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Changing Social Investment Strategies in the EU

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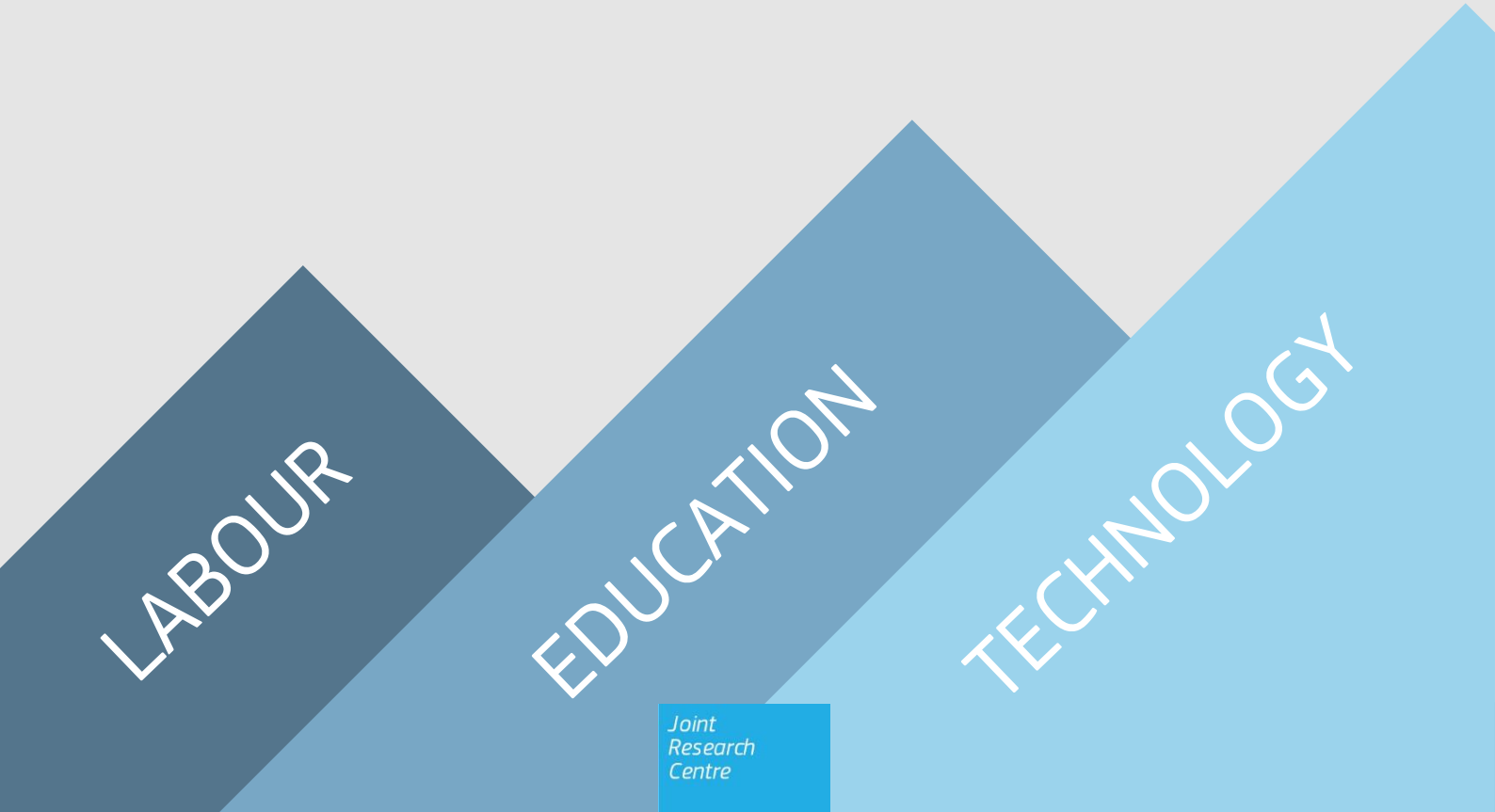

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Changing Social Investment Strategies in the EU

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Abstract

This article attempts to identify social investment strategies across EU countries and explain their evolution over the period 2004-18, by using cluster analysis on expenditure and coverage variables and qualitative analysis on selected policy areas to contextualize the results. It finds that strategies have diversified over time in a progressively complex way. After the financial crisis, three main social investment strategies emerge in Europe. They do not overlap with canonical welfare state models, nor have a clear-cut geographical connotation. The strategies are distinct because of their different levels of overall expenditure on social investment but, over time, also by their different life-course orientations. Significant variation within the clusters, in terms of both expenditure and design of social investment policies, indicates that fully-fledged strategies have not yet formed in well-defined groups of countries.

Keywords: Social investment, cluster analysis, welfare state.

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Executive summary

Social investment encompasses policies to prepare and support individuals to face new risks in fast-changing economies and societies. It has gained increasing attention in academic and policy arenas in recent decades. Its relevance for responding to social needs arising from key societal transformations has been maintained, despite ongoing debate about its social outcomes.

The social investment approach is reflected in several principles of the **European Pillar of Social Rights (EPSR)**. Its first chapter on "Equal opportunities and access to the labour market" is strongly oriented towards capacitation and the creation of opportunities throughout the life course. Access to lifelong education, training and support to participate in the labour market correspond to two cornerstones of the social investment approach, or active social policy (Bonoli, 2013). The chapter also outlines principles that stress the rights of women and youth, as two social groups to target in the development of social policy and the welfare state towards a social investment approach. Investing in people and providing the conditions for them to achieve their potential also permeate other chapters, with mentions of work–life balance, healthcare and support for children as well as the elderly.

By looking at the **evolution and features of social investment strategies** in the EU over the last decades, this paper seeks to provide empirical evidence on how trajectories of social investment vary across the EU. Such evidence can contribute to inform EU actions for the implementation of the EPSR. It can be used as reference for future research delving into the evolutions and future of the welfare state. Finally, it can provide reference to assess resilience of countries that adopted different social investment strategies, in the aftermath of Covid-19.

The analysis covers the periods before, during and after the financial crisis, from 2004 to 2018. **Principal component analysis and cluster analysis** are applied to variables of expenditure and coverage of key social investment policy areas, such as family and childcare, education and support to work activation. Focusing on the after-crisis period, the strategies identified through the clustering are better characterized in terms of key features. Moreover, the quantitative analysis is complemented by a qualitative analysis of design features of selected social investment policies. The main findings are:

- The study of the evolution of clusters before, during and after the financial crisis shows that over time **social investment strategies differentiated in a progressively complex way**. While in the first period the strategies differed mostly in terms of overall expenditure, additional features emerged, and more markedly so, after the financial crisis. In this sense, the financial crisis and its aftermath might have played a role in shaping social expenditure towards social investment in a more decisive and more differentiated manner across the EU27. While the present analysis provides some background, this is an aspect worth investigating through further research.
- The analysis of the clusters identified in the period after the financial crisis, points to three types of social investment strategies in the EU27, labelled as ***balanced***, ***basic*** **and** ***bent*** **strategy**. These strategies are characterised as following:
    - The Balanced Social Investment Strategy is characterised by high expenditure in all the main areas of social investment, namely family and childcare, education, and support for work activation. In addition, it is featured by medium/high enrollment rates in non-compulsory education, such as pre-primary and tertiary education. The countries associated with this strategy tend to be among the EU27 best performers in spending on several social investment policies throughout the life-course. In particular (but not exclusively), these countries display, on average, high expenditure for early life-stages, especially through in-kind childcare services.
    - The Basic Social Investment Strategy is characterised by low/medium overall expenditure in the main areas of social investment considered in the analysis. Also, this strategy is featured by low/medium enrolment in non-compulsory education.

The strategy is focused on high expenditure for social investment functions that pertain to later stages in life, especially expenditure for school (i.e. compulsory education) and, to some extent, university. Both can be seen as crucial, yet more traditional, areas of expenditure in the social investment approach. By contrast, the strategy is characterised by low expenditure in social investment policies for early ages, as the countries associated with this strategy show, on average, low efforts in both in-kind childcare services and in-cash family support benefits.

- The Bent Social Investment Strategy is similarly characterised by low/medium overall expenditure in the main areas of social investment. Yet, differently from the previous strategy, this one is featured by medium/high enrolment in non-compulsory education and an orientation of the social investment expenditure towards early ages rather than later in life (e.g. school age). The countries associated with this strategy show, on average, medium/high expenditure for early life stages (e.g. family and children support), especially through in-cash benefits, such as parental leaves.

- A comparison of the cluster composition after the financial crisis *vis-à-vis* the traditional welfare regime classification highlights only **a partial overlap between the social investment strategies and the welfare regimes**. This finding points to a possible undergoing evolution of the canonical welfare state models. Such evolution could be analysed under the social investment lenses to inform policy making towards the future of welfare states. As the next two findings indicate, this evolution appears far from complete, yet worth to be further investigated to achieve a sound understanding of the dynamics at place.
- There is **significant internal variation within the clusters** and thus in the social investment strategies identified through expenditure and coverage, suggesting that fully-fledged homogeneous strategies have not yet emerged in the EU.
- There is **significant heterogeneity in the institutional design features** of the selected social investment policies analysed, even within groups of countries that display similar patterns of expenditure. This reinforces the previous finding and suggests also that different policy designs can lead to the same policy output (i.e. same/similar levels of expenditure and coverage), and *vice versa*.

Contents

1 Introduction

The social investment approach has sometimes been questioned by scholars. Some have considered it a variation of neoliberalism, by emphasizing recommodification over decommodification of people and stressing the crowding out effect of social investment policies at the expense of traditional compensatory policies (Nolan 2013; Bonoli et al., 2017). A second strand of literature has casted doubts on the actual employment effect of social investment measures as well as on the 'Matthew Effect' of social investment policies on middle-class groups, who disproportionately benefit from capacitating services at the expense of vulnerable groups in society (Cantillon, 2011), including women (Saraceno, 2015). In spite of its critics, social investment has gradually gained purchase as a novel welfare policy compass to address economic and social change. Its objective to provide a mix of policies that capacitate individuals and societies to respond to the changing nature of post-industrial social risks and labour markets has attracted the interest of policy makers, both at national and European level (Hemerijck and Corti, 2022). The pandemic has further strengthened the demand not only for inclusive income support policies (either via cash benefits or via benefits in kind), but also for (gendered) life-course transition and human capital policies (Hemerijck and Huguenot-Noël, 2020).

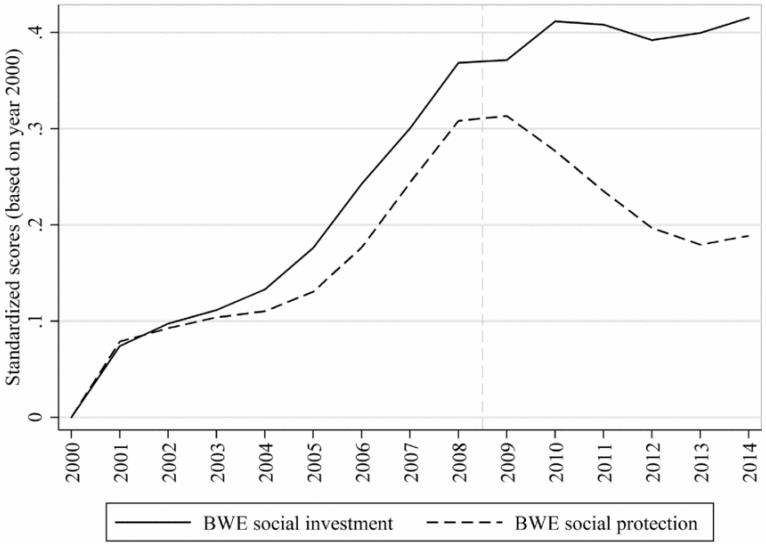
With social investment gaining political attention, the focus on comparative welfare state research shifted from explaining change-resistant welfare states (Pierson 1994, 1998) towards better understanding how welfare states do change over time (Ferrera and Hemerijck 2003, Ferrera et al. 2000). Understanding trajectories of welfare recalibration became a key object of investigation. This notwithstanding, scholars so far have not succeeded in the identification of coherent strategies in the transition towards social investment. Both the quantitative studies on the evolution of welfare expenditure (Kuitto 2016, Ronchi 2018, Vandenbroucke and Vleminckx, 2011) and qualitative analyses of institutional reforms (Hemerijck 2013, Bouget et al. 2015) find evidence of an increasing attention towards social investment policies. Figure 1, developed by Ronchi (2018) based on the Social Investment Welfare Expenditure (SIWE) dataset (Ronchi, 2016), provides a quantification of this transition trend of social expenditure in the EU after the 2000. It shows a decreasing trend for welfare functions traditionally associated to social protection, *versus* an increasing trend in those welfare functions associated to the emerging social investment approach.

These studies, however, also highlight different recalibration paths, which do not always depend on pre-existing welfare regimes. As put by Hemerijck (2013), EU member states show a tendency towards social investment, but without following a structural approach and, in practice, with different orientations.

Part of the difficulties in understanding the trajectories of welfare recalibration depends on some elements of complexity around the definition itself of social investment. Scholars do not agree on whether social investment is to be understood as a policy paradigm *per se*, including traditional compensatory social protection policies (Hemerijck 2018), or if it identifies only a sub-group of welfare provisions, namely those aimed at capacitating life-course transition and human capital policies (Nolan, 2017). Depending on the definition that is given, welfare recalibration towards social investment can be measured in different ways.

In this respect, the largest share of the literature has looked at the trade-off between traditional compensatory policy and 'new' capacitating and human capital enhancing measures (Vandenbroucke and Vleminckx, 2011; Ronchi 2018). Such literature, however, falls short in two respects. First, while looking at social investment policies *en bloc*, it does not consider that welfare recalibration happens over time, in response to policy preferences, which are reflected in the timing of the implementation of reforms. Such changes in preferences explain why some countries might decide to focus first on children and family policies rather than on youth and jobseekers (e.g. activation support) or *vice versa*. Second, this literature does not distinguish between the different strategies that can be adopted to foster social investment, for instance in-cash transfers or in-kind services.

Figure 1. Trends of social protection and social investment spending in EU (2000-2014; 2000=0)



Note: Expenditure is expressed in terms of Budgetary Welfare Effort (BWE) which is calculated dividing the expenditure in Euros on a given welfare function (either for social protection or for social investment) by the target population of that given welfare function (Ronchi, 2018: 468). The BWE displayed are the average of EU27_2007 (e.g. including the UK but excluding Croatia, due to lack of data) (Ronchi, 2018).
Source: Ronchi (2018: 473)

Against this background, this paper engages with the debate on welfare recalibration by adopting a different perspective. It departs from the question on the trade-off between compensatory and preparatory welfare policies, and directly focuses on the latter, asking which social investment policy mix EU member states have adopted over the past two decades. While covering the period from 2004 to 2018, the aim is to identify and characterise strategies of social investment and look at how they have evolved across member states before, during and after the financial crisis. In so doing, the contribution of the paper is threefold.

First, through a data-driven approach, it clusters countries that are similar in terms of social investment policy outputs, namely expenditure and coverage. The approach does not rely on any presumption about the existence of a social investment strategy closely associated with welfare regimes. As such, it does not test any theoretical prior, but it allows comparisons between welfare regimes and emerging social investment strategies. Since there is no predefined social investment model to test, this approach allows gaining insights on government expenditure preferences related to social investment, by looking at how public funds are allocated across different social expenditure areas.

Second, the analysis concentrates on social investment policy areas, identified by focusing solely on expenditure that explicitly aims at preventing rather than mitigating risks. It covers policies for family and childhood, education, training and working-age support to participate in the labour market. This selection ensures a level of detail that allows identification of specific characteristics of social investment strategies, rather than just the overall social investment orientation of the welfare state (Bakker and van Vliet, 2019).

Third, we complete the quantitative analysis with a qualitative analysis of the main institutional design features of two key policy areas under examination. As the institutional design is intertwined with the social spending, we seek to explore the potential relationship between regulation and financing in social investment policies, with the aim to contextualize the results of the cluster analysis. In so doing, we bring together two strands of literature that have traditionally examined these two aspects separately.

The paper is organised as follows. Section 2 reviews the literature on how social investment strategies have been identified so far. Section 3 illustrates the data and the cluster analysis methodology used to empirically identify social investment strategies. Section 4 presents the results of the anal-

ysis, by focusing on social investment strategies after the financial crisis. Section 5 offers a first attempt to contextualize the findings of the cluster analysis in light of the variation in the institutional design of social investment policies after the financial crisis. Section 6 summarises the main findings and concludes.

2 Identifying social investment strategies

Large part of the empirical literature on social investment has focused on tracing trajectories of welfare recalibration and policy change. Quantitative studies mostly look at the structure of social expenditure and at welfare recalibration through measurements of government expenditure on new 'capacitating' or 'preventative' policies, as opposed to old 'compensatory' social policies (Vandenbroucke and Vleminckx, 2011). Such literature has focused on services for social investment, which mostly include in-kind benefits, as opposed to cash benefits for social protection (Ronchi, 2016), and on social investment policies targeted at different age groups of the population and serving different social functions (Bakker and van Vliet, 2019, Plavgo and Hemerijck, 2020). Quantitative studies focus on investigating the recalibration of welfare expenditure and on measuring the link between social investment expenditure and social outcomes, with no attention paid to the identification of potential types of social investment strategies common across countries and their development over time.

Overall, the empirical evidence shows a variety of social investment strategies that do not necessarily depend on pre-exiting welfare regimes (Bonoli, 2009) and the recalibration between capacitating and compensatory social expenditure in the social investment approach can reach different degrees.

Similarly, qualitative studies that attempt to trace the trajectories of social investment reforms across welfare regime, manage to establish a link with traditional welfare regimes, but find quite strong country-specific path towards social investment (Hemerijck, 2017; Bouget et al., 2015).

Hence, while quantitative and qualitative studies describe the process of welfare recalibration, both fall short in identifying 'models' or 'strategies' of social investments, either as new social investment models or clearly associated with the canonical welfare regimes. This should not come as a surprise. The literature on comparative social policy abounds in classifications of welfare states (Esping-Andersen 1990, Ferrera 1996, Bonoli, 1997), and these classifications have been designed to group traditional compensatory policies (pensions, unemployment benefits, healthcare), not social investment.

Yet, given that social investment has evolved from pre-existing welfare provisions, the identification of social investment strategies cannot disregard the long-standing tradition of comparative welfare studies (Esping-Andersen, 1990; Esping-Andersen et al., 2002; Ferrera, 1996; Hemerijck, 2013). In practice, social investment developments are embedded in welfare regimes (Kuitto, 2016), though social investment strategies do not necessarily match canonical welfare regimes.

Overall, social investment spending increased from the late 1980s to the years before the financial crisis, across all regimes. Yet, the general trend conceals wide differences across countries, whereby EU member states are not equally placed with respect to the social investment-orientation of their welfare states (Nikolai, 2012). For instance, the Nordic social-democratic welfare states have been traditionally considered forerunners of social investment (Busemeyer, 2015; Garritzman, 2016). Yet, with the outbreak of the financial crisis, also the Nordic welfare states experienced a setback in their social investment expansion (Nygård et al., 2019). Southern member states are traditionally considered laggards in social investment recalibration (Kazepov and Ranci, 2017), but some of

them, like Spain, have undertaken different patterns in recent times.[1] Also continental or conservative welfare states have followed different paths over time. The Netherlands was the first to jump on the social investment wagon (Visser and Hemerijck, 1997; Hemerijck and Marx, 2010) but it was also the first one to shirk social investment policies after the financial crisis. By contrast, Germany was considered a latecomer to social investment developments in the early 2000s, but it then invested in childcare policies in the late 2000s (Seeleib-Kaiser, 2016). Finally, liberal welfare states undertook social investment policies earlier in the 1990s, initially with the introduction of activation measures and, in a second stage, investment in early childhood care, education and parental leave (Morgan, 2013). However, after the outbreak of the Great Recession, Ireland experienced a significant reduction of social investment.

Against this background, a gap in the literature emerges and additional empirical investigation is needed to identify social investment strategies and their evolution over time. In addition, two streams of literature, the empirical one focused on social investment expenditure and the qualitative one focused on comparative welfare states, should be linked to contextualise emerging trends and countries commonalities in social investment. Closing this gap is the purpose of the paper.

3 Data and the cluster analysis

The empirical analysis conducted in this paper covers different areas of social investment (see Table 1) that pertain to different life stages. It considers both the expenditure and the coverage dimension of social investment[2], over the period 2004-18, for the EU27 member states[3]. Expenditure variables are measured as budgetary effort, namely spending relative to target population[4], to capture the effort *per* potential beneficiary and remove the effect of changes in the economic cycle and demographic structure (Ronchi, 2016). Similarly, gross enrolment rates are calculated dividing the enrolled/participating population by the target population for level of education/adult learning.

Empirical research delving into specific areas of social policies that relate to social investment provide a useful background and reference from a methodological point of view. Most of these existing analyses concern family policies (Mishke, 2011; Pezer, 2018; Thevenon, 2011) and these studies use clustering and Principal Components Analysis (PCA) to identify groups of countries with similar family policy approaches (Anderson, 2007; Bambra, 2007; Danforth, 2010; Ferragina et al., 2015; Gough, 2001; Paniscu et al., 2014; Mishke, 2011; Pezer, 2018; Sharkh and Gough, 2010, Thevenon, 2011).

When running a cluster analysis, an important factor to consider is the ratio between the number of variables and of sections (i.e. in this case the number of countries). As the number of variables grows, country observations become more and more scattered across different dimensions and, therefore, the structure of clusters becomes increasingly less clear.[5] Given the structural limitation to 27 sections (i.e. EU member states), PCA is used to eliminate redundant information on correlated variables (Bartholomew et al., 2008). The PCA returns restructured data in the form of components that contain most of the information on the variance among countries for the different varia-

[1] Spain embarked on social investment with family policies (León and Pavolini, 2014) and labour activation measures (Guillén and León, 2011)

[2] This analysis considers coverage "as actual recipients" (Nelson and Nieuwenhuis, 2021: 3) of social policy benefits or services over the relevant target group of the population.

[3] For a detailed overview of data sources and series, as well as estimations of missing values, see Annex 1.

[4] The target population for Family and children and for Education indicators relies on statistics broken down by five-years age categories. Working age expenditure, instead, relies on adjusted LFS series of unemployed population available for the age group 20-64. Adult learning participation rate, instead, is originally available with the age group 25-64. For more details, see Annex 1.

[5] Indications on the ratio of observations and variables are e.g. a sample size of at least 2^k observations, where k is the number of variables (Formann, 1984) or a sample size of 70 times the number of variables (Dolnicar et al., 2013).

bles. The number of components to retain is determined based on the components' weight in explaining the entire variance of the dataset and their eigenvalues.[6]

In this analysis, the PCA is conducted on five-year averages across all the three sub-periods for the 13 variables indicated in Table 1. The three five-years periods on which the averages are calculated correspond to the period before the financial crisis (2004-08), during the crisis (2009-13) and after the crisis (2014-18). It uses the standardised form in z-scores of the original variables.

Table 1. Overview of the social investment variables analysed

Pillar of SI	Policy area	Target population	Expenditure / coverage
Families & children	Families	0-19	Expenditure
	Childcare	0-4	Expenditure
	Parental leave	0-4	Expenditure
	Pre-primary	0-4	Expenditure
	Pre-primary (enrolment rate)	0-4	Coverage
Education	School	5-19	Expenditure
	School (enrolment rate)	5-19	Coverage
	University	20-34	Expenditure
	University (enrolment rate)	20-34	Coverage
Working age	ALMPs	20-64 (unemployed)	Expenditure
	PES	20-64 (unemployed)	Expenditure
	Training	20-64 (unemployed)	Expenditure
	Adult learning participation (rate)	25-64	Coverage

Note: SI = social investment; ALMPs = Active Labour Market Policies; PES = Public Employment Services. Each expenditure item (i.e. policy area) is expressed in *per capita* terms, scaled down to the target population of each policy area. The target population for Family and children and for Education indicators relies on statistics broken down by five-years age categories. Working age expenditure, instead, relies on adjusted LFS series of unemployed population available for the age group 20-64. Adult learning participation rate, instead, is originally available with the age group 25-64 (see Annex 1).*Source*: Authors' own compilation

The cluster analysis is then conducted for each of the three sub-periods separately using the scoring of the main components obtained from the PCA for each combination of country and period. A hierarchical clustering using Ward's linkage method based on Euclidean distance is applied. The visual inspections of the dendrograms, returned by the hierarchical clustering for each period, allows the identification of the number of clusters. The main criterion for the selection is the balance between having distinct clusters in terms of characteristics while keeping a homogenous distribution of countries among clusters. Robustness checks, as detailed in Annex 2 Detailed results, delivered consistent results in terms of number and composition of the clusters.

4 Evolving social investment strategies

Following the methodology described above, the first step consists in conducting the PCA for each variable across the three sub-periods. This delivers three main components, which explain 74% of the entire variance in the dataset and serve as basis to cluster EU member states. The loadings of each variable in the components show which part of the variance each component captures (Table

[6] There are not specific rules to apply for the selection of components; yet usually, only those with an eigenvalue of at least one are retained.

2) and are important for the interpretation of the results of the cluster analysis, as they allow to go back to the policy variables driving the components.

Component 1 'expenditure' captures 51% of the variance in the dataset (see table A2.1). It is mainly driven by variables on expenditure and adult learning participation. It can be interpreted as the financial effort in social investment. All main policy areas, such as families and children, education and labour market policy, move together in this component (i.e. have the same positive sign and have similar loadings), suggesting a holistic approach to social investment. The only exception is expenditure on parental leave[7], which is instead negatively correlated with this component.

Expenditure on parental leave and almost all variables of expenditure and coverage related to social investment early in life mainly drive component 2, which captures 12% in the variance of the dataset, according to table A2.1. Because of the variables behind it, this component is labelled 'early-life focus'. Variables related to social investment later in life are all negatively correlated with this component, pointing to a contrast, early versus later in life, in the orientation of social investment strategies. The expenditure on childcare is positively correlated with component 2, however, its loading is higher in component 1, possibly because this variable tends to be positively correlated with expenditures on social investment at later life stages. The smaller loading of expenditure for childcare, which is an in-kind type of social investment at early ages, in component 2 is also likely to be the result of a negative correlation of this variable with expenditure on parental leave, an in-cash type of expenditure, which is the main driver of component 2.

Component 3 accounts for another, smaller, part of the variance in the dataset (i.e. 11%, see table A2.1). It is named 'Enrolment in non-compulsory education' because of the two variables driving it. Adult learning participation is also positively correlated with this component, though it mainly drives component 1, indicating that this variable tends to co-move with levels of participation in earlier education and training.

As second step of the methodology, the scores of these components, calculated for each country in each of the three sub-periods, are used to cluster the countries. Thus, clusters are defined along the three dimensions defined by the PCA results, namely the level of expenditure, the early-life focus of social investment and the enrolment in non-compulsory education. The hierarchical clustering approach (Figure 2) leads to three clusters of countries in each of the three sub-periods considered (Figure 3).

Among the three components, expenditure distinguishes the clusters the most, in each of the three sub-periods, and emerges as a defining characteristic of the social investment strategies. The early-life focus and enrolment in non-compulsory education contribute to distinguishing clusters to a lesser extent. Yet, the role of the latter components seems more pronounced over time. Importantly, both the clusters' composition and the specific characteristics of each cluster vary over time.

[7] For information about data for parental leave expenditure, see chapter 6 of the ESSPROS 2019 manual (Part 2). Coherent definition is also provided by the MISSOC database.

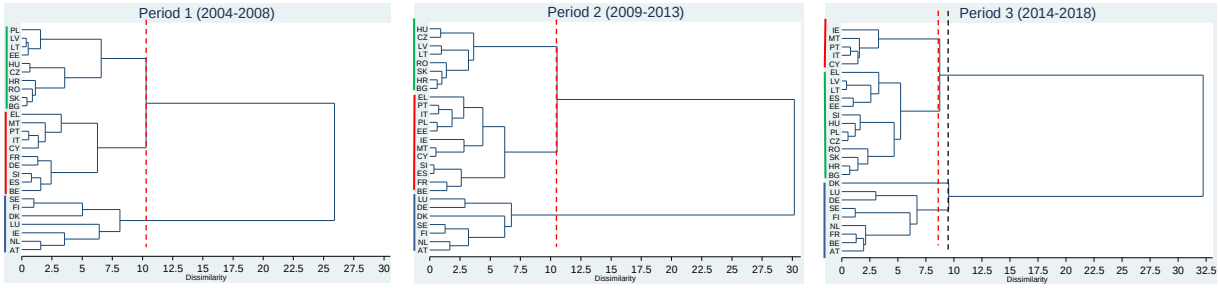
Table 2. Principal component analysis

Pillar of SI	Policy area	Loadings of variables on the components		
		Component 1	**Component 2**	**Component 3**
		Expenditure	**Early-life focus**	**Enrolment in non-compulsory education**
Family & children	Family	0.2973	0.3132	-0.253
	Childcare	0.3377	0.1603	0.0832
	Parental leave	-0.1119	0.5218	0.1197
	Pre-primary	0.2478	0.4598	0.0877
	Pre-primary (enrol. rate)	0.1317	0.3973	0.5196
Education	School	0.3316	-0.0901	-0.2379
	School (enrol. rate)	0.2253	-0.1841	0.1736
	University	0.3507	-0.216	0.1003
	University (enrol. rate)	0.0577	-0.3438	0.6645
Working age	ALMPs	0.3519	-0.0121	-0.1427
	PES	0.2975	-0.0653	-0.108
	Training	0.3081	-0.1377	-0.1592
	Adult learning (partic. rate)	0.3347	-0.0657	0.2035

Notes: overall KMO test = 0.81; overall variance explained = 74%. See Annex 2 Detailed results for further details.
Colour code: Green: loading>0.3, light green >0.2. Orange: negative loading in absolute value >0.3.

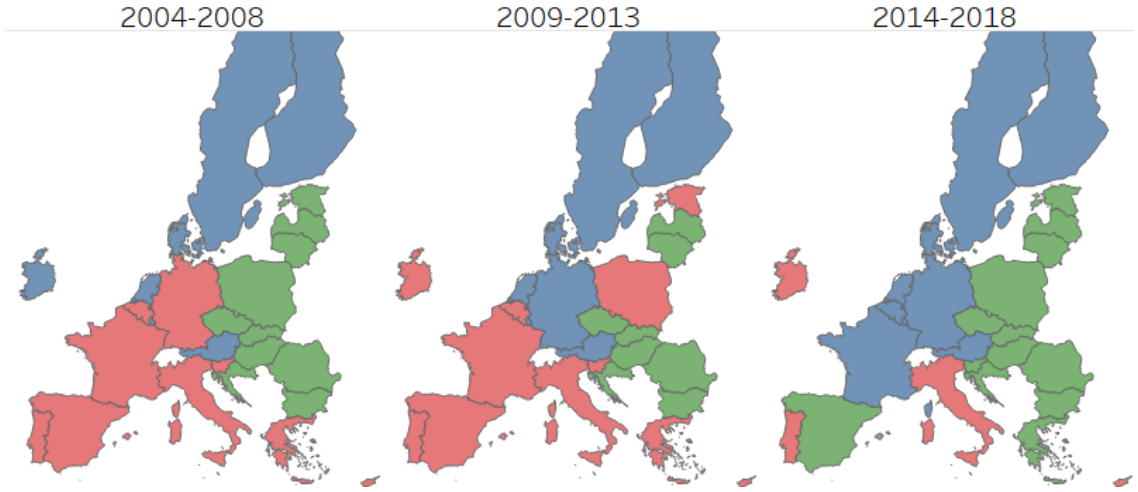
Source: Authors' own compilation

Figure 2. Hierarchical clustering of 27 EU countries, by sub-period, Ward's method and Euclidean distances



Source: Authors' own compilation

Figure 3. Clusters of EU member states over the three periods



Source: authors' own compilation.

Before the financial crisis (2004-08), the clusters appear clearly stratified according to the expenditure component, while the other two components do not play any role.[8] The blue cluster, which includes the three Scandinavian countries, some other countries associated with the continental welfare regime (i.e. the Netherlands, Luxembourg and Austria) and Ireland, with a liberal welfare regime, is characterised by high overall expenditure on social investment. The red cluster, which includes continental (i.e. France, Germany and Belgium) and southern European countries (i.e. Portugal, Spain, Italy, Greece, Malta and Cyprus) as well as Slovenia, is characterised by an intermediate level of expenditure, in comparison with the other two clusters. The green cluster is composed of Central and Eastern European countries, which show on average a social investment strategy defined by low overall expenditure.

During the recession following the financial crisis (2009-13), the clusters are still defined markedly by the overall expenditure on social investment. However, the component describing the early-life focus of social investment gains in importance[9]. The blue cluster, which is still characterised by (relatively) high expenditure in social expenditure and no notable features linked to the other two components, still includes the Scandinavian countries and now most of the continental welfare regime countries (i.e. Austria, Germany, Luxembourg and the Netherlands). Yet, this cluster appears to have lost Ireland, which experience a major fiscal and financial crisis and move to a cluster with lower expenditure. The red cluster is still composed of a mix of southern countries (i.e. Portugal, Spain, Italy, Greece, Malta and Cyprus) and continental countries (i.e. Belgium and France), in addition to Ireland and some Central and Eastern European countries (Slovenia, Estonia and Poland). A low-to-medium expenditure on social investment and a low focus on investing in early ages feature this cluster. The green cluster, composed of several Central and Eastern European countries, has on average the lowest expenditure on social investment. Yet, it shows a greater focus on social investment in early ages.

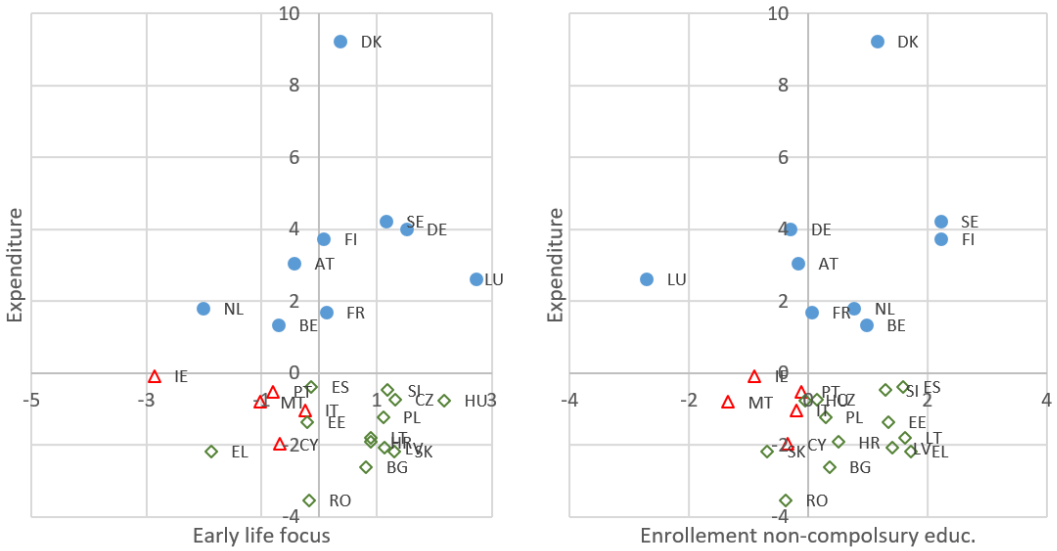
In the sub-period after the financial crisis (2014-18), stratification along expenditure is still clearly visible, but the early-life focus and enrolment in non-compulsory education become more important in the identification of the clusters, as shown in Figure 4. On average, the countries in the blue cluster are still those that spend the most on all core areas of social investment, such as overall family policy, school and ALMPs (Figure 5). With the sole exception of Luxembourg, this cluster also shows high enrolment in non-compulsory education (Figure 4). By contrast, the early-life focus of social investment does not appear as a clear-cut feature of the cluster altogether, although some of the

[8] See Annex 2 Detailed results for the scatterplot of clusters in the period 2004-2008.

[9] See Annex 2 Detailed results for the scatterplot of clusters in the period 2009-2013.

countries exhibit a marked early-life focus (Figure 4). The internal variation regarding early-life focus is even more evident when looking at expenditure for overall family policy across the countries in this cluster (Figure 5).

Figure 4. Clusters of countries across social investment expenditure, early-life focus and enrolment in non-compulsory education after the financial crisis (2014-18)



Source: authors' own calculation.

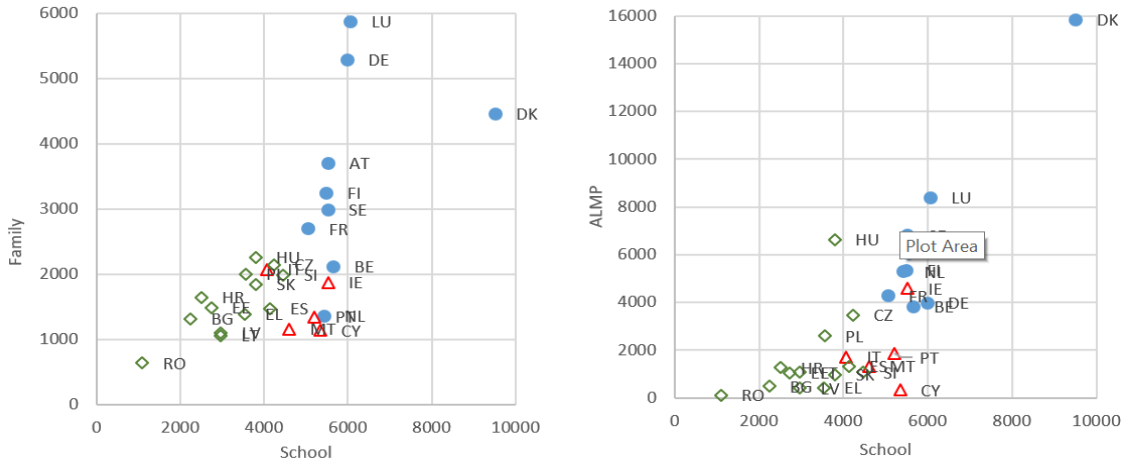
Countries in the blue cluster appear to be best performers in nearly all individual areas of expenditure analysed, in spite of some exceptions, and to have a social investment strategy that seems well developed for all areas of policy throughout the life course, and not necessarily focused exclusively on early ages. The fact that they are not featured by a specific focus on early ages as defined by the component 2, which is driven mainly by in-cash benefits for parental leaves, may be because they are more oriented towards service provision through in-kind expenditure (e.g. childcare services), which is a main driver of component 1. On this ground, the social investment strategy adopted by countries in the blue cluster can be labelled as '*balanced*'.

The red and the green clusters define two approaches to social investment that lag behind the 'balanced' strategy. Yet, these two clusters differ in several aspects. The red cluster remains characterised by low-to-medium overall expenditure on social investment, but also by a lack of early-life focus and, on average, low enrolment in non-compulsory education. The green cluster is also characterised by low overall expenditure on social investment. However, albeit a few exceptions (e.g. Greece), its distinct feature is a stronger focus towards social investment in early ages rather than in later life, as defined by component 2, which is mainly driven by in-cash parental leaves. Furthermore, it exhibits wider enrolment than the red cluster in non-compulsory education, with the exceptions of Slovakia and Romania (Figure 4).

As illustrated in *Figure 5*, the green and red clusters are also distinguished mainly in terms of expenditure for schooling. The red cluster has on average higher expenditure for schools than the green one, but, still on average, lower expenditure in policy areas for early life stages, included in overall family policy. With limited investment in the latter, countries in the red cluster seem to focus on older ages, mostly through higher expenditure on school, but not through ALMPs. Given these features, the strategy for social investment adopted in the countries belonging to the red cluster is interpreted as '*basic*'. This tag does not necessarily refer to the overall level of expenditure on social investment, which is, on average, more or less intermediate *vis-à-vis* the other two clusters. It recalls, instead, the limited enrolment in non-compulsory education and underlines the priority of expenditure on an important yet traditional policy area, namely compulsory education in schools. It

implies the little effort put into policy areas addressing new social risks, like parental leave or childcare for work–life balance, or ALMPs to prevent long-term unemployment.

Figure 5. Social investment expenditure in selected policy areas after the financial crisis (2014-18)



Source: authors' own calculation.

The social investment strategy characterising countries in the green cluster can be labelled '*bent*'. This points to the prominent orientation of social investment expenditure towards early ages, especially through cash benefits for parental leave, as opposed to policies targeting education, such as schooling, and ALMPs. Figure 6summarises the key distinctive characteristics of the three clusters.

Figure 6. Summary of strategies after the financial crisis (2014-18) and country clusters

Balanced strategy

- High capacitating expenditure on all main areas of social investment
- Medium/high enrolment in non-compulsory education
- Best performers in each area of expenditure throughout the life course
- On average, high expenditure for early life stages, especially through childcare services.

Basic strategy

- Low/medium overall capacitating expenditure on main areas of social investment
- Low/medium enrolment in non-compulsory education
- Social investment orientation towards later ages, especially through school and university
- On average, low expenditure in all types of policies for early ages.

Bent strategy

- Low/medium overall capacitating expenditure on main areas of social investment
- Medium/high enrolment in non-compulsory education
- Social investment orientation towards early ages rather than later in life (e.g. during school and university)
- On average, medium/high expenditure for early life stage, especially through in-cash parental leaves.

Source: authors' own compilation.

5 Institutional design features and social investment strategies

In order to better understand and contextualise the social investment strategies identified, we look at the institutional design features of social investment policies in EU member states, as grouped by the cluster analysis, during the last period analysed (2014-18). The focus is on policies for early life stages, namely child and family policies, because these emerge as key in defining social investment strategies.

Taking insights from the social investment literature and varieties of familialism (Leitner 2003; Hausermann, 2018; Beramendi et al., 2015, Wiss and Greve, 2020; Thevenon, 2011; West et al., 2020), we look at three dimensions of childcare policies: availability, affordability and quality. Availability is measured in terms of universality, means-tested or right-based entitlement to access to childcare facilities. Affordability is measured in terms of net costs for parents to enroll the children to childcare facilities and based on the existence of specific provisions for vulnerable groups. Quality is measured in terms of numbers of hours guaranteed. These indicators are retrieved from the OECD Starting Strong and Eurydice comparative reports. With respect to family policies, we focus on (maternity and paternity) leave measures. Based on comparative family policies literature, we distinguish between two dimensions: generosity (replacement rate) and duration of the leave. Data are retrieved from MISSOC database (see Annex 3).

Balanced social investment strategy cluster

With overall high spending both in family and childcare policies, countries with a balanced strategy seem to have an *optional familialism* approach (Leitner, 2003; Hausermann, 2018), on average. Both childcare services and generous income support measures for family care are indeed provided, thus leaving the family the decision to take up its care responsibility or to unburden from them. The institutional design of family and child policies confirms this interpretation, yet with some differences across countries and a notable exception. On the one hand, Sweden, Denmark and Finland adopt an approach explicitly targeted at a dual-earner family, which aims to lift the care provision from families, and notably women (*de-familialization*) and incentivise a quick return to the labour market, with high-quality, affordable, and available childcare service as well as generous maternity and (especially) paternity leave policies. On the other hand, Germany maintains a more balanced optional familialism approach, which is found (except for early childcare) also in France, Luxembourg, Austria and Belgium. While leaving to the families the choice in allocating time and resources to either care or employment, this approach remains attached to single-earner (male breadwinner) family models. A notable exception is represented by the Netherlands, with less affordable childcare provisions, not-guaranteed access to childcare facilities and highly generous leave policies (in particular maternity leave), which seem to follow a *supported de-familialization* through the market approach (Saraceno, 2016).

More in detail, Denmark, Finland, Germany and Sweden guarantee universal access as a legal entitlement to all children from the age of one. While in Sweden and Finland attendance is compulsory, in Germany and Finland it is not. Germany, Sweden and Demark have comparatively lower costs than the OECD average[10], while Finland has higher costs. By contrast, France, Luxembourg, Austria and Belgium guarantee a means-tested access to childcare and a legal entitlement from the age of 3[11], with attendance compulsory to pre-primary education in France and Luxembourg, but not in Belgium. In terms of costs, while in Luxembourg and Austria net childcare costs for parents are relatively low, in France and Belgium, they are slightly higher but still under the OECD average. Finally, in the Netherlands there is no legal entitlement to childcare but it is compulsory and free of charge for participation from the age of 5. Because of the specific market-based childcare system,

[10] This indicator measures the net costs paid by parents for full-time centre-based childcare, after any benefits designed to reduce the gross childcare fees, as percentage of the average wage

[11] In the case of Austria, the legal entitlement starts from the age of 5.

net childcare costs for parents are particularly high. In terms of quality, Finland, France, Austria and Luxembourg guarantee at least 20 hours per week, Sweden guarantees 15 hours per week, while in Denmark, Germany and the Netherland the number of guaranteed hours varies across regions.

With respect to leave policies, Luxembourg (20 weeks) has the most generous and longest maternity leave, followed by Austria and the Netherlands with 16 weeks full-time equivalent[12], France and Germany (14 weeks), Finland (13 weeks) and Sweden, Denmark and Belgium (10 weeks). With respect to paternity leave, Finland is characterised by the longest and most generous policy (38 days full-time equivalent), followed by France (11 days), Belgium, Sweden and Denmark (around 8 days). By contrast, Austria, the Netherlands, Germany and Luxembourg guarantee less than 2 days of paternity leave, which is paid less than sick-pay level.

Basic social investment strategy cluster

Countries with a basic strategy, with overall low spending both in family and childcare polices seems to pursue an *intrinsic familialism* strategy. These countries neither offer de-familialization policies (i.e. policies that unburden families from their care responsibility, such as child day care services) nor actively support the caring function of the family through any kind of *familialistic* policy (e.g. paid leaves or any family benefit). This interpretation is confirmed also in the institutional design of the childcare and leave policies, except for Portugal. With an overall preference for income support care policies, notably maternity leaves, over employment-based childcare provisions, Italy, Ireland, Malta and Cyprus show an *implicit familialism* approach. This approach remains attached to a single-earner (male breadwinner) family model, *de facto* disincentivising (female) employment and shifting the burden of care responsibilities on family (notably women). By contrast, Portugal is characterised by accessible, affordable and quality childcare provisions and highly generous paternity leaves, that makes its approach closer to an *optional familialism*.

In detail, Italy, Cyprus, Ireland and Malta are characterised by no guaranteed access to childcare services for early ages (0-3), and no legal entitlement even at later ages. Universal and free of charge access to pre-primary school is guaranteed for pre-primary school (3-5 years old). In terms of affordability, the net costs for parents are relatively high in Ireland and Cyprus, while they are low in Italy and Malta. No targeted measures for disadvantaged groups are envisaged in the other countries. There are no national guidelines on the minimum number of weekly hours to be guaranteed. By contrast, Portugal guarantees access to childcare facilities from the age of 3 as a legal entitlement, net childcare costs for parents are relatively low and of good quality.

Significant cross-country variation exits in leave policies. Italy is the country with the most generous maternity leave policies, guaranteeing around 17 weeks in full time equivalent, followed by Malta (14 weeks), Cyprus (12 weeks), Ireland (7 weeks) and Portugal (6 weeks). By contrast, with respect to paternity leaves, Portugal guarantees 25 days' full time equivalent, while Cyprus (10 days), Malta (5 days), Italy (4 days) and Ireland (0 days) lag behind.

Bent social investment strategy cluster

With significant spending in family policies, especially in terms of leaves, countries with a bent strategy seems to pursue an *explicit familialism* approach, which strengthens the role of families in caring for children but lacks the provision of alternatives for family care (Szelewa, 2016; Saraceno, 2016). Yet, the analysis of the institutional design of family and childcare policies shows a quite significant variation across countries.

[12] This is calculated as follows: ((duration)*(replacement rate))/100

Overall, Slovenia, Estonia and Latvia have an approach in line with the Scandinavian countries, aimed at supporting a dual-earner family model. A de-familialising approach is pursued through employment-based care provisions, which aim first at keeping women in the labour market, at the same time supporting (in a gender balanced way) families' care responsibility in children early life course through generous maternity and especially paternity leaves. By contrast, Poland and Spain pursue an explicit familialism approach that is closer to France and Belgium, with childcare provisions only from the age of three, and with generous paternity and maternity leaves. A more traditional explicit familialism is pursued by the Czech Republic and Hungary that adopt a family-based care strategy, with the burden of the responsibility mostly on women. The remaining countries show a very poor institutional design of both childcare and family policies, that point to a kind of implicit familialism approach, in line with countries adopting a basic strategy to social investment.

In detail, Estonia, Latvia and Slovenia have a legal entitlement to access services free of charge when a child turns 1.5 years old (Estonia and Latvia) or 9 months old (Slovenia). Poland, Hungary, the Czech Republic and Spain guarantee a legal entitlement to free access to pre-primary school at the age of 3. Access to services is not guaranteed in Slovakia and only from the age of 4 in Greece and 5 in Bulgaria and Romania. In terms of affordability, the net childcare costs for parents varies significantly, with the costs well above the OECD average in Slovakia (31%) and Czech Republic (25%), and lower in Slovenia (12%), Lithuania (11%), Poland (10%), Romania (10%), Greece (9%), Estonia, Latvia, Bulgaria (8%), Hungary and Spain (7%). Significant variation emerges also in terms of quality of the childcare facilities, with no minimum guaranteed hours per week in Estonia, Romania and Slovakia, less than 20 hours per week guaranteed in Croatia, Bulgaria, Hungary, Lithuania, and more than 20 hours in the Czech Republic, Greece, Poland and Spain.

Significant cross-country variation exits in leave policies. Estonia, Slovenia, Poland, Lithuania, Spain and Latvia have generous paternity, and at the same time high replacement rates and long durations for maternity leave. The Czech Republic and Hungary provide for long, paid maternity leave, but for short paternity leave. Slovakia, Croatia, Greece, Bulgaria and Romania have very generous maternity leave policies (with long durations and high replacement rates, except for Greece and Croatia), but very restricted paternity leave.

6 Concluding remarks

This paper identifies three types of social investment strategies that emerged or were consolidated in the EU27 over the period 2004-18. It documents their development, looking at expenditure and coverage in three policy areas: families and children, education, and working age. The paper zooms in on the years after the financial crisis, characterises the social investment strategies through expenditure in some selected key social investment policies, and contextualises the cluster analysis by looking at institutional design features of selected policies that significantly contribute to identify and discern between social investment strategies

Overall, five main messages can be drawn from the analysis.

First, the study of the evolution of clusters before, during and after the financial crisis shows that over time social investment strategies differentiated in a progressively complex way. While in the first period the strategies differed mostly in terms of overall expenditure, additional features emerged, and more markedly so, after the financial crisis. This suggests a dynamic reorientation of welfare policies and in particular within the social investment sphere. This is happening in a more complex fashion than simply shifting expenditure towards social investment areas *tout court*. This is consistent with the emergence of varieties of social investment strategies, which seem more the result of governments attempting to respond to new demands from society, rather than a plan to deploy social investment models designed *ex-ante*. In this sense, the findings of the cluster analysis can be seen as a sort of revealed policy preferences among a bundle of options for social invest-

ment. The role played by the financial crisis and the recession in its aftermath in this shifting and differentiation of social investment approaches remain an interesting aspect to investigate in further analyses.

Second, and consistently with the previous finding, the analysis of the clusters identified in the period after the financial crisis, points to three types of social investment strategies in the EU27, that we label *balanced*, *basic* and *bent* strategy. These strategies exhibit different combinations and degrees of the three features of social investment identified by Vandenbroucke and Vleminckx (2011): effort in capacitating expenditure, attention to different new social risks, services *versus* in-cash benefits.

Third, the paper allows a comparison of the cluster composition after the financial crisis *vis-à-vis* the traditional welfare regime classification. The analysis shows a convergence of Nordic and continental welfare states towards a similar, well-developed, balanced strategy of social investment considering the entire life course and investing in service provisions. Meanwhile, countries with southern welfare regimes diverge in their strategies. This group, together with Ireland (with a liberal welfare regime), exhibits limited social investment, with a strategy based mainly on education. The other southern countries are clustered with Central and Eastern European countries in a strategy that has limited overall expenditure on social investment and a marked orientation towards early ages through in-cash benefits. This seems to point to an evolution in the welfare regimes. Further research in this area might lead to a reclassification, which looks beyond the recalibration between social protection and social investment, and accounts for the specific measures of social investment and the risks targeted. Further analyses in this sense might even adopt a more comprehensive approach including other functions of the welfare state, beyond those traditionally assigned to the social investment approach, such as policy areas traditionally considered in the social protection domain.

Four, the analysis points to a significant internal variation within the clusters and thus in the social investment strategies identified by policy outputs. This indicates that fully-fledged homogenous strategies have not yet formed in well-defined groups of countries in the EU27. In line with what stated above, further research could help to refine methods and data to continue investigating developments in social investment trajectories in the EU and eventually lead to define social investment models and better understand welfare states evolutions.

Finally, there is also significant heterogeneity in the institutional design features of child and family policies, the policy areas that contribute to distinguish the clusters in the post-crisis period. Familialism approaches, from optional, to intrinsic to explicit, appear to broadly match the three strategies identified by the clusters (balanced, basic and bent). Yet, within each cluster, significant cross-country variation exists in the generosity and duration of family policies, as well as in availability, affordability and quality of child policies. This highlights that institutional design features vary even within groups of countries that display similar patterns of expenditure. This finding suggests that different policy designs can lead to the same policy output, and *vice versa,* and deserve deeper investigation.

Overall, the explorative data-driven analysis and a contextualization focused on selected policy areas, presented above, open the avenue to more extensive research that bridges two streams of literature that tend to run in parallel. Linking qualitative comparative welfare literature to empirical analysis of social investment strategies could help explaining differences in social outcomes across the EU, in terms of education, employment, gender equality, poverty and inequalities, which are all particularly relevant in the aftermath of the Covid-19 crisis.

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7 Annex

7.1 Annex 1 Methodological note

7.1.1 Data sources and estimation

Table A1.1 reports the specific data sources and specifications for each variable.

Items of expenditure were accessed in national currency and then standardised to 2005 prices and harmonised with the purchasing power parities (PPPs) index. The final consumption expenditure of the general government was selected as a national account indicator for the 2005 price index, and government services as an analytical category for the PPP index.

For expenditure on families and children, the subcomponents of childcare and parental leave were selected from the in-kind and in-cash benefit categories, respectively. In the case of parental leave, the sum of both periodic and lump-sum benefits was taken.[13]

For education, all the indicators relied on two different series due to a break in statistics and a change in classification from the International Standard Classification of Education (ISCED) 1997 to ISCED 2011. The categories almost fully overlapped with a few additional breakdowns provided by the ISCED 2011 classification. For pre-primary education, category 02 in ISCED 2011 corresponded to category 0 in ISCED 1997, while for tertiary education, categories 5, 6 and 7 in ISCED 2011 corresponded to category 5 in ISCED 1997, and category 8 in 2011 to category 6 in 1997. For school, primary, secondary and upper-secondary were considered to be covered by ISCED categories from 1 to 4. Gross enrolment rates were calculated using the number of students in the same ISCED categories applied to expenditure, and with the same target population identified for the budgetary effort.

The final indicators selected provided a good overall coverage with a few gaps for specific years, which were estimated with interpolation and extrapolation based on information available for the previous and following years. For country-specific cases with missing information for different years and where estimates based on interpolation and extrapolation were not reliable, values were estimated using a mixed approach relying on the previous literature on clusters of EU countries by social investment developments (Bouget et al., 2015). First, the clusters identified in Bouget et al. (2015) were considered; second, for all the available years, the country's values were compared with the average of its cluster; and third, missing years were estimated by applying the differential between the country vis-à-vis its cluster calculated for the available years to the average of the cluster for the missing years. This approach was applied to Denmark for expenditure on pre-primary education for the years 2012-18; to Luxembourg for expenditure on university education for the period 2004-11, for 2013 and for 2017-18; and to Croatia for expenditure on pre-primary, school and university education for the years 2012-18.

[13] For detailed information, see chapter 6 of the ESSPROS 2019 manual https://ec.europa.eu/eurostat/documents/3859598/10295301/KS-GQ-19-014-EN-N.pdf/e7c8c019-944c-1c71-aee5-1ffc8ce45200?t=1575969094000 .

Table A1.1 Detailed overview of data sources and data series specifications

Area	Function	Data source	Table code	Table name	Last year available	Series name and specifications	Target population of SI
Family & Children	Family	Eurostat – ESSPROS	spr_exp_ffa	Tables by benefits - family/children function	2017	Expenditure in social protection benefits	0-19
	Child-day care	Eurostat – ESSPROS	spr_exp_ffa	Tables by benefits - family/children function	2017	Expenditure in child day care	0-4
	Parental leave	Eurostat – ESSPROS	spr_exp_ffa	Tables by benefits - family/children function	2017	Expenditure in parental leave benefits (periodic and lump sum)	0-4
	Pre-primary	Eurostat – EDUC	educ_figdp	Expenditure on education as a % of GDP or public expenditure [1]	2011	Expenditure in pre-primary education (ISCED 02) [3]	0-4
			educ_uoe_fine02	Public educational expenditure by education level [2]	2016		
	Pre-primary (enrolment rate)	Eurostat – EDUC	educ_enrl1tl	Students by ISCED level, age and sex	2012	Number of students in pre-primary education (ISCED 02) [3]	0-4
			educ_uoe_enra02	Pupils and students enrolled by education level, sex and age	2018		
Education	School	Eurostat – EDUC	educ_figdp	Expenditure on education as a % of GDP or public expenditure [1]	2011	Expenditure in primary (ISCED 1), secondary (ISCED 2), and upper-secondary (ISCED 3-4) education	5-19
			educ_uoe_fine02	Public educational expenditure by education level [2]	2016		
	School (enrolment rate)	Eurostat – EDUC	educ_enrl1tl	Students by ISCED level, age and sex	2012	Number of students in primary (ISCED 1), secondary (ISCED 2), and upper-secondary (ISCED 3-4) education	5-19
			educ_uoe_enra02	Pupils and students enrolled by education level, sex and age	2018		
	University	Eurostat – EDUC	educ_figdp	Expenditure on education as a % of GDP or public expenditure [1]	2011	Expenditure on tertiary education (ISCED 5-8)[4]	20-34
			educ_uoe_fine02	Public educational expenditure by education level [2]	2016		

Area	Function	Data source	Table code	Table name	Last year available	Series name and specifications	Target population of SI
	University (enrolment rate)	Eurostat – EDUC	educ_enrl1tl	Students by ISCED level, age and sex	2012	Number of students in tertiary education (ISCED 5-8) [4]	20-34
			educ_uoe_enra02	Pupils and students enrolled by education level, sex and age	2018		
Working age	ALMPs	DG EMPL	lmp_expsumm	LMP expenditure by type of action	2018	Expenditure on LMP measures (categories 2 to 7)	20-64 (unemployed)
	PES	DG EMPL	lmp_expsumm	LMP expenditure by type of action	2018	Expenditure on LMP services (category 1)	20-64 (unemployed)
	Training	DG EMPL	lmp_expsumm	LMP expenditure by type of action	2018	Expenditure in LMP measure: training (category 2)	20-64 (unemployed)
	Adult learning participation in education and training (rate)	Eurostat – EDUC	trng_lfse_01	Participation rate in education and training (last 4 weeks) by sex and age	2018	Participation rate for age category 25-64	25-64
Background	Population	Eurostat – DEMO	demo_pjangroup	Population on 1 January by age group and sex	2018	Age categories for target populations of budgetary effort and enrolment rates	NA
	Unemployment	Eurostat – LABOUR	une_rt_a	Unemployment by sex and age	2018	Adjusted Labour Force Survey (LFS) series of unemployed population, age category 20-64	NA
	GDP at market prices	Eurostat	nama_10_gdp	GDP and main components (output, expenditure and income)	2018	GDP current prices Mio NAC	NA
	Price index 2005	Eurostat	nama_10_gdp	GDP and main components (output, expenditure and income)	2018	Price index 2005=100 NAC, national account indicator: final consumption expenditure of general government	NA
	PPP Index EU-27	Eurostat	prc_ppp_ind	Purchasing power parities (PPPs)[5]	2018	Purchasing power parities (EU27_2020=1), Analytical categories for PPS: government services	NA

Notes: (1) Expenditure on education before 2012 was taken as a % of GDP and converted in levels using GDP at market prices. (2) Full name: public educational expenditure by education level, programme orientation, type of source and expenditure category. (3) Category 0 under the ISCED 1997 classification corresponds to category 02 under the ISCED 2011 classification. (4) Category 5 under the ISCED 1997 classification corresponds to categories 5, 6 and 7 under the ISCED 2011 classification, while category 6 in 1997 corresponds to category 8 in 2011. (5) Full name: purchasing power parities (PPPs) price level indices and real expenditures for ESA 2010 aggregates.
Source: Authors own compilation

7.2 Annex 2 Detailed results

Table A2.1 PCA: Components' eigenvalues and share of variance explained

Component #	Eigenvalue	Variance explained (%)
1	6.604	50.8
2	1.622	12.5
3	1.411	10.9
4	.806	6.2
5	.696	5.4
6	.527	4.1
7	.391	3.0
8	.271	2.1
9	.209	1.6
10	.186	1.4
11	.142	1.1
12	.072	0.6
13	.063	0.5

Source: Authors' own calculations

Table A2.2 PCA: Kaiser-Meyer-Olkin (KMO) test of sampling adequacy for each variable and overall

Variable	KMO test
Families	0.72
Childcare	0.85
Parental leave	0.46
Pre-primary	0.82
Pre-primary (enrolment rate)	0.61
School	0.82
School (enrolment rate)	0.88
University	0.83
University (enrolment rate)	0.41
ALMPs	0.91
PES	0.82
Training	0.84
Adult learning participation	0.84
Overall	0.81

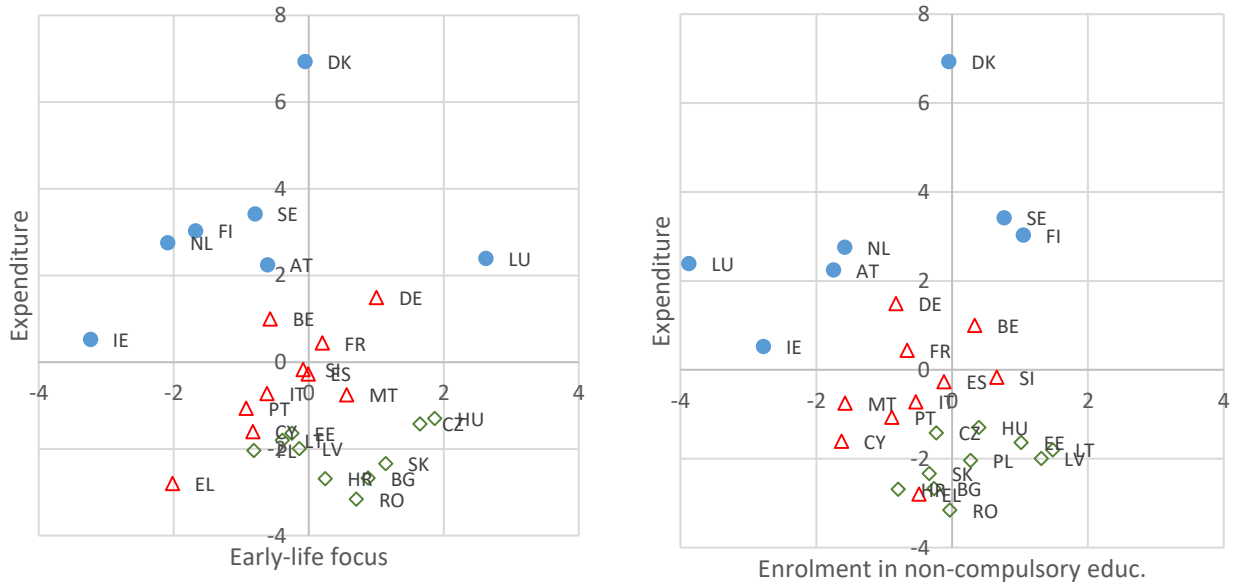
Source: Authors' own calculations

Table A2.3 Cluster analysis: Mean and standard deviation of each component by period and cluster

Period	Cluster	Component 1		Component 2		Component 3	
		Mean	Sd	Mean	sd	Mean	sd
2004-2008	1	3.04	1.95	-0.84	1.86	-1.18	1.84
	2	-0.45	1.25	-0.33	0.86	-0.58	0.73
	3	-2.11	0.60	0.49	0.90	0.28	0.76
2009-2013	1	3.62	1.72	0.13	1.64	-0.12	1.52
	2	-0.83	1.07	-0.80	0.88	-0.18	0.97
	3	-2.12	0.66	0.91	0.71	0.45	0.80
2014-2018	1	3.51	2.39	0.32	1.37	0.48	1.51
	2	-0.89	0.71	-1.12	1.01	-0.58	0.52
	3	-1.64	0.92	0.65	1.02	0.71	0.83

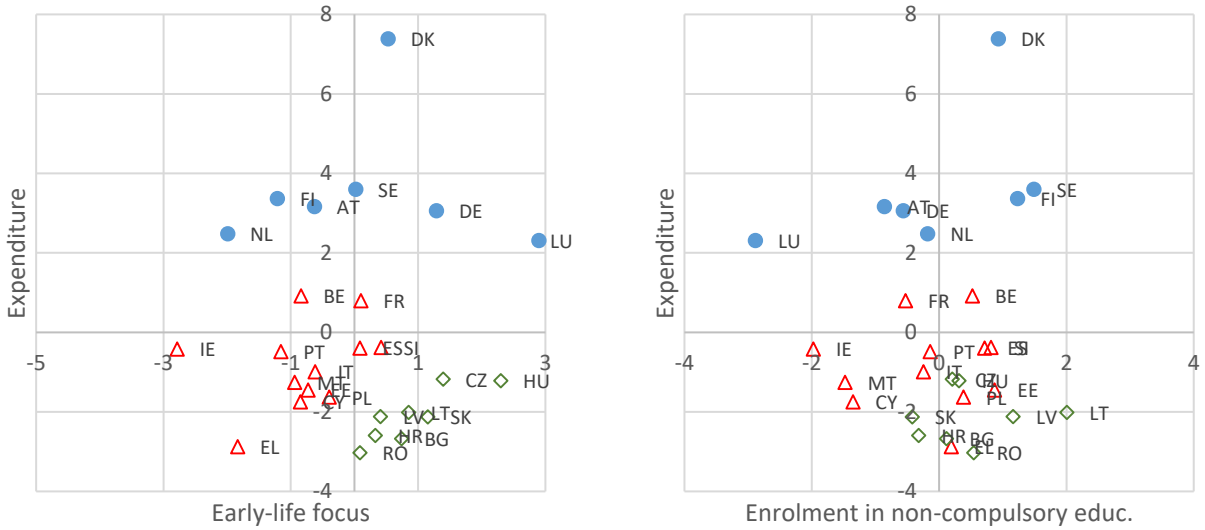
Source: Authors' own calculations

Figure A2.4 Clusters of countries across expenditure, life-course orientation and coverage of social investment before the financial crisis (2004-08)



Source: authors' own calculation

Figure A2.5 Clusters of countries across expenditure, life-course orientation and coverage of social investment during the crisis period (2009-13)



Source: authors' own calculation

7.2.1 Robustness checks

Hierarchical over k-means clustering was chosen based on two reasons: first, the number of clusters was not known while it must be specified *ex ante* when using k-means; and second, hierarchical clustering returns structured results (in the form of a dendrogram), which enable a better interpretation of the results.

The analysis carried out on hierarchical clustering identified three clusters in each of the periods within the scope. Thanks to the structured form of the results, it has allowed identification of one outlier in the last period. A robustness check comparing unstructured results from a k-means clustering can therefore be run by indicating three as the *ex-ante* number of clusters.

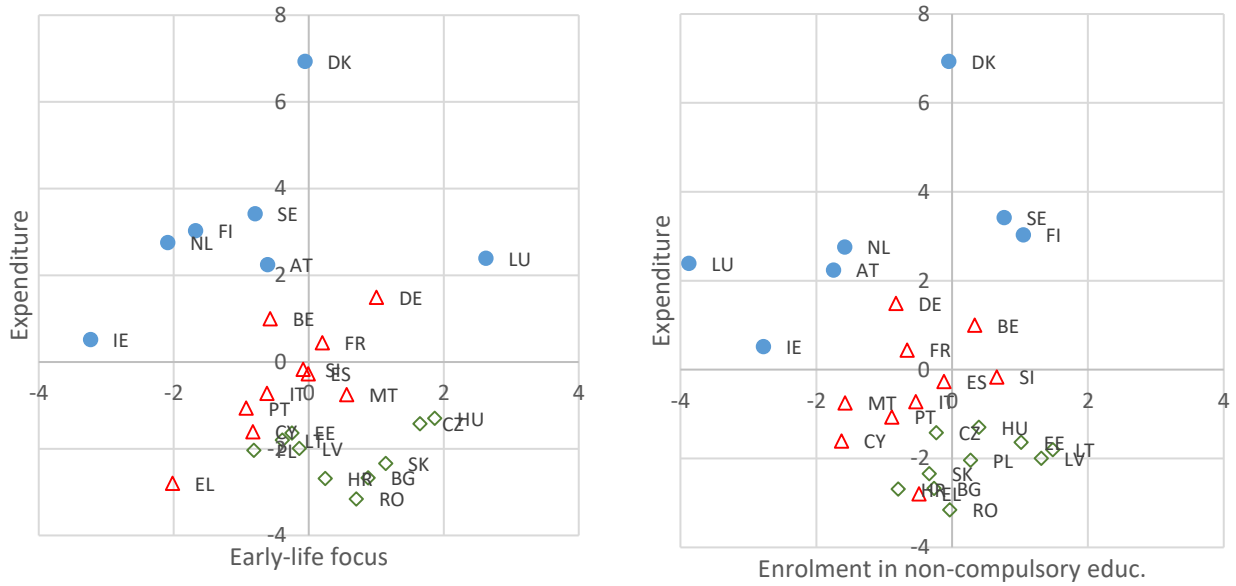
The k-means method, however, also requires specifying the starting points (i.e. centroids) for assigning observations to different clusters. A first check is performed using the centroids obtained from the hierarchical analysis, therefore taking a hybrid approach. The idea is in fact to overcome the two main limitations posed by the k-means (i.e. *ex ante* specification of the number of clusters and sensitivity of the results to an initial random selection of centroids) while also improving computation speed and possibly enhancing the portioning defined by the hierarchical clustering.[14] In this analysis, computation speed does not represent a significant problem given the very low number of observations, but the sensitivity of k-means results to initial centroids is always present.

Assigning the centroids obtained from the hierarchical clustering leads to very similar results in each period. In the first period, Ireland is placed in the red cluster and Greece in the green cluster when using the k-means. The results are identical for the second period, while in the third period Greece is placed in the red cluster in the k-means clusters. In brief, the differences concern only two countries and two periods. Moreover, these differences reflect similar changes across periods reported by the hierarchical clustering. Ireland, for instance, is placed in the red cluster in the second period in the hierarchical, while it is in the red cluster from the first period in the k-means. In both hierarchical and k-means, Ireland belongs to the red cluster in the third period.

[14] See https://www.datanovia.com/en/lessons/hierarchical-k-means-clustering-optimize-clusters/; see also https://www.rdocumentation.org/packages/factoextra/versions/1.0.7/topics/hkmeans.

Finally, a further check is run leaving the choice of the centroids to be random and testing for 1,000 iterations to compare different cluster solutions at different starting points with those obtained from both the hierarchical clustering and the hybrid solution tested using the centroids of the hierarchical clustering. Results from the random k-means are then assessed in terms of both the number of times a specific cluster solution converged and its overall fit as indicated by the Calinski-Harabasz test.[15] The solutions obtained with the random k-means that reflect the hierarchical grouping are always among those that converged the most out of the 1,000 iterations tested, being in the top five for each period (Source: Authors' own calculations

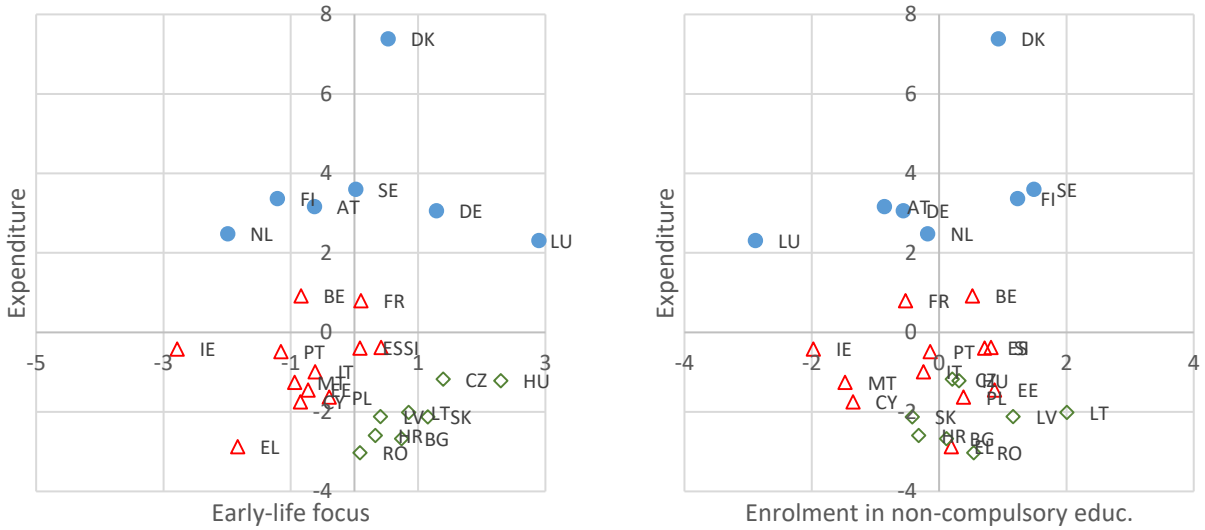
Figure A2.4 Clusters of countries across expenditure, life-course orientation and coverage of social investment before the financial crisis (2004-08)



Source: authors' own calculation

[15] The Calinski-Harabasz index is the ratio of the sum of the between-cluster variance and within-cluster variance: the higher the score, the better the overall performance.

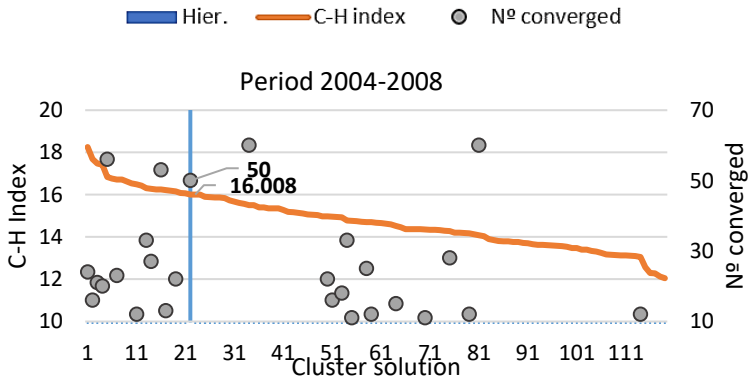
Figure A2.5 Clusters of countries across expenditure, life-course orientation and coverage of social investment during the crisis period (2009-13)



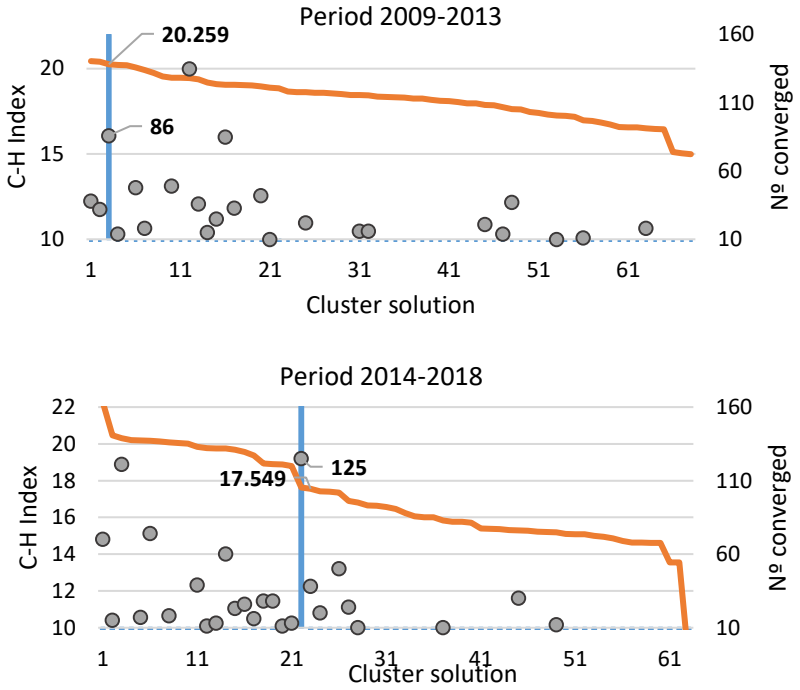
Source: authors' own calculation

A2.2). In terms of the Calinski-Harabasz test, they never perform more than 20% worse than the first solution, with the second period being the closest. For the third period,[16] instead, the best-performing solution found in the random k-means is the one creating a single-country cluster with Denmark, which confirms the difficulty of controlling for outliers with unstructured cluster results provided by the k-means method.

Figure A2.7 Robustness check with k-means random centroids



[16] The solution most similar to the one identified in the hierarchical cluster differs only with regard to Greece and Romania being allocated to the second red cluster instead of to the third green cluster.



Source: Authors' own calculations

7.3 Annex 3. Indicators for the qualitative analysis

Area	Function	Data source	Indicator name	Values	Last year available
Family and children	Childcare/Pre-primary	EURYDICE	Age from which a place in ECEC is guaranteed (either legal entitlement or compulsory enrolment)	Early age (0-3); around 3-4; last two years (5-6); No guaranteed place	2017
	Childcare	EURYDICE	Weekly ECEC hours, by type of guarantee	Part-time (up to 20 h/week); school time (20-29 h/weeks); full-time (> 30 h/weeks)	2018-19
	Childcare	EURYDICE	Childcare free of charge	Paid provision; provision free of charge	2018-19
	Childcare	EURYDICE	Average monthly fees for ECEC for children under age 3	High (more than 500 PPS); medium (between 250 and 500 PPS); low (between 100 and 250 PPS); very low (less than 100 PPS)no data available	2018-19
	Childcare	EURYDICE	Range of criteria used when offering fee reductions or priority admission in centre-based settings for children under age 3	Values from 1 (low targeted policy) to 9 (highly targeted policy)	2018-19
	Pre-primary school (3-5)	EURYDICE	Pre-primary free of charge	Paid provision; provision free of charge	2018-19
	Parental leave	MISSOC/ Leave Network	Replacement rate	0–100% based on previous earnings; flat rate	2019
	Parental leave	MISSOC/ Leave Network	Duration	Number of paid months	2019
	Maternity leave	MISSOC/ Leave Network	Replacement rate	0–100% based on previous earnings; flat rate	2019
	Maternity leave	MISSOC/ Leave Network	Duration	Number of paid weeks	2019
	Paternity leave	MISSOC/ Leave Network	Replacement rate	0–100% based on previous earnings; flat rate	2019
	Paternity leave	MISSOC/ Leave Network	Duration	Number of paid days	2019

Source: Authors' own compilation

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