.92	51466.56	5.22	28.73
BEL	8.20	10.76	83.08	-0.34	1.62	-7.66	-6.63	47544.98	6.38	25.08
BGR	5.82	7.34	65.70	2.54	1.56	2.73	1.39	9446.72	4.05	23.75
HRV	4.02	6.78	49.39	-0.88	1.47	2.12	0.46	15244.43	3.91	22.30
CYP	5.91	6.77	74.97	1.41	1.32	-4.34	-29.47	29418.94	5.15	20.69
CZE	9.49	7.52	76.94	5.94	1.71	3.34	2.44	23424.48	4.27	33.14
DNK	5.72	10.07	56.56	6.14	1.73	2.46	1.88	61591.93	6.79	28.74
EST	11.59	6.69	74.32	2.73	1.67	4.02	-0.74	23165.85	5.26	30.76
FIN	8.08	9.04	38.47	-1.25	1.41	-3.83	1.14	49987.63	6.28	24.01
FRA	4.57	11.19	31.71	-1.01	1.87	2.78	4.99	41557.85	5.41	22.85
DEU	8.54	11.45	47.31	6.10	1.57	4.20	4.93	47939.28	4.98	28.02
GRC	6.06	7.96	38.99	-2.16	1.35	1.90	0.25	19756.99	3.60	10.99
HUN	4.75	6.55	83.76	4.25	1.55	-40.09	-42.29	16425.10	4.62	31.06
IRL	7.74	6.86	122.78	28.49	1.75	17.46	24.58	79250.39	3.39	57.37
ITA	5.38	8.68	31.35	2.40	1.29	2.12	1.85	34622.17	4.26	20.93
LVA	4.04	6.19	61.46	-0.66	1.60	1.24	-0.92	17865.03	4.24	22.44
LTU	4.16	6.53	75.21	1.82	1.63	2.42	1.93	19186.36	3.89	22.17
LUX	15.33	5.29	197.50	32.58	1.38	-36.68	-35.88	116786.51	3.65	49.62
MLT	3.20	8.81	145.22	17.45	1.23	29.18	-46.52	31567.94	5.14	38.44
NLD	8.78	10.03	84.68	10.54	1.59	-37.68	-29.92	53044.53	5.36	31.50
POL	8.21	6.33	52.75	2.05	1.46	2.99	0.40	15504.58	4.62	23.50
PRT	4.81	9.41	43.45	0.46	1.42	3.24	0.60	23562.55	4.68	18.75
ROU	3.86	5.56	41.54	-3.39	1.76	3.02	0.62	12494.48	3.34	19.96
SVK	6.06	6.71	95.84	1.87	1.54	2.12	0.90	19486.39	3.97	25.22
SVN	6.78	8.28	84.79	8.44	1.60	2.84	0.83	26123.75	4.94	29.75
ESP	5.49	8.99	35.15	2.72	1.26	4.12	2.68	30379.72	4.18	23.18
SWE	3.54	10.94	45.68	2.23	1.76	-0.25	2.31	54589.06	7.64	28.24
GBR	5.43	9.90	31.23	-1.53	1.68	-0.87	-0.99	43306.31	5.17	16.57

Country	TEC	IMP	INF	LIF	MOR	POP	RES	UNE	URB	WSW
AUT	11.65	52.46	2.00	81.69	3.60	107.13	3.09	4.93	58.30	87.99
BEL	11.71	83.42	2.05	81.60	4.20	377.38	2.86	5.95	98.00	85.97
BGR	10.37	63.16	2.81	74.96	7.00	64.71	0.75	5.21	75.01	88.35
HRV	8.84	50.27	1.50	78.07	4.70	73.04	0.95	8.43	56.95	87.93
CYP	19.87	73.56	1.44	81.38	2.80	131.91	0.62	8.50	66.81	86.72
CZE	19.55	71.00	2.15	79.03	3.10	137.68	1.90	2.25	73.79	83.06
DNK	12.35	50.42	0.81	80.95	3.90	144.84	2.97	5.13	87.87	91.86
EST	18.17	71.60	3.44	78.24	2.40	30.92	1.42	5.37	68.88	89.29
FIN	9.02	39.72	1.08	81.73	2.40	18.15	2.76	7.36	85.38	86.79
FRA	25.92	32.72	1.85	82.68	4.30	122.65	2.20	9.02	80.44	88.35
DEU	15.74	41.21	1.73	80.89	3.80	237.29	3.11	3.38	77.31	90.10
GRC	12.95	41.16	0.63	81.79	4.20	83.27	1.21	19.18	79.06	66.52
HUN	16.81	79.51	2.85	76.07	4.20	107.12	1.51	3.71	71.35	89.58
IRL	24.94	94.29	0.49	82.20	3.30	70.65	1.17	5.74	63.17	84.98
ITA	7.48	28.95	1.14	83.35	3.20	204.32	1.42	10.61	70.44	77.09
LVA	20.55	62.12	2.53	74.78	4.20	30.97	0.64	7.41	68.14	88.48
LTU	12.10	73.39	2.70	75.68	4.00	44.73	0.94	6.15	67.68	88.33
LUX	6.97	164.92	1.53	82.30	2.80	236.15	1.17	5.59	90.98	91.42
MLT	33.07	127.78	1.16	82.45	6.50	1514.47	0.59	3.66	94.61	85.64
NLD	22.49	74.14	1.70	81.81	4.10	511.78	2.14	3.83	91.49	83.31
POL	10.39	50.70	1.81	77.60	4.50	124.03	1.21	3.85	60.06	79.73
PRT	5.28	42.98	0.99	81.32	3.60	112.26	1.35	6.99	65.21	83.35
ROU	10.08	44.93	4.63	75.36	7.40	84.64	0.50	4.19	54.00	74.78
SVK	10.64	93.97	2.51	77.27	5.90	113.29	0.84	6.54	53.73	85.19
SVN	6.83	76.35	1.74	81.38	2.30	102.99	1.95	5.13	54.54	84.80
ESP	6.77	32.43	1.67	83.43	3.30	93.67	1.24	15.25	80.32	84.03
SWE	14.16	43.45	1.95	82.56	2.70	24.98	3.32	6.36	87.43	90.28
GBR	22.32	32.76	2.29	81.26	4.30	274.71	1.70	4.00	83.40	84.89

Data for the year 2019

Country	COE	HEA	EXP	EBA	FER	FII	FIO	GDP	EDU	GDS
AUT	7.29	10.43	55.76	3.63	1.46	-2.95	-1.50	50070.40	5.21	28.99
BEL	8.10	10.66	82.40	0.63	1.60	-5.61	-6.49	46638.68	6.34	25.64
BGR	5.61	7.13	63.93	3.23	1.58	3.22	1.20	9879.33	4.20	24.23
HRV	4.06	6.98	50.59	-0.41	1.47	6.26	0.14	15331.88	3.92	22.48
CYP	5.85	7.01	76.49	1.03	1.33	161.87	162.35	29417.14	5.25	20.88
CZE	9.02	7.83	73.88	5.99	1.71	4.26	1.89	23664.85	4.54	33.60
DNK	5.11	9.96	58.65	7.07	1.70	-1.10	1.83	59592.98	6.89	28.92
EST	7.67	6.73	73.88	4.01	1.66	9.85	5.95	23424.48	5.30	30.30
FIN	7.37	9.15	39.88	0.16	1.35	5.81	2.62	48629.86	6.42	24.25
FRA	4.46	11.06	31.59	-0.96	1.86	1.96	3.09	40494.90	5.35	23.41
DEU	7.91	11.70	46.67	5.65	1.54	1.84	4.03	46793.69	5.12	27.77
GRC	5.60	7.84	40.11	-1.66	1.34	2.44	0.31	19144.28	3.59	10.77
HUN	4.75	6.35	81.55	2.31	1.55	60.07	59.84	16782.95	4.24	30.71
IRL	7.25	6.68	127.88	3.51	1.71	-11.68	-36.08	80927.07	3.29	58.72
ITA	5.31	8.67	31.60	3.33	1.27	1.55	1.63	33673.75	4.10	21.57
LVA	3.96	6.58	59.81	-0.66	1.61	3.17	0.25	17945.22	4.43	22.33
LTU	4.20	7.01	77.32	5.32	1.61	6.27	3.95	19595.14	3.97	23.03
LUX	15.31	5.37	204.32	30.80	1.34	18.33	-3.69	112621.82	3.72	49.09
MLT	3.29	8.21	146.09	16.89	1.14	26.53	-42.00	31198.24	4.99	38.13
NLD	8.44	10.13	82.54	9.80	1.57	-3.71	-2.40	52476.27	5.16	31.90
POL	7.77	6.45	53.20	3.70	1.44	2.83	0.86	15699.91	4.67	24.20
PRT	4.34	9.53	43.51	0.45	1.43	4.30	0.68	23330.82	4.63	18.94
ROU	3.82	5.74	40.20	-4.10	1.77	2.93	0.77	12958.08	3.58	20.19
SVK	5.70	6.96	91.90	0.32	1.57	2.16	-0.16	19383.48	4.29	24.06
SVN	6.51	8.52	83.70	8.60	1.61	3.96	2.38	26016.08	4.91	29.22
ESP	5.09	9.13	34.91	2.94	1.23	1.78	2.31	29581.52	4.23	23.77
SWE	3.41	10.87	47.81	4.18	1.71	2.93	4.26	51939.43	7.64	29.31
GBR	5.22	10.15	31.26	-1.61	1.63	0.08	-1.69	42747.08	5.21	16.65

Country	TEC	IMP	INF	LIF	MOR	POP	RES	UNE	URB	WSW
AUT	11.48	52.13	1.53	81.90	3.60	107.61	3.13	4.56	58.52	87.84
BEL	14.14	81.77	1.44	82.00	4.20	379.42	3.16	5.36	98.04	85.77
BGR	10.85	60.71	3.10	75.11	6.60	64.26	0.83	4.23	75.35	89.17
HRV	8.29	51.01	0.77	78.42	4.60	72.64	1.08	6.62	57.24	87.65
CYP	19.87	75.46	0.25	81.40	2.80	132.99	0.71	7.15	66.81	86.35
CZE	20.71	67.89	2.85	79.23	3.00	138.23	1.93	2.02	73.92	83.20
DNK	12.04	51.58	0.76	81.45	3.70	145.36	2.89	5.02	87.99	91.66
EST	16.94	69.87	2.28	78.65	2.30	31.04	1.63	4.45	69.05	89.01
FIN	9.21	39.72	1.02	81.98	2.30	18.17	2.80	6.69	85.45	86.54
FRA	26.91	32.55	1.11	82.83	4.30	123.07	2.19	8.41	80.71	87.87
DEU	16.38	41.02	1.45	81.29	3.70	237.82	3.17	3.14	77.38	90.39
GRC	12.51	41.77	0.25	81.64	4.20	83.18	1.28	17.04	79.39	68.10
HUN	17.36	79.24	3.34	76.32	4.10	107.07	1.48	3.42	71.64	89.17
IRL	25.98	124.37	0.94	82.70	3.20	71.63	1.23	4.95	63.41	85.60
ITA	7.76	28.28	0.61	83.50	3.00	201.98	1.46	9.95	70.74	77.26
LVA	17.22	60.47	2.81	75.39	4.10	30.76	0.64	6.31	68.22	88.42
LTU	12.03	72.01	2.33	76.28	3.60	44.62	0.99	6.26	67.86	88.34
LUX	6.57	173.52	1.74	82.64	2.80	240.83	1.18	5.59	91.22	91.26
MLT	29.62	129.20	1.64	82.86	6.50	1575.19	0.59	3.62	94.68	84.30
NLD	23.03	72.73	2.63	82.11	4.10	515.14	2.18	3.38	91.88	83.38
POL	9.85	49.49	2.23	77.90	4.40	124.03	1.32	3.28	60.04	79.99
PRT	6.94	43.06	0.34	81.68	3.40	112.29	1.40	6.46	65.76	83.14
ROU	11.07	44.30	3.83	75.61	7.10	84.20	0.48	3.91	54.08	75.77
SVK	9.91	91.58	2.66	77.67	5.80	113.44	0.83	5.76	53.73	84.95
SVN	7.35	75.10	1.63	81.53	2.30	103.71	2.05	4.45	54.82	86.33
ESP	6.85	31.97	0.70	83.83	3.30	94.35	1.25	14.10	80.57	84.32
SWE	14.50	43.62	1.78	83.11	2.70	25.24	3.39	6.83	87.71	90.16
GBR	23.08	32.87	1.74	81.20	4.30	276.26	1.71	3.74	83.65	84.43

Annex B – Data Source of the Indicators

Code	Indicator Name	Source
EXP	Exports of goods and services (% of GDP)	World Bank national accounts data, and OECD National Accounts data files.
EBA	External balance on goods and services (% of GDP)	World Bank national accounts data, and OECD National Accounts data files.
FII	Foreign direct investment, net inflows (% of GDP)	International Monetary Fund, International Financial Statistics and Balance of Payments databases, World Bank, International Debt Statistics, and World Bank and OECD GDP estimates.
FIO	Foreign direct investment, net outflows (% of GDP)	International Monetary Fund, Balance of Payments database, supplemented by data from the United Nations Conference on Trade and Development and official national sources.
GDP	GDP per capita (current US$)	World Bank national accounts data, and OECD National Accounts data files.
GDS	Gross domestic savings (% of GDP)	World Bank national accounts data, and OECD National Accounts data files.
IMP	Imports of goods and services (% of GDP)	World Bank national accounts data, and OECD National Accounts data files.
INF	Inflation, consumer prices (annual %)	International Monetary Fund, International Financial Statistics and data files.
HEA	Current health expenditure (% of GDP)	World Health Organization Global Health Expenditure database (http://apps.who.int/nha/database). The data was retrieved on January 30, 2022.
FER	Fertility rate, total (births per woman)	(1) United Nations Population Division. World Population Prospects: 2022 Revision. (2) Census reports and other statistical publications from national statistical offices, (3) Eurostat: Demographic Statistics, (4) United Nations Statistical Division. Population and Vital Statistics Reprot (various years), (5) U.S. Census Bureau: International Database, and (6) Secretariat of the Pacific Community: Statistics and Demography Programme.
LIF	Life expectancy at birth, total (years)	(1) United Nations Population Division. World Population Prospects: 2022 Revision, or derived from male and female life expectancy at birth from sources such as: (2) Census reports and other statistical publications from national statistical offices, (3) Eurostat: Demographic Statistics, (4) United Nations Statistical Division. Population and Vital Statistics Reprot (various years), (5) U.S. Census Bureau: International Database, and (6) Secretariat of the Pacific Community: Statistics and Demography Programme.

MOR	Mortality rate, under-5 (per 1,000 live births)	Estimates developed by the UN Inter-agency Group for Child Mortality Estimation (UNICEF, WHO, World Bank, UN DESA Population Division) at www.childmortality.org.
UNE	Unemployment, total (% of total labour force) (national estimate)	International Labour Organization. "Labour Force Statistics database (LFS)" ILOSTAT. Accessed December 6, 2022. https://ilostat.ilo.org/data/.
WSW	Wage and salaried workers, total (% of total employment) (modelled ILO estimate)	International Labour Organization. "ILO modelled estimates database" ILOSTAT. Accessed January 2021. https://ilostat.ilo.org/data/.
TEC	High-technology exports (% of manufactured exports)	United Nations, Comtrade database through the WITS platform.
RES	Research and development expenditure (% of GDP)	UNESCO Institute for Statistics (UIS). UIS.Stat Bulk Data Download Service. Accessed October 24, 2022. https://apiportal.uis.unesco.org/bdds.
POP	Population density (people per sq. km of land area)	Food and Agriculture Organization and World Bank population estimates.
URB	Urban population (% of total population)	United Nations Population Division. World Urbanization Prospects: 2018 Revision.
EDU	Government expenditure on education, total (% of GDP)	UNESCO Institute for Statistics (UIS). UIS.Stat Bulk Data Download Service. Accessed October 24, 2022. https://apiportal.uis.unesco.org/bdds.
COE	CO2 emissions (metric tons per capita)	Climate Watch. 2020. GHG Emissions. Washington, DC: World Resources Institute. Available at: https://www.climatewatchdata.org/ghg-emissions. See SP.POP.TOTL for the denominator's source.

Annex C – Linear correlation coefficients between variables and first 5 compromise axes

	COE					HEA					EXP				
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
2014	0.370	0.065	-0.085	0.264	0.243	**0.854**	-0.268	0.170	-0.162	0.129	0.155	**0.893**	0.145	0.190	0.008
2015	0.344	-0.017	-0.135	0.307	0.298	**0.819**	-0.369	0.159	-0.272	0.012	0.165	**0.894**	0.178	0.222	0.040
2016	0.324	-0.048	-0.175	0.369	0.302	**0.815**	-0.353	0.146	-0.296	0.013	0.149	**0.897**	0.189	0.209	0.035
2017	0.258	-0.023	-0.172	0.366	0.295	**0.809**	-0.357	0.138	-0.315	-0.003	0.142	**0.885**	0.189	0.221	0.025
2018	0.260	-0.023	-0.179	0.367	0.301	**0.808**	-0.371	0.118	-0.318	-0.018	0.144	**0.865**	0.179	0.257	0.046
2019	0.291	-0.030	-0.132	0.347	0.312	**0.783**	-0.425	0.066	-0.293	-0.023	0.161	**0.854**	0.195	0.274	0.057

	EBA					FER					FII				
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
2014	0.435	**0.581**	0.168	0.316	0.417	**0.568**	0.049	-0.459	-0.025	0.090	-0.103	0.006	0.313	**0.743**	-0.456
2015	0.358	0.499	0.104	0.462	**0.512**	**0.514**	0.059	**-0.536**	-0.041	0.087	0.043	0.244	0.407	**0.727**	-0.210
2016	0.360	**0.637**	0.140	0.291	0.325	0.470	0.083	**-0.625**	-0.052	0.072	0.098	0.493	0.241	0.482	-0.244
2017	0.394	**0.673**	0.209	0.221	0.393	0.354	0.071	**-0.735**	-0.022	0.140	0.061	0.271	0.486	**0.556**	-0.356
2018	0.375	**0.628**	0.215	0.331	0.445	0.257	0.106	**-0.762**	0.009	0.155	-0.064	0.169	0.250	-0.144	0.292
2019	0.454	**0.525**	0.265	-0.018	0.009	0.151	0.082	**-0.789**	0.047	0.140	-0.168	0.083	0.303	**0.582**	**-0.657**

	FIO					GDP					EDU				
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
2014	-0.143	-0.172	0.166	**0.774**	-0.423	**0.880**	-0.235	0.025	0.058	0.134	**0.731**	-0.056	0.163	0.029	-0.447
2015	-0.060	-0.111	0.186	**0.807**	-0.299	**0.851**	-0.147	0.031	0.118	0.222	**0.697**	-0.238	-0.120	0.126	-0.496
2016	-0.019	-0.159	-0.280	**0.609**	-0.030	**0.856**	-0.143	0.034	0.137	0.223	**0.757**	-0.250	-0.060	0.112	-0.439
2017	-0.031	-0.430	-0.090	**0.643**	-0.270	**0.850**	-0.104	0.039	0.165	0.246	**0.743**	-0.299	-0.111	0.016	-0.467
2018	-0.075	-0.431	-0.384	0.028	**0.602**	**0.835**	-0.071	0.037	0.194	0.274	**0.788**	-0.236	-0.103	-0.061	-0.430
2019	-0.207	-0.205	0.084	**0.612**	**-0.642**	**0.822**	-0.044	0.034	0.216	0.292	**0.752**	-0.257	-0.152	-0.066	-0.440

	GDS					TEC					IMP				
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
2014	0.409	**0.584**	-0.352	0.247	0.407	**0.545**	**0.573**	0.104	0.010	-0.027	0.091	**0.894**	0.130	0.153	-0.071
2015	0.376	**0.640**	-0.177	0.304	0.473	**0.541**	**0.550**	0.024	0.030	0.066	0.105	**0.899**	0.178	0.146	-0.073
2016	0.412	**0.650**	-0.107	0.329	0.427	0.492	0.439	-0.067	0.165	0.185	0.107	**0.897**	0.188	0.185	-0.014
2017	0.447	**0.662**	-0.061	0.331	0.397	0.459	**0.620**	0.087	0.045	0.084	0.075	**0.878**	0.172	0.206	-0.061
2018	0.437	**0.641**	-0.074	0.374	0.409	0.388	**0.625**	0.172	0.085	-0.101	0.067	**0.856**	0.154	0.213	-0.070
2019	0.444	**0.621**	-0.076	0.375	0.415	0.440	**0.581**	0.138	0.111	-0.065	0.101	**0.848**	0.170	0.303	0.061

	INF					LIF					MOR				
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
2014	0.444	0.049	-0.343	-0.314	0.220	**0.653**	-0.362	**0.567**	0.031	0.213	**-0.545**	0.475	-0.153	-0.481	-0.082
2015	**0.595**	0.284	-0.171	**-0.502**	0.089	**0.668**	-0.354	**0.564**	0.066	0.195	**-0.527**	0.483	-0.117	**-0.505**	-0.083
2016	**0.718**	0.038	-0.171	-0.260	-0.015	**0.649**	-0.344	**0.582**	0.048	0.213	**-0.501**	0.489	-0.068	**-0.526**	-0.084
2017	-0.136	0.128	-0.479	-0.223	-0.190	**0.667**	-0.339	**0.567**	0.078	0.213	-0.460	0.484	-0.028	**-0.561**	-0.086
2018	-0.407	0.240	**-0.606**	-0.200	-0.210	**0.650**	-0.347	**0.583**	0.077	0.221	-0.424	0.479	0.012	**-0.571**	-0.092
2019	-0.269	**0.523**	**-0.599**	-0.220	-0.090	**0.672**	-0.330	**0.567**	0.076	0.226	-0.394	0.484	0.049	**-0.574**	-0.095

	POP					RES					UNE				
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
2014	0.326	**0.599**	**0.570**	-0.370	-0.146	**0.824**	-0.350	-0.291	-0.025	0.114	-0.468	-0.445	**0.549**	0.160	0.116
2015	0.325	**0.601**	**0.570**	-0.370	-0.146	**0.805**	-0.362	-0.307	-0.092	0.071	-0.441	-0.483	**0.565**	0.131	0.103
2016	0.324	**0.603**	**0.570**	-0.369	-0.147	**0.810**	-0.410	-0.256	-0.093	0.071	-0.393	**-0.532**	**0.567**	0.099	0.119
2017	0.323	**0.604**	**0.570**	-0.368	-0.147	**0.810**	-0.408	-0.253	-0.093	0.075	-0.342	**-0.574**	**0.559**	0.058	0.104
2018	0.320	**0.607**	**0.571**	-0.367	-0.147	**0.800**	-0.412	-0.264	-0.093	0.051	-0.292	**-0.580**	**0.547**	-0.003	0.139
2019	0.317	**0.610**	**0.571**	-0.366	-0.148	**0.794**	-0.415	-0.261	-0.075	0.048	-0.238	**-0.596**	**0.542**	-0.047	0.138

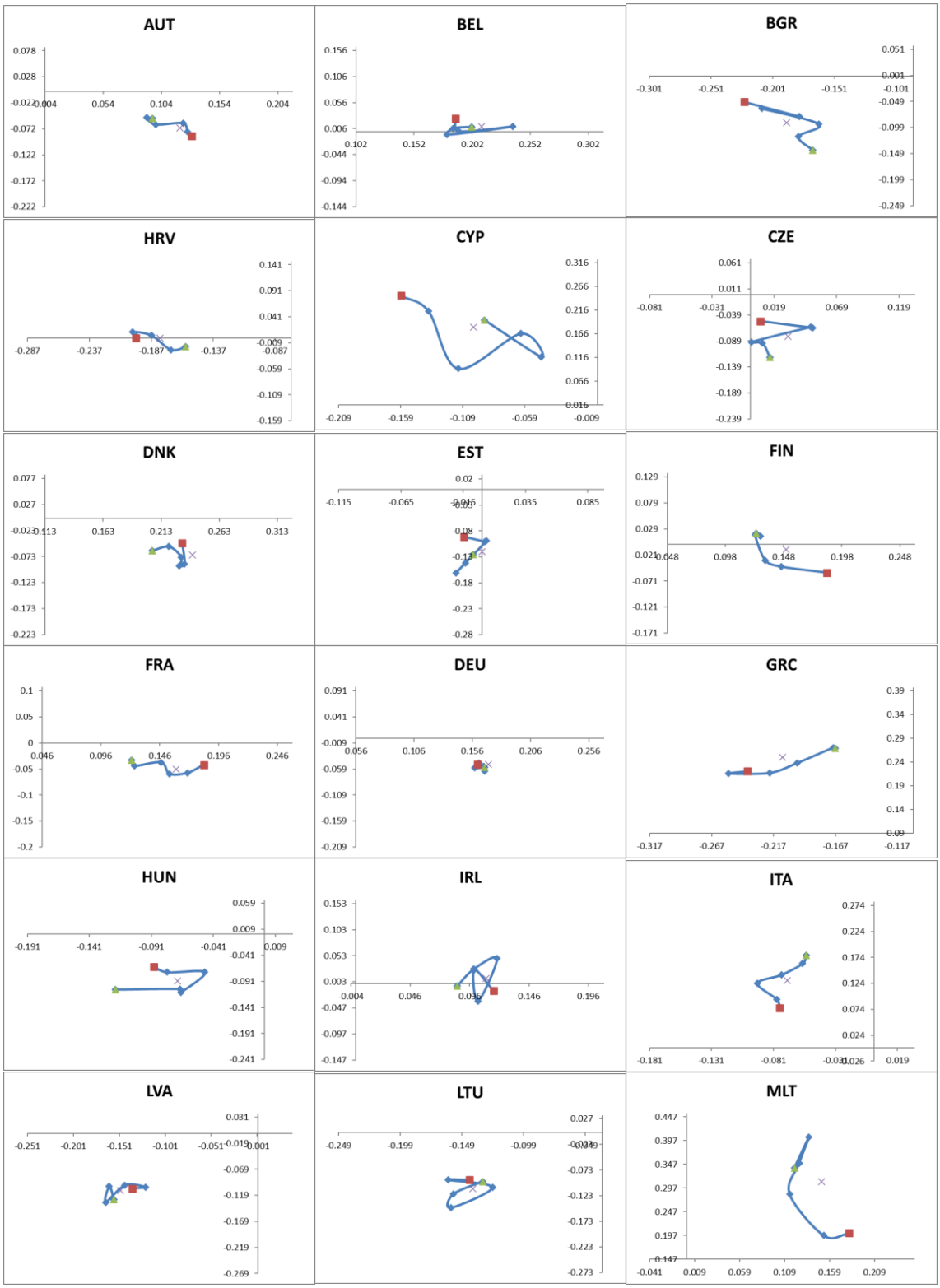
	URB					WSW				
	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5	Axis 1	Axis 2	Axis 3	Axis 4	Axis 5
2014	**0.678**	0.001	0.300	-0.332	-0.297	**0.553**	0.245	-0.435	0.104	-0.374
2015	**0.679**	-0.002	0.301	-0.334	-0.294	**0.532**	0.242	-0.447	0.163	-0.410
2016	**0.679**	-0.006	0.302	-0.335	-0.291	**0.509**	0.231	-0.469	0.181	-0.408
2017	**0.679**	-0.009	0.303	-0.336	-0.288	0.498	0.194	-0.468	0.212	-0.414
2018	**0.679**	-0.012	0.304	-0.337	-0.285	0.485	0.208	-0.471	0.187	-0.416
2019	**0.679**	-0.014	0.304	-0.339	-0.283	0.467	0.185	**-0.509**	0.209	-0.379

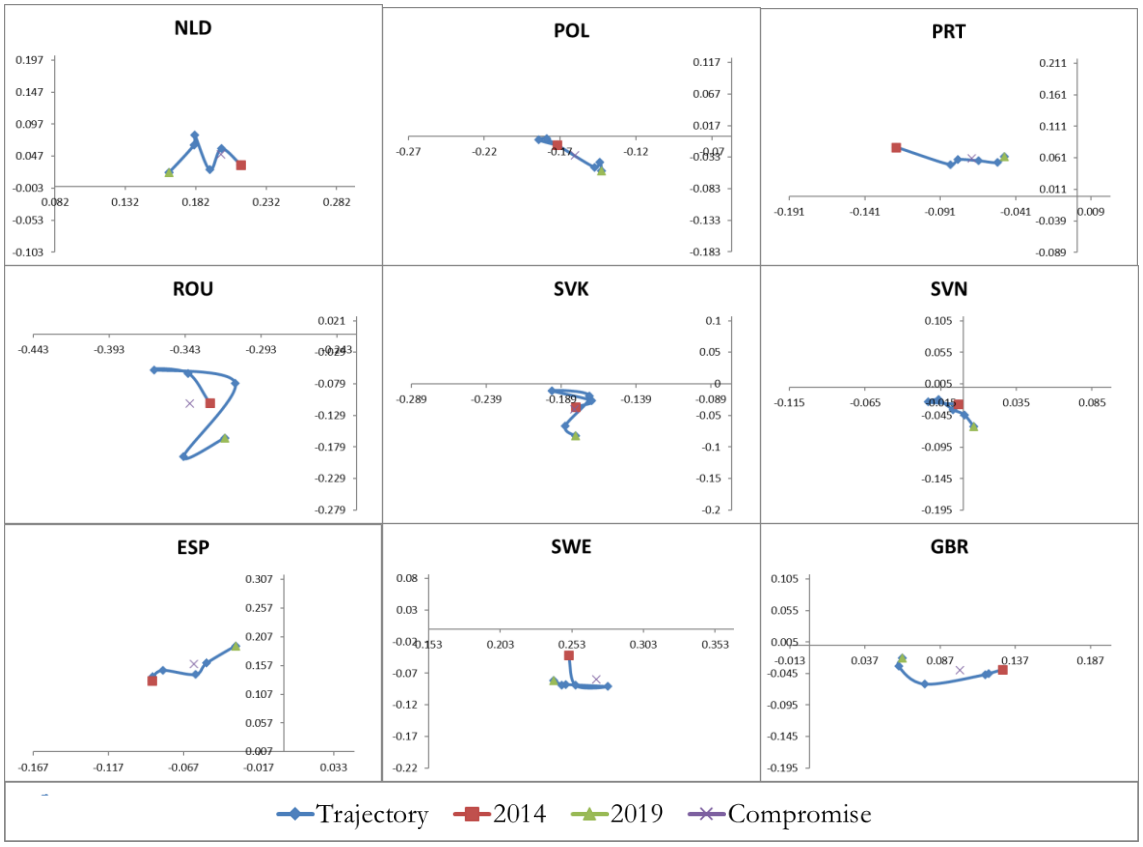
Annex D – Coordinates, absolute and relative contributions of the countries in the first 5 compromise axes

	Coordinates					Absolute Contributions					Relative Contributions				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
AUT	0.12	-0.07	-0.07	-0.01	0.05	0.02	0.01	0.01	0.00	0.02	0.27	0.09	0.08	0.00	0.05
BEL	**0.21**	-0.02	0.01	-0.08	-0.05	0.06	0.00	0.00	0.02	0.01	**0.58**	0.00	0.00	0.08	0.03
BGR	-0.19	0.09	-0.09	-0.08	-0.06	0.05	0.02	0.02	0.03	0.02	0.42	0.09	0.09	0.08	0.05
HRV	-0.18	-0.04	0.00	0.00	-0.01	0.05	0.00	0.00	0.00	0.00	**0.66**	0.03	0.00	0.00	0.00
CYP	-0.10	-0.04	0.18	**0.33**	**-0.23**	0.01	0.00	0.09	**0.41**	**0.29**	0.04	0.01	0.15	**0.50**	0.25
CZE	0.03	0.08	-0.08	0.05	0.06	0.00	0.01	0.02	0.01	0.02	0.02	0.16	0.15	0.05	0.10
DNK	**0.24**	-0.06	-0.07	-0.02	-0.05	0.08	0.01	0.01	0.00	0.01	**0.68**	0.04	0.06	0.01	0.03
EST	0.00	0.07	-0.12	0.10	0.01	0.00	0.01	0.04	0.04	0.00	0.00	0.07	0.22	0.14	0.00
FIN	0.15	-0.17	-0.01	0.01	-0.03	0.03	0.06	0.00	0.00	0.00	0.33	0.44	0.00	0.00	0.01
FRA	0.16	-0.09	-0.05	-0.06	0.00	0.04	0.01	0.01	0.02	0.00	0.30	0.09	0.02	0.05	0.00
DEU	0.17	-0.04	-0.05	-0.03	0.03	0.04	0.00	0.01	0.00	0.01	**0.54**	0.03	0.05	0.01	0.02
GRC	**-0.21**	**-0.21**	**0.25**	-0.06	0.09	0.06	0.09	**0.18**	0.01	0.04	0.23	0.24	0.32	0.02	0.04
HUN	-0.07	0.14	-0.09	0.05	-0.09	0.01	0.04	0.02	0.01	0.04	0.07	0.27	0.10	0.04	0.10
IRL	0.11	**0.22**	0.01	**0.23**	**0.25**	0.02	**0.10**	0.00	**0.21**	**0.36**	0.06	0.24	0.00	0.27	0.32
ITA	-0.07	-0.15	0.13	-0.04	0.08	0.01	0.05	0.05	0.00	0.04	0.07	0.37	0.28	0.02	0.10
LVA	-0.15	0.06	-0.11	-0.02	-0.07	0.03	0.01	0.04	0.00	0.02	0.35	0.06	0.20	0.01	0.07
LTU	-0.14	0.05	-0.11	-0.01	-0.04	0.03	0.01	0.03	0.00	0.01	0.37	0.05	0.21	0.00	0.04
MLT	0.15	**0.44**	**0.31**	-0.17	-0.06	0.03	**0.39**	**0.29**	**0.11**	0.02	0.06	**0.55**	0.28	0.08	0.01
NLD	0.20	0.09	0.05	0.02	0.00	0.06	0.02	0.01	0.00	0.00	0.48	0.10	0.03	0.01	0.00
POL	-0.16	0.00	-0.03	0.00	0.02	0.04	0.00	0.00	0.00	0.00	**0.59**	0.00	0.02	0.00	0.01
PRT	-0.07	-0.13	0.06	-0.03	0.00	0.01	0.04	0.01	0.00	0.00	0.11	0.40	0.09	0.02	0.00
ROU	**-0.34**	0.07	-0.11	-0.12	0.04	**0.16**	0.01	0.03	0.06	0.01	**0.61**	0.03	0.06	0.08	0.01
SVK	-0.18	0.10	-0.04	0.00	0.02	0.05	0.02	0.00	0.00	0.00	**0.56**	0.17	0.02	0.00	0.01
SVN	0.00	-0.03	-0.03	0.08	0.07	0.00	0.00	0.00	0.02	0.03	0.00	0.02	0.03	0.14	0.14
ESP	-0.06	-0.18	0.16	-0.01	0.04	0.01	0.07	0.07	0.00	0.01	0.05	0.39	0.29	0.00	0.02
SWE	**0.27**	-0.13	-0.08	-0.02	-0.06	**0.10**	0.03	0.02	0.00	0.02	**0.62**	0.14	0.06	0.00	0.03
GBR	0.10	-0.05	-0.04	-0.10	-0.04	0.02	0.00	0.00	0.04	0.01	0.20	0.04	0.03	0.19	0.03

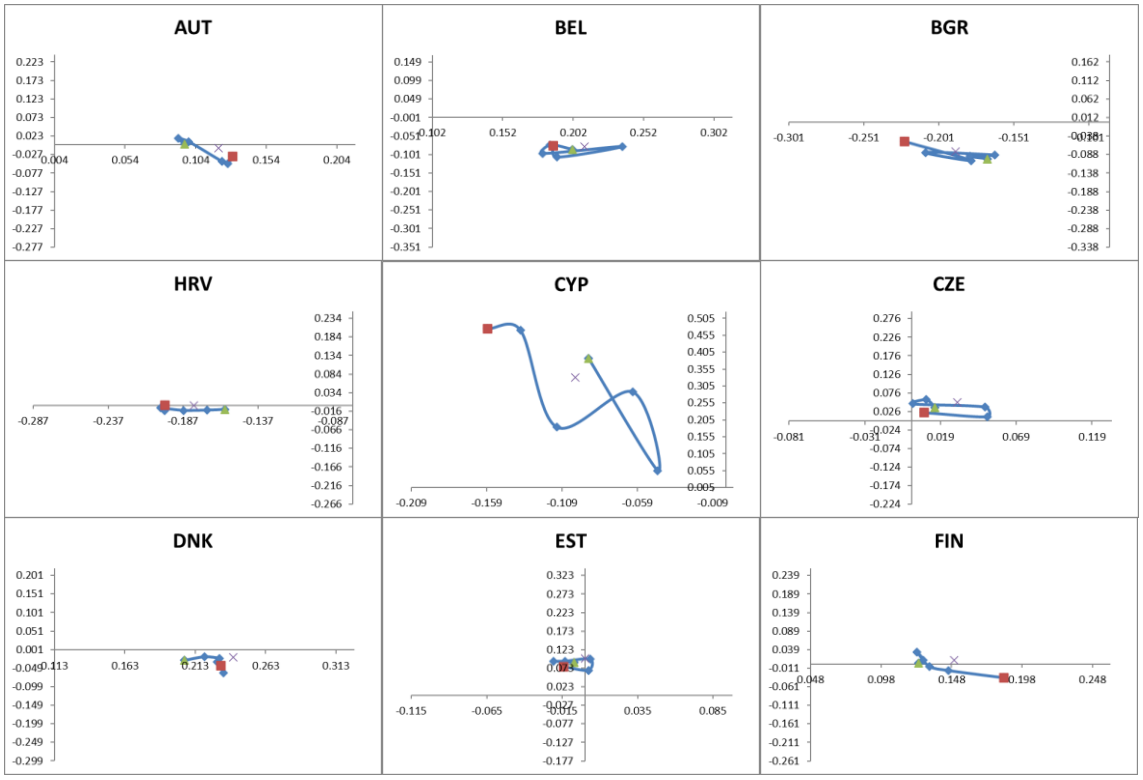
Annex E – Countries' trajectories in the plans [1,3] and [1,4]

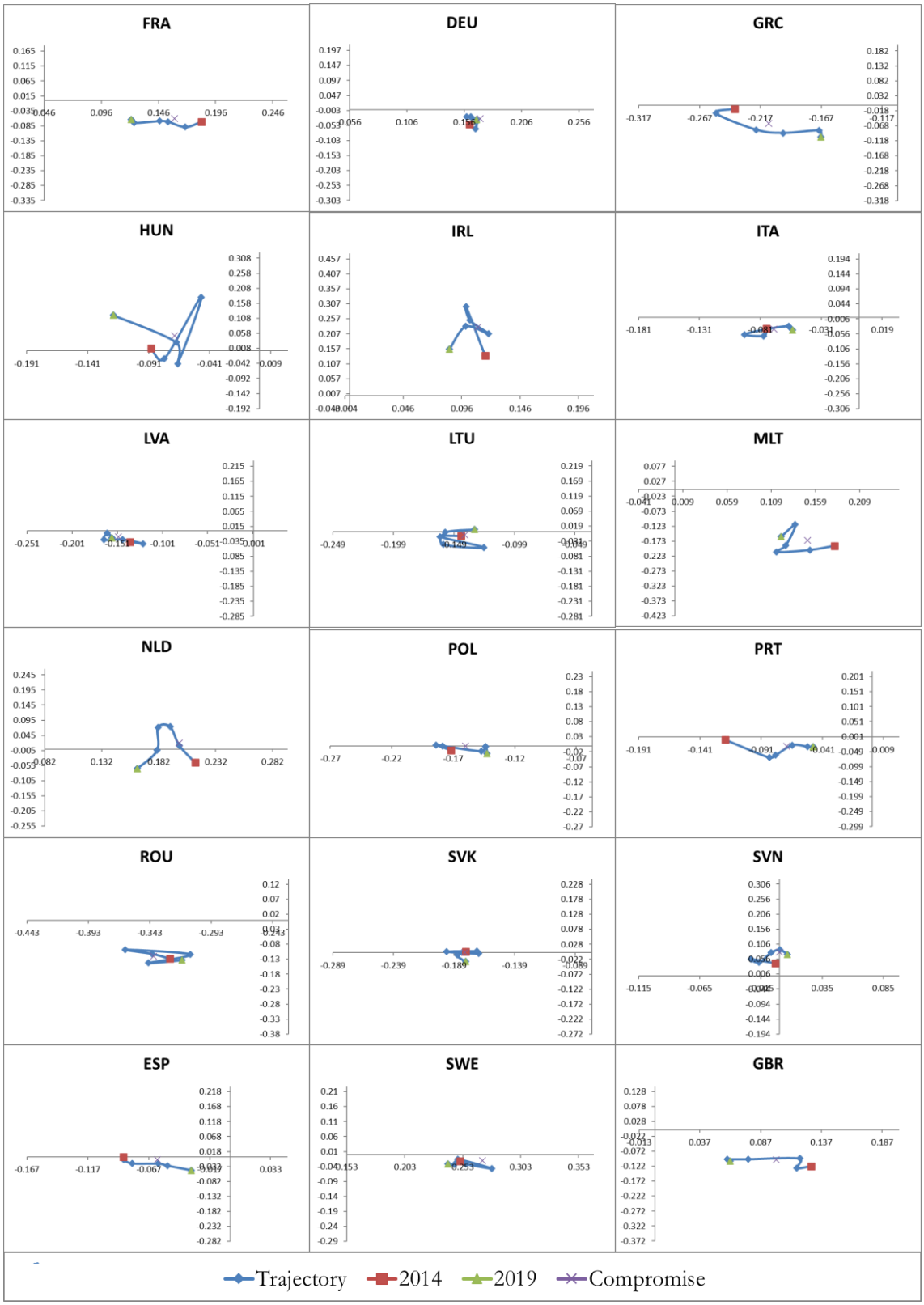
Countries' trajectories in the plan [1,3]





Countries' trajectories in the plan [1,4]



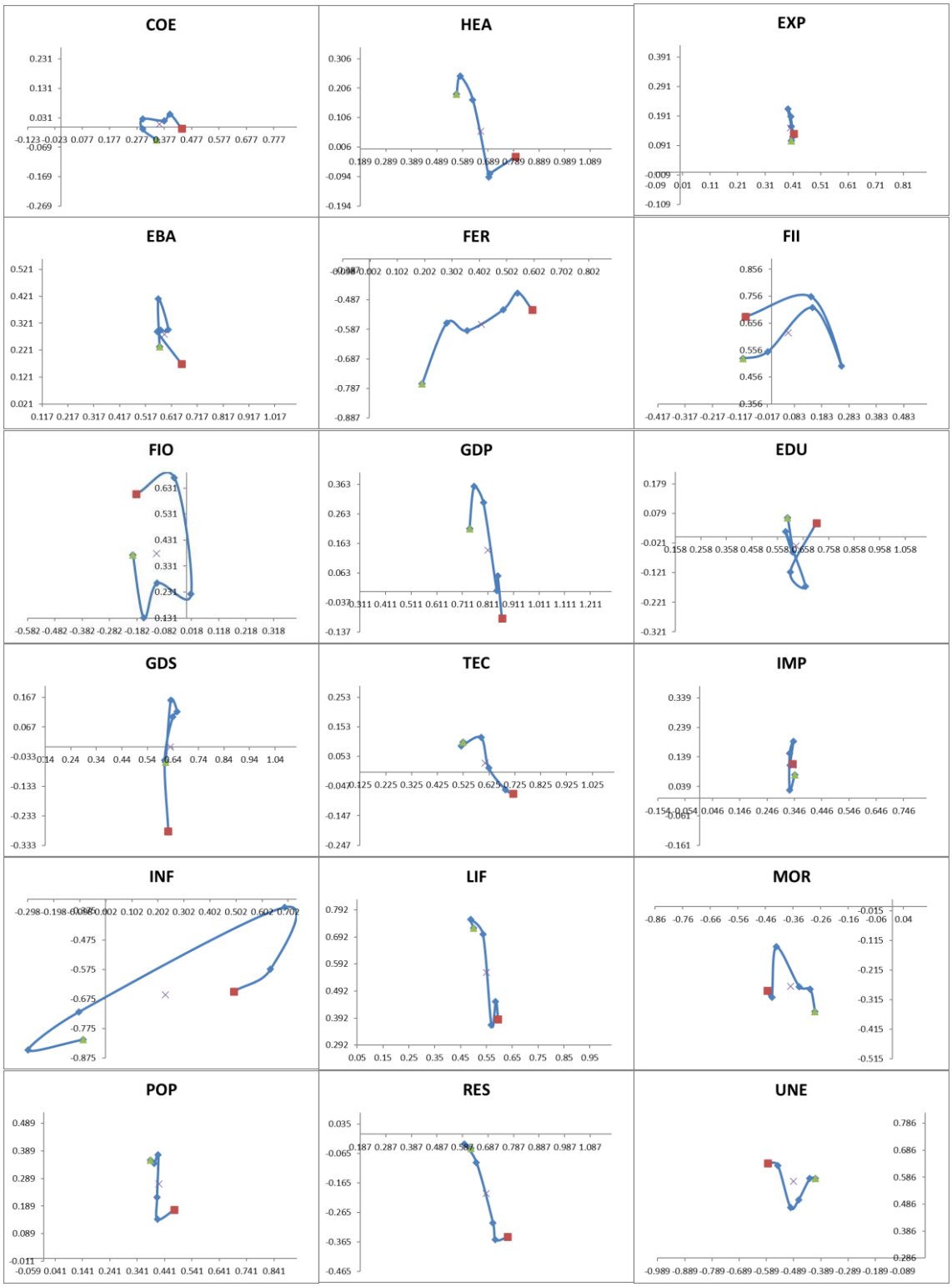

FRA
DEU
GRC
HUN
IRL
ITA
LVA
LTU
MLT
NLD
POL
PRT
ROU
SVK
SVN
ESP
SWE
GBR
Trajectory
2014
2019
Compromise

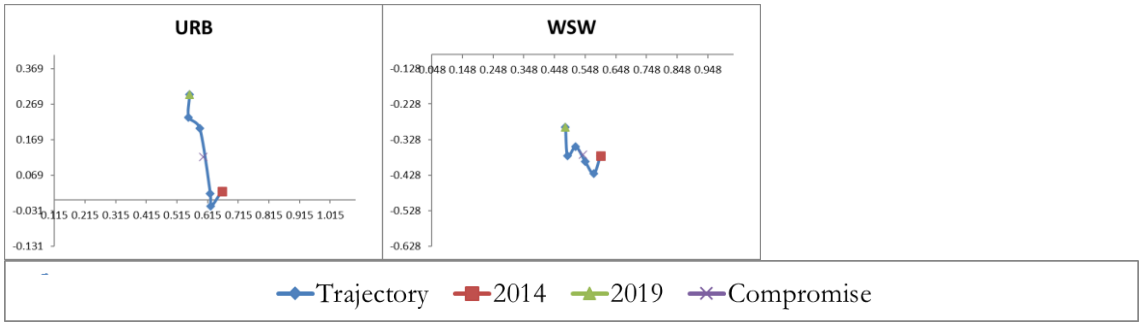
Annex F – Coordinates, absolute and relative contributions of the variables in the first 5 compromise axes

	Coordinates					Absolute Contributions					Relative Contributions				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
COE	0.36	0.07	0.01	0.38	-0.50	0.02	0.00	0.00	0.07	**0.18**	0.13	0.00	0.00	0.14	0.25
HEA	**0.66**	0.58	0.06	-0.30	0.04	0.08	0.08	0.00	0.04	0.00	**0.44**	0.34	0.00	0.09	0.00
EXP	0.40	**-0.85**	0.15	0.02	-0.04	0.03	**0.17**	0.01	0.00	0.00	0.16	**0.73**	0.02	0.00	0.00
EBA	0.59	-0.53	0.28	0.11	-0.29	0.07	0.07	0.03	0.01	0.06	0.35	0.28	0.08	0.01	0.09
FER	0.41	0.11	-0.57	0.30	0.21	0.03	0.00	**0.13**	0.04	0.03	0.17	0.01	0.33	0.09	0.04
FII	0.06	-0.25	**0.62**	0.43	0.51	0.00	0.01	**0.16**	0.09	**0.19**	0.00	0.06	0.39	0.19	0.26
FIO	-0.11	0.20	0.38	**0.74**	0.38	0.00	0.01	0.06	**0.26**	**0.10**	0.01	0.04	0.15	**0.55**	0.14
GDP	**0.81**	0.33	0.14	0.08	-0.07	**0.13**	0.03	0.01	0.00	0.00	**0.66**	0.11	0.02	0.01	0.01
EDU	**0.63**	0.45	-0.03	-0.01	0.35	0.08	0.05	0.00	0.00	0.09	**0.40**	0.20	0.00	0.00	0.12
GDS	**0.63**	-0.54	0.00	0.28	-0.32	0.08	0.07	0.00	0.04	0.08	**0.40**	0.30	0.00	0.08	0.10
TEC	**0.61**	-0.39	0.03	-0.05	0.22	0.07	0.04	0.00	0.00	0.03	0.38	0.15	0.00	0.00	0.05
IMP	0.34	**-0.86**	0.11	0.00	0.01	0.02	**0.18**	0.01	0.00	0.00	0.11	**0.74**	0.01	0.00	0.00
INF	0.23	-0.10	**-0.66**	-0.07	0.05	0.01	0.00	**0.18**	0.00	0.00	0.05	0.01	**0.43**	0.01	0.00
LIF	0.55	0.45	0.56	-0.23	-0.17	0.06	0.05	**0.13**	0.03	0.02	0.30	0.20	0.32	0.05	0.03
MOR	-0.37	-0.52	-0.27	-0.39	0.26	0.03	0.06	0.03	0.07	0.05	0.14	0.27	0.08	0.15	0.07
POP	0.42	-0.48	0.27	**-0.63**	0.17	0.03	0.06	0.03	**0.19**	0.02	0.18	0.23	0.07	0.39	0.03
RES	**0.68**	**0.60**	-0.20	0.05	-0.14	0.09	0.09	0.02	0.00	0.01	**0.46**	0.37	0.04	0.00	0.02
UNE	-0.49	0.35	0.57	-0.17	-0.09	0.05	0.03	**0.13**	0.01	0.01	0.24	0.12	0.32	0.03	0.01
URB	**0.60**	0.22	0.12	-0.46	0.29	0.07	0.01	0.01	**0.10**	0.06	0.36	0.05	0.02	0.22	0.09
WSW	0.54	-0.04	-0.37	0.28	0.29	0.06	0.00	0.06	0.04	0.06	0.29	0.00	0.14	0.08	0.08

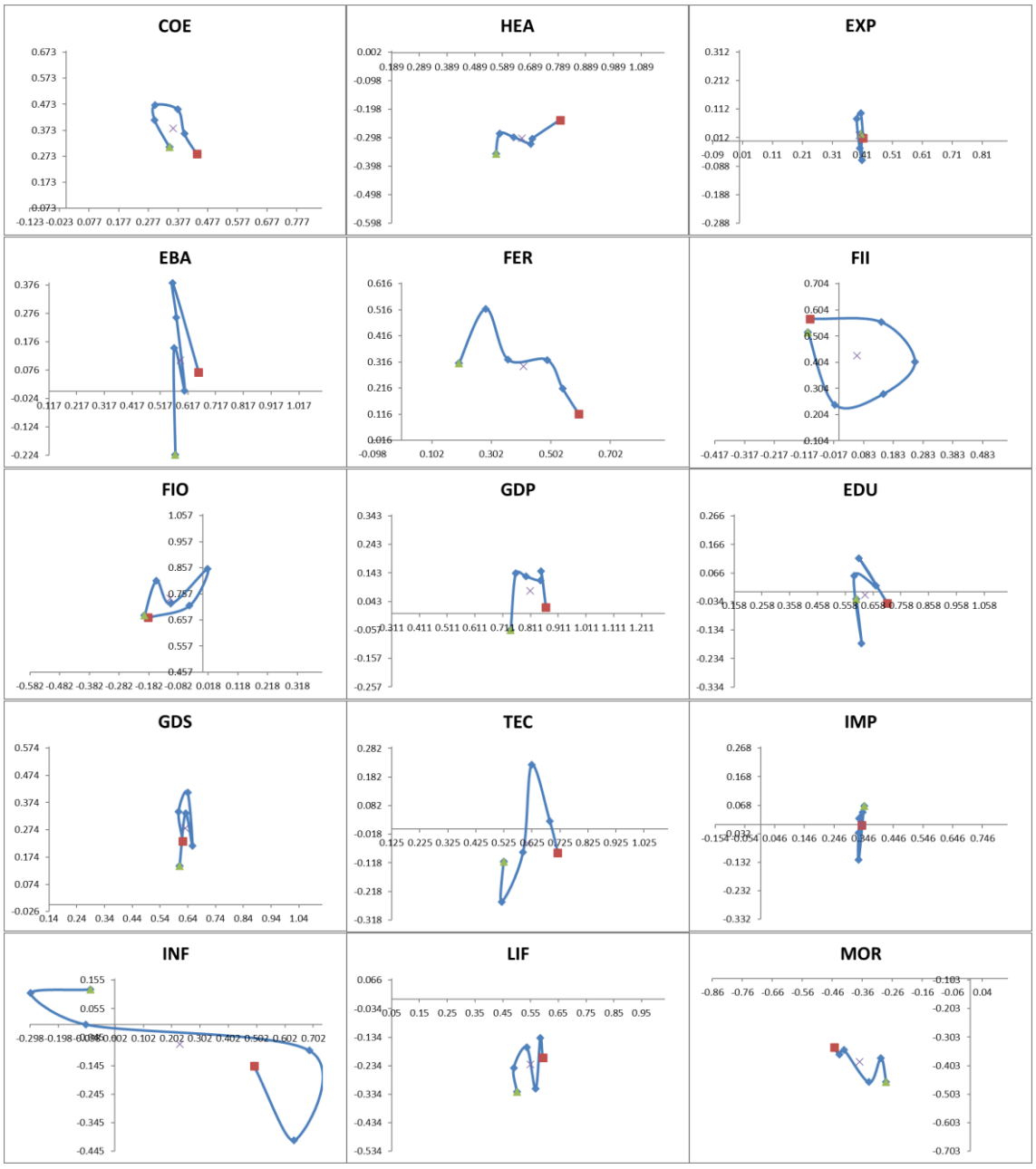
Annex G – Variables' trajectories in the plans [1,3] and [1,4]

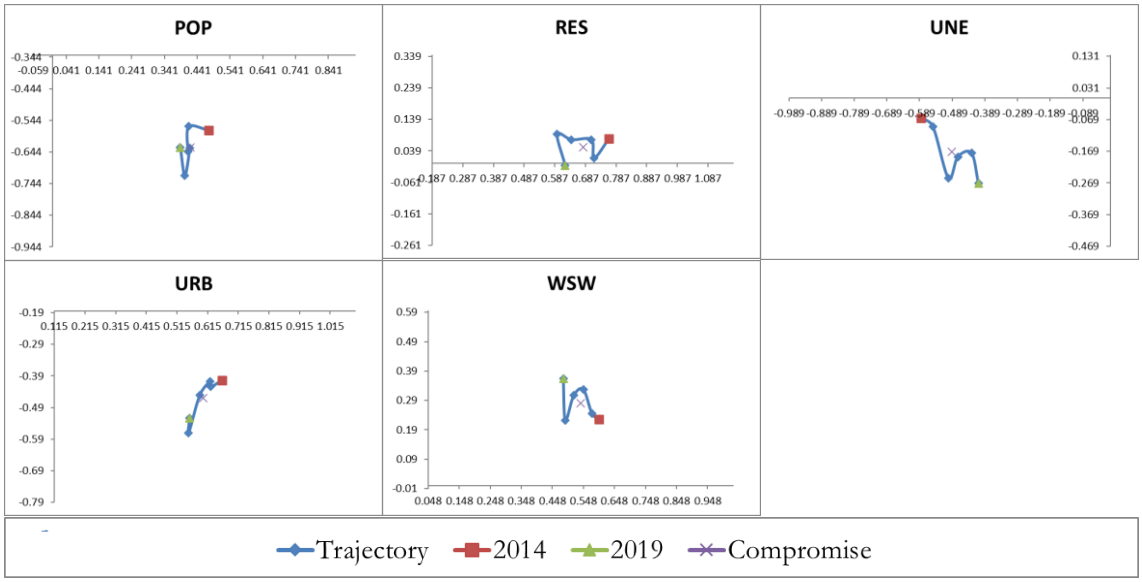
Variables' trajectories in the plan [1,3]





Variables' trajectories in the plan [1,4]




POP
-0.344
-0.059 0.041 0.141 0.241 0.341 0.441 0.541 0.641 0.741 0.841
-0.444
-0.544
-0.644
-0.744
-0.844
-0.944
RES
0.339
0.239
0.139
0.039
-0.061
-0.161
-0.261
-0.187 0.287 0.387 0.487 0.587 0.687 0.787 0.887 0.987 1.087
UNE
0.131
0.031
-0.989 -0.889 -0.789 -0.689 -0.589 -0.489 -0.389 -0.289 -0.189 -0.089
-0.069
-0.169
-0.269
-0.369
-0.469
URB
-0.19
0.115 0.215 0.315 0.415 0.515 0.615 0.715 0.815 0.915 1.015
-0.29
-0.39
-0.49
-0.59
-0.69
-0.79
WSW
0.59
0.49
0.39
0.29
0.19
0.09
-0.01
0.048 0.148 0.248 0.348 0.448 0.548 0.648 0.748 0.848 0.948
Trajectory
2014
2019
Compromise