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Developing a longitudinal typology of European parenting leave policies from 1970 to 2024

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Constantin Gregor Kumaus BSc

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Abstract

This thesis proposes a novel longitudinal typology of European parenting leave policies spanning the years from 1970 to 2024. While previous typologies provide static snapshots of policy configurations, this study constructs a dynamic framework that captures both cross-sectional diversity and temporal evolution across three dimensions of parenting leave policy design: duration, payment, and gender equality.

Through a descriptive analysis of policy instruments shaping the three analytical dimensions, three distinct historical eras are identified, each characterised by a distinct policy landscape: The era of maternal leave (1970-1989) focuses on maternal protection. The era of transition (1990-2014) experiences diversification and expansion across all instruments. The era of equality (2015-2024) demonstrates a sharp increase in gender-equality-oriented measures.

Within each era, k-means clustering is applied to identify country clusters based on their policy configurations. The analysis reveals stable cluster profiles that maintain their interpretative meaning across all three eras despite changing absolute indicator values. Three clusters emerge in the first era, expanding to four in the second and third era: The egalitarian cluster is characterised by high replacement rates and extensive co-parent leave, the conservative cluster provides very long paid parental leave, the basic support cluster focuses on maternity leave with minimal other provisions, and the leave-sharing cluster – appearing only in the second and third era – prioritises symmetric entitlements by earmarking 50% of paid parental leave for each parent.

This research makes three principal contributions to the field of parenting leave policies. First, it introduces a genuinely longitudinal typology enabling both cross-sectional comparison of clusters within eras and temporal analysis of cluster evolution and country trajectories across eras. Second, it delineates three distinct eras of parenting leave, highlighting substantial differences in the policy landscape over time. Third, it demonstrates the utility of k-means clustering methodology in parenting leave policy research, a data-driven approach underutilised in this domain.

Abstract

Diese Masterarbeit schlägt eine neuartige Längsschnitttypologie der europäischen Elternzeitpolitik für den Zeitraum von 1970 bis 2024 vor. Während bestehende Typologien statische Momentaufnahmen der politischen Konfigurationen liefern, konstruiert diese Studie einen dynamischen Rahmen, der sowohl die Querschnittsvielfalt als auch die zeitliche Entwicklung in drei Dimensionen der Ausgestaltung von Elternzeitpolitik erfasst: Dauer, Vergütung und Gleichstellung der Geschlechter.

Durch eine deskriptive Analyse von elternzeitpolitischen Instrumenten, werden drei unterschiedliche historische Epochen identifiziert, die durch starke Unterschiede in der elternzeitpolitischen Landschaft gekennzeichnet sind: Die Ära des Mutterschaftsurlaubes (1970–1989) konzentriert sich auf den Schutz der Mütter. Die Ära des Übergangs (1990–2014) ist durch eine Diversifizierung und Ausweitung aller Instrumente gekennzeichnet. Die Ära der Gleichstellung (2015–2024) zeigt einen starken Anstieg geschlechtergleichstellender Maßnahmen.

Innerhalb jeder Epoche wird k-means Clustering angewendet, um Ländercluster anhand ihrer politischen Konfigurationen zu ermitteln. Die Analyse zeigt stabile Clusterprofile, die trotz sich ändernder absoluter Indikatorwerte in ihrer wesentlichen Bedeutung gleichbleiben. In der ersten Epoche zeigen sich drei Cluster, die sich in der zweiten und dritten Epoche auf vier erweitern: Der egalitäre Cluster zeichnet sich durch hohe Einkommensersatzquoten und umfangreiche Vaterkarenz aus, der konservative Cluster bietet übermäßig lange bezahlte Elternzeit, der Cluster der Grundunterstützung konzentriert sich auf Mutterschutz mit minimaler sonstiger Unterstützung, und der Cluster der geteilten Elternzeit priorisiert symmetrische Ansprüche, indem er 50% der bezahlten Elternzeit für jeden Elternteil vorsieht.

Diese Forschung leistet drei wesentliche Beiträge zum Forschungsgebiet der Elternzeitregelungen. Erstens führt sie eine echte Längsschnitttypologie ein, die sowohl einen Querschnittsvergleich der Cluster innerhalb der Epochen als auch eine zeitliche Analyse der Clusterentwicklung und der Länderverläufe über die Epochen hinweg ermöglicht. Zweitens beschreibt sie drei unterschiedliche Epochen des Elternurlaubs und hebt dabei die wesentlichen Unterschiede in der politischen Landschaft im Laufe der Zeit hervor. Drittens zeigt sie den Nutzen der datengestützten k-Means-Clustering-Methodik auf, die in der Forschung zu Elternzeitregelungen noch zu wenig genutzt wird.

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1 Introduction

Becoming a parent is one of the most transformative moments in a person's working life – particularly for mothers, who often face lasting disadvantages in pay, career progression, and job stability, commonly described as the "motherhood penalty" (Budig, 2014; Yu & Hara, 2021). How parenting leave is designed matters greatly: The length of leave, the level of financial support, and whether both parents are encouraged to participate in childrearing have far-reaching implications: for gender equality in employment as well as childcare (Olivetti & Petrongolo, 2017; Rocha, 2021), for parents' and children's well-being (Heymann et al., 2017; Koslowski & O'Brien, 2022; Whitney et al., 2023), and for families' economic security (Albrecht et al., 2024; Olivetti & Petrongolo, 2017). For this reason, parenting leave is not just a matter of family policy, but also a core element of how societies organise work, care, and gender-equal opportunities.

To systematically compare parenting leave regimes across countries and asses their consequences for families, the creation of typologies is an established analytical technique in the field of social sciences (Collier et al., 2012). Typologies are systematic classifications of countries along well-defined policy dimensions and often form the basis for subsequent analyses in relation to the effect of policies. Depending on the policy dimension upon which a typology is created (e.g. duration of leave, benefits offered, flexibility in use) and the analytical method chosen (e.g. qualitative policy analysis, quantitative methods), different typologies can arise (Collier et al., 2012). Moreover, these typologies may vary depending on the country selection and time span under study.

While several broad typologies along the whole of the welfare state (e.g. Esping-Andersen, 1990) or family policies (e.g. Ferragina & Seeleib-Kaiser, 2011; Powell et al., 2020; Thévenon, 2011) have been developed, only few explicit parenting leave typologies have been proposed (e.g. Ciccia & Verloo, 2012; Dearing, 2016; Dobrotić & Blum, 2020; Keck & Saraceno, 2012; Pezer, 2018; Ray et al., 2010). Most of these typologies are based on high-income or exclusively Western European countries, leaving Eastern European developments underrepresented. At the same time, contributions tend to focus on single points in time or a short observation window which limits their ability to capture long-term developments and structural changes in the policy landscape.

Against this background, this thesis proposes a longitudinal typology of European parenting leave policies that explicitly accounts for change over time. Rather than treating parenting leave regimes as static configurations, the thesis conceptualises that policy development happens in distinct historical eras characterised by shared policy constellations and landscapes. This approach

enables both cross-national comparison and the systematic analysis of long-term policy changes.

The contribution of this thesis to the academic field of parenting leave policies is fourfold: First, it delineates three distinct historical eras of parenting leave, highlighting substantial differences in the policy landscape over 54 years. Second, it develops a longitudinal typology of parenting leave regimes spanning the three eras, enabling both cross-sectional and temporal analyses within one framework and situates it within existing classifications of parenting leave policies. Third, it using k-means clustering as a method novel to this field, offering an updated framework that explicitly includes Eastern Europe.

The guiding research question is:

"What new typology of European parenting-leave policies emerges from clustering countries based on gender equality, payment, and duration from 1970 to 2024?"

Methodologically, existing typologies have predominantly relied on qualitative policy analysis (Keck & Saraceno, 2012), ideal type mapping (Ciccia & Verloo, 2012), index-construction approaches (Dearing, 2016; Ray et al., 2010) or dimension-reduction techniques such as principal component analysis (Pezer, 2018; Thévenon, 2011). While these methods have generated important insights, they often depend on predefined categories or weighting schemes, or alter the original data structure in ways that constrain the empirical identification of policy similarities and differences. This thesis contributes to methodological diversity by applying k-means clustering as an empirical tool for grouping countries based on similarity across multiple policy dimensions without imposing predefined regime types or departing from the original data structure. To the best of my knowledge, the application of data-driven clustering techniques to parenting leave policies has been underemployed in the literature, limiting the identification of empirically derived policy profiles that go beyond established regime classifications. Combined with a theory-backed interpretation of the resulting clusters, this approach offers a transparent, data-driven way to identify patterns in policy design.

Substantially, existing typologies focus on one or few distinct dimensions of parenting leave policies, among which leave duration and benefits (Pezer, 2018; Ray et al., 2010), gender equality (Ciccia & Verloo, 2012; Dearing, 2016; Ray et al., 2010) or familialism, which is a concept describing the reliance on family in social policies (Keck & Saraceno, 2012; Lohmann & Zagel, 2016). One single policy dimension does not capture the whole nature of parenting leave and different dimensions may not be constructed in coherence with each other, meaning that they

pursue unaligned goals. A multidimensional analysis therefore provides a more accurate picture of the regime landscape.

The typology proposed in this thesis combines three analytical dimensions – duration, payment, and gender equality – derived from the three core dimensions of social policy construction outlined by Blum & Dobrotić (2021): entitlement, eligibility and benefit scope. In the context of parenting leave, latter describes *what* parents get, while the first two are more intertwined and define *who* is entitled to take leave as well as *when* and for *how long* leave is granted. *What* and for *how long* have been central elements in parenting leave policies ever since their appearance. The leave design in relation to recipients of leave *(who)* is getting more and more attention with rising awareness for gender equality in childcare (Earle et al., 2025; Rocha, 2021). While fathers' involvement in childcare is rising, mothers continue to take up the majority of parenting leave (Karu & Tremblay, 2018; Tharp & Parks-Stamm, 2021). In an attempt to promote a more equal split in leave-taking behaviour between parents, many countries include measures that are targeted at increasing men's uptake of childbirth-related leave times (Karu & Tremblay, 2018; Tharp & Parks-Stamm, 2021). Following these dimensions of policy construction, the analytical dimensions of this study are stated as:

a) Duration: For how long can parents stay out of the workforce after childbirth to care for the child?
b) Payment: How much in public financial transfers do parents get during parenting leave?
c) Equality: How oriented towards gender equality is the design of policies? What measures are taken to promote equality? How equally split is the leave availability between parents?

This thesis contributes to the research field of parenting leave policies by providing a systematic, longitudinal typology of parenting leave policies in Europe employing k-means clustering. It draws upon the newly available European Parenting Leave Policy (EPLP) Dataset (Spitzer et al., 2025) covering 21 European countries between 1970 and 2024. The analysis incorporates six policy instruments (maternity leave, parental leave, earnings replacement rates, co-parent leave, parental leave for the second parent, and sharing incentives) belonging to the three central dimensions of leave design: duration, payment, and gender equality. On this basis, the thesis identifies three distinct eras of parenting leave by employing a descriptive analysis of policy data over time, supported by theoretical considerations from the literature on parenting leave policy development. An era is defined as a span of time in which the broad understanding and implementation of parenting leave is similar across countries, and in which the development of policies follows similar dynamics and trends. For each era, k-means clustering is then applied as an empirical tool to construct the typology and identify groups of countries with similar policy

profiles. The resulting clusters are then analysed to assess their substantive meaning and their development over time is traced.

This study proceeds as follows: Section 2 introduces the conceptual and historical background of parenting leave as well as a literature review of existing typologies, Section 3 presents the EPLP Dataset (Spitzer et al., 2025) used for the analysis, Section 4 explains the methods employed, Section 5 presents the era division as well as the clustering results, Section 6 discusses these results by consulting relevant literature, and Section 7 concludes everything.

2 Background and Literature Review

This section provides the conceptual and empirical foundation for addressing the research question of how parenting leave policies can be systematically compared across countries and over time through a typological approach. In particular, it establishes the theoretical basis for distinguishing different historical eras of policy development and motivates the combined contemplation of the dimensions of duration, payment, and gender equality. Furthermore, it analyses existing typologies to carve out key findings and situate the present study within established frameworks. The section is structured into three parts:

The first subsection establishes terminology, outlines the main design features and policy instruments that constitute parenting leave systems and aligns them with the analytical dimensions of this thesis: duration, payment and gender equality. Clarifying these instruments is essential for understanding variations in parenting leave policies across countries and for capturing these variations in a typological framework.

The second subsection gives a historic overview of the development of parenting leave policies in Europe, which motivates a differentiated typology over time in distinct eras. Moreover, it synthesises key findings from family policy research that clarify the dynamics between policy design, leave-taking behaviour, and selected outcomes. While a profound analysis of these interactions lies beyond the scope of this thesis, a brief outline leads to a deepened understanding of the relevance of the selected analytical policy instruments in parenting leave policy design and rationalises the selection of the three analytical dimensions used to construct the typology.

Finally, the third subsection reviews existing typologies treating parenting leave policies. It systematically compares their analytical dimensions, methodological approaches and results, highlighting similarities and differences and pointing out gaps that this thesis aims to address through a data-driven clustering approach.

2.1 Parenting leave policy design and terminology

Before outlining existing research on European parenting leave policies, it is essential to clarify the constituent elements of leave systems. Parenting leave does not represent a single, uniform policy instrument but rather acts as an umbrella term comprising a set of interrelated leave schemes and instruments that together form a country's overall leave architecture (Dobrotić et al., 2022; Escobedo & Moss, 2025). While national configurations vary considerably, several common elements can be identified across countries:

Most European states provide three types of leave: maternity leave, paternity leave and parental leave (Dobrotic et al., 2025). These schemes differ not only in their duration but also in their compensation structures, which typically take the form of either earnings-related benefits (replacement rates) or flat-rate payments. Researchers commonly aggregate the statutory durations of these different leave types to construct indicators of total job-protected leave (e.g. Spitzer et al., 2025), capturing the period during which parents can withdraw from paid employment while retaining a guaranteed right of return to their job. In addition, more recent policy developments have increasingly incorporated design features aimed at promoting a more equal sharing of the provided leave between parents. These include financial or time-based incentives to share leave between parents, as well as non-transferable leave entitlements specifically reserved for fathers (Albrecht et al., 2024; Rocha, 2021).

The following section outlines the main elements of policy design in parenting leave and systematically relates them to the three analytical dimensions applied in this thesis – duration, payment, and gender equality – by determining which elements belong to each dimension.

2.1.1 Duration-focussed leave types

2.1.1.1 Maternity leave

Maternity leave refers to a short period of leave around childbirth available exclusively to the biological mother. Typically, maternity leave is obligatory, fully paid and job-protected. "It is usually understood to be a health and welfare measure, intended to protect the health of the mother and newborn child, and to be taken just before, during and immediately after childbirth" (International Network on Leave Policies and Research, 2024).

2.1.1.2 Paid parental leave

Paid parental leave is an extended, voluntary period of leave following maternity leave. It is provided either as a shared family entitlement that parents divide between them or as separate individual entitlements for each parent (International Network on Leave Policies and Research, 2024).

This thesis treats parental leave entitlements at the individual level to assess how policies structure opportunities for each parent separately. To be able to differentiate between entitlements, the terms *first parent* and *second parent* are used. The first parent represents the primary user of parental leave. This differentiation allows to investigate non-transferable leave components available exclusively to the second parent. Throughout the analysis, the term *paid parental leave* will be used to denote the entitlement available to the first parent, while the corresponding entitlement for the second parent will be referred to as *paid parental leave for the second parent,* which will be introduced in detail in Section 2.1.3.

Although parental leave is formally gender-neutral, empirical evidence shows that the largest part is taken up by mothers (Olsson et al., 2023; Tharp & Parks-Stamm, 2021). Consequently, some parts of the narrative implicitly assume the mother to be the first parent, when discussing patterns of equality between parents. This constitutes a simplification and does not imply that the entitlement is inherently addressed to mothers, it rather reflects prevailing usage patterns. Additionally, this distinction facilitates the examination of the gender equality dimension of leave policies in the comparison of distinct entitlements available to either parent.

2.1.2 Payment schemes

Financial compensation that is given to parents during parental leave is offered in two different forms: by replacing a percentage of the previous income (*replacement rates*) or by giving out a fixed amount of money (*flat rates*). Some countries offer a mix of both or give parents the option to choose their preferred payment type.

There is an interaction between the payment dimension and the other analytical dimensions duration and equality. In countries that offer different schemes to choose from, longer durations typically come with lower monthly payments, as the same benefit amount is spread over a longer time. In relation to equality, empirical evidence has shown that the form and amount of benefits is connected to the division of leave between mothers and fathers (Karu & Tremblay, 2018; Moss, 2018; Rocha, 2021). Two main dynamics can be observed:

a) Replacement rates promote gender egalitarianism

High replacement rates have been shown to increase paternal leave uptake (Karu & Tremblay, 2018; O'Brien, 2009; Rocha, 2021). What qualifies as high is not trivial: O'Brien (2009) declares 50% as the minimum for a noticeable change, Saxonberg (2013) argues it takes at least 65% to be classified as generous, while Rocha (2021) argues only full compensation (100%) effectively leads to men taking on a larger share of parental leave. The opposite is the case for flat rate payments, which are associated with high maternal but low paternal uptake (Moss, 2018; Rocha, 2021).

b) Replacement rates reflect opportunity costs more accurately

Flat rates are typically relatively low and do not incentivise the higher earner – which is usually the father (OECD, 2023) – to go on leave, as the benefits are not tied to prior earnings (Rocha, 2021). Having a higher share of the salary reimbursed reduces the opportunity cost of taking leave. Even with high flat rates, couples are left with a better financial situation if the higher earner keeps working while the lower earner takes leave and is granted the flat rate. Tying monetary benefits to earnings leads to a more situational decision on how to split the leave amongst partners (Karu & Tremblay, 2018; Moss, 2018).

In addition, as replacement rates reflect a percentage rather than absolute values, they have a universal meaning in all countries, enabling cross-country comparisons. In contrast, flat rates can only be interpreted in relation to a country's national economic context.

For these reasons, flat rates are excluded from the cluster analysis carried out to form the typology. Temporal developments of the presence of flat rates, however, will be included in the descriptive analysis employed to identify eras of parenting leave.

2.1.3 Gender-equality-oriented instruments

The parenting leave policy landscape is increasingly seeing policy instruments that directly target an increased leave uptake of men to promote greater gender equality in childcare. While *paternity leave* as a father-oriented counterpart to maternity leave has been in place for a longer time, *non-transferable parental leave for fathers* as well as *sharing incentives* that nudge fathers into taking more leave are increasingly incorporated into policy design (Albrecht et al., 2024; Earle et al., 2025; Rocha, 2021).

2.1.3.1 Paternity leave / Co-parent leave

Like maternity leave, paternity leave is intended to be taken shortly after childbirth. It provides an option for the father to stay home around the birth of a child to give the newly formed family time with each other (International Network on Leave Policies and Research, 2024). Extensions of paternity leave, which grant this leave not exclusively to fathers but to second parents irrespective of their gender have been termed *co-parent leave* (e.g. Spitzer et al., 2025). To be inclusive and consistent throughout the thesis, mostly the broader term *co-parent leave* will be used as no differentiation between who this leave is offered to is made in the analysis.

2.1.3.2 Paid parental leave earmarked for the second parent

As indicated in the paragraph on paid parental leave (see 2.1.1.2), some countries allocate some parts of parental leave entitlements on an individual basis. Earmarked leave for the second parent refers to leave periods that are exclusively reserved for the co-parent and cannot be transferred

to the other parent ("use it or lose it"). Assuming that the second parent is most often male, distinguishing between parents' individual entitlements enables a gender-specific analysis of parenting leave policy design.

A growing body of empirical research demonstrates a relationship between non-transferable leave for fathers and increased paternal uptake of parental leave (e.g. Albrecht et al., 2024; Earle et al., 2025; Rocha, 2021). The presence of such earmarked leave components shows effects beyond the non-transferable parts of leave as a more equal sharing of leave is also observed in transferable components of parental leave (Rocha, 2021). Four European countries include compulsory paternity leave as an even stronger mechanism: Spain – 6 weeks, Portugal – 28 days, Italy – 10 days, France – 4 days. (Farré et al., 2025; MISSOC, 2025).

2.1.3.3 Sharing incentives

In addition to earmarked leave entitlements, sharing incentives are instruments that encourage a more balanced distribution of parental leave between parents. Such incentives can be broadly classified into two categories: *duration-based* incentives, which extend the total length of leave available to the family if both parents participate, and *monetary* incentives, which provide financial rewards such as cash transfers or tax benefits (Albrecht et al., 2024; Earle et al., 2025). While more binding policy instruments – such as non-transferable or compulsory leave for fathers – exhibit a stronger association with paternal engagement in childcare, sharing incentives nonetheless play a supportive role in fostering greater paternal involvement (Albrecht et al., 2024; Rocha, 2021).

2.1.4 Additional measures and instruments

2.1.4.1 Childcare leave

Childcare leave is a less common leave type existing in few countries, typically acting as a short-term and lowly paid leave option in later stages of childhood (OECD Family Database, 2024). Implementations allow for additional time at home outside of the scope of maternity and paid parental leave giving parents flexibility, for example day leaves when children are ill.

2.1.4.2 Job-protected leave

Job-protected leave is an aggregated measure stating the maximum leave duration for which individuals cannot be laid off by their employer. As such, it provides a unitary meaning and represents a simplified indicator reflecting the length of available leave in a country, neglecting the varying structure of the different leave types and designs available. Its duration can differ from that of paid entitlements (maternity and paid parental leave), as there is usually the possibility to take unpaid but job-protected leave (Spitzer et al., 2025).

2.1.5 Analytical dimensions

In summary, the introduced elements of parenting leave policies represent a collection of indicators that are related to the three dimensions of interest: *duration*, *payment* and *equality*. Although combinations of duration and payment implicitly affect equality (Karu & Tremblay, 2018; Olivetti & Petrongolo, 2017; Rocha, 2021), I am only referring to *co-parent leave, paid leave earmarked for the second parent* and *sharing incentives* as equality variables, as they explicitly aim at leading to more equality among partners. *Replacement rates* are forming the payment dimension, expressing how strongly policies support parents financially. *Paid parental leave* in general, *maternity leave,* and *job-protected leave* form the duration variables, because they are the main drivers of the overall duration. Although *job-protected leave* is not an instrument found in countries' policies but rather an aggregated measure, it will be used in the era-analysis, as it represents a meaningful indicator for the overall leave duration available. *Childcare leave* is excluded, as it is neither a driver of duration or payment, as it is typically short term and lowly paid, nor is it linked to gender equality. Table 1 gives an overview of the analytical dimensions of this thesis and by which policy instruments they are measured.

Table 1: Analytical dimensions and policy instruments

Dimensions	Instruments
Duration	Maternity leave
	Paid parental leave
Payment	Replacement rate of previous earnings
Equality	Co-parent leave
	Paid parental leave earmarked for the second parent
	Sharing incentives

Figure 1 sketches the timeline of different leave types available to each parent. The depiction is simplified as it treats the mother as the first parent and her partner as the second parent. Thus, paid parental leave is placed at the mother's branch, although it is in general not tied to mothers exclusively. Also, paid parental leave for the second parent only starts when paid parental leave for the mother has ended. This ordering reflects the predominant policy design across countries, where paid parental leave for both parents is required to be taken consecutively rather than simultaneously. Although a minority of countries do allow overlapping paid leave, the timeline portrays the more typical sequential arrangement. The sketch furthermore positions co-parent leave immediately after childbirth. While many countries permit this leave to be taken within a broader window following birth, its intended function is to support families during the immediate

postnatal period, which is why the figure presents it as commencing directly after childbirth. Together, these simplifications help visualise the most common sequencing of parental leave entitlements without implying that all national policies conform exactly to this pattern.

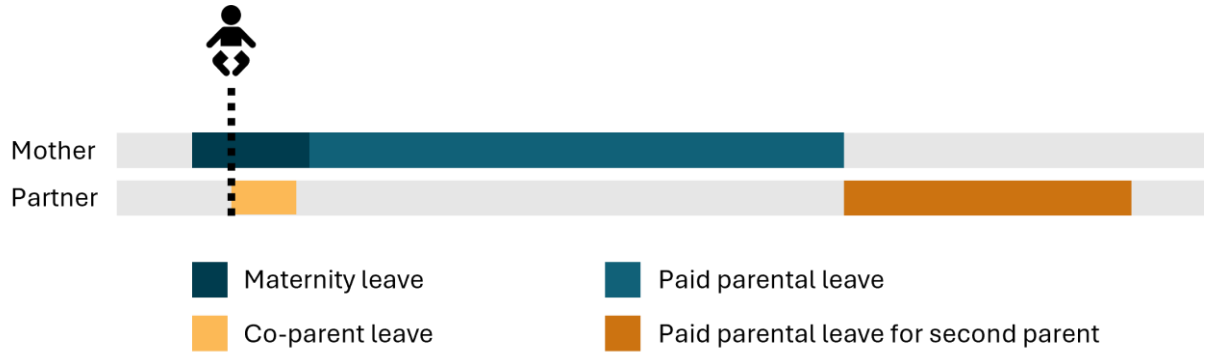

Figure 1: Timeline of leave types

2.2 Historical overview, outcomes, and gendered behaviour

Having introduced parenting leave elements, an outline of the historic development of parenting leave policies in Europe in the first part of this chapter builds up to the era split carried out later.

Furthermore, an overview of the ways in which policies influence outcomes and parents' behaviour puts more context to the relevance of the analytical dimensions of this thesis. Policymakers often design parenting leave policies to influence a range of social and demographic outcomes, such as female employment, fertility, or health (Gauthier & Bartova, 2018; Gauthier & Gietel-Basten, 2025; Olivetti & Petrongolo, 2017). Additionally, an increasing number of policy instruments explicitly pursue gender equality objectives by seeking to alter the leave-taking behaviour of couples, particularly since mothers tend to take up the majority of parenting leave entitlements (Olsson et al., 2023; Tharp & Parks-Stamm, 2021). Accordingly, parenting leave policies interact with both individual behaviour and broader social outcomes in a reciprocal way. Laws are passed to impact certain outcomes, while changes in these outcomes are often the starting point for policymakers to counteract (Hefeker, 2023).

While this thesis does not empirically analyse the effects of parental leave policies on specific outcomes, it is nevertheless important to understand which behavioural and societal outcomes are shaped by the three dimensions under consideration – duration, payment, and gender equality. This contextualisation highlights why a typology organised around these dimensions is analytically meaningful and is therefore presented in the second part of this subsection.

Moreover, as contemporary policy design increasingly incorporates explicit instruments aimed at promoting a more equal distribution of childcare between parents (see 2.1.3), it becomes necessary to examine the underlying mechanisms that contribute to persistent gendered patterns

of care. The third part of this section therefore draws on household economic theories to explain why parents continue to allocate paid and unpaid work unevenly, thereby motivating the emergence of such targeted policy instruments.

2.2.1 Historical overview of parenting leave policies

Rather than emerging as a coherent policy field from the outset, policies relating to parenting leave have developed gradually in response to changes in social, economic, and demographic conditions. This evolution reflects altering perceptions of care, work, and gender roles, as well as shifting policy priorities relating to labour market regulation, family welfare, and population dynamics. Over time, parenting leave has expanded from narrowly defined maternity protection towards more comprehensive leave systems that increasingly incorporate income replacement and gender-equality-oriented design elements (Olivetti & Petrongolo, 2017).

The earliest forms of parenting leave emerged in the late nineteenth century in the United Kingdom, and most European countries had adopted them by the early twentieth century. The first leave models took the form of maternity leave, which was intended as a labour protection and health measure (Olivetti & Petrongolo, 2017). These early arrangements aimed to protect women's health around childbirth and reduce infant mortality, rather than to promote employment continuity or gender equality (Kamerman & Moss, 2009; Moss, 2018). Leave was usually short, poorly compensated or unpaid, and explicitly targeted at mothers, reinforcing the idea that childcare was their responsibility and that leaving the workforce following childbirth was both natural and desirable (Kamerman & Moss, 2009).

In the post-war period, particularly from the 1950s onwards, parenting leave became more institutionalised as welfare states expanded. Maternity leave was increasingly embedded in social insurance systems, providing broader coverage and more predictable income replacement (Gauthier, 2007). During this phase, policy design was largely dominated by the duration dimension with little focus on payment or equality. Extended leave entitlements were often intended to support family stability and child well-being, however, they also implicitly reinforced traditional gender roles (Olivetti & Petrongolo, 2017) and the male breadwinner model prevalent in many welfare regimes (Esping-Andersen, 2012). Income replacement remained secondary, and policies paid limited attention to women's long-term labour market attachment.

From the 1970s onwards, rising female labour force participation and changing family forms challenged this model. As dual-earner households became more common, governments began to focus more on reconciling employment and motherhood (Olivetti & Petrongolo, 2017). Parenting leave expanded beyond maternity leave to include parental leave that could, at least formally, be shared between parents (Moss, 2018; Olivetti & Petrongolo, 2017). Additionally,

Sweden first introduced explicit paternity leave in 1974 (Olivetti & Petrongolo, 2017). This marked an important conceptual shift: leave was no longer only a protective measure but also a labour market policy instrument. Nevertheless, early parental leave schemes were often unpaid or low-paid, which limited uptake by fathers and reinforced gendered patterns of leave use (Olivetti & Petrongolo, 2017).

The role of income replacement gained prominence in the 1980s and 1990s, as empirical research highlights. Poorly compensated or excessively long leave led to negative labour market consequences, particularly for women (OECD, 2011; Ruhm, 1998). In response, many countries expanded earnings-related benefits and strengthened job protection. This reflected a growing recognition that leave design shapes long-term employment outcomes and gender inequalities (Moss, 2018; Olivetti & Petrongolo, 2017).

From the 1990s onwards, gender equality increasingly emerged as a key objective of parenting leave policies. Rather than assuming that gender-neutral entitlements would be used equally by both parents, policymakers acknowledged that leave design could actively reinforce or challenge traditional divisions of labour (Moss, 2018). Examples of leave design elements that were introduced in reforms include non-transferable leave for fathers or incentives for shared use, which were introduced most prominently in the Nordic countries (Duvander et al., 2017). These reforms marked a transition away from policies primarily focussed on time at home towards arrangements aimed at redistributing caregiving responsibilities and encouraging equal participation in both paid and unpaid work.

More recently, attention has extended beyond policy instruments to the symbolic and linguistic dimensions of leave design. A growing number of countries have adopted gender-neutral terminology and equalised leave durations for both parents. Spain's 2018 reform exemplifies this trend, replacing gendered maternity and paternity leave with a unified "Birth and Childcare leave" and granting identical entitlements to both parents, while explicitly accommodating non-heterosexual couples (Escobedo & Moss, 2025). While such changes may appear merely symbolic, language and terminology in policy design play a structural role in shaping social norms and expectations (Escobedo & Moss, 2025). Ungendered terminology reframes caregiving as a shared responsibility rather than a maternal obligation, thus contributing to the gender equality.

The policy development did not occur in harmony across countries. Until the late 1990s, national policy landscapes diverged substantially as countries experimented with different combinations of leave duration and payment levels (Gauthier, 2002). Over time, however, policies began to show signs of convergence. At the end of the twentieth century, policy learning and the evaluation of outcomes targeted by leave policies led to more similar policy trajectories across countries

(Olivetti & Petrongolo, 2017). The imitation of role-model countries as well as the formation of unions such as the European Union – in which nations agree on overarching economic and social goals – contributed to the convergence of policies (Olivetti & Petrongolo, 2017; Schunter-Kleemann, 1995). The observed convergence remained, however, partial: comparative evidence suggests that countries primarily converged within welfare regime clusters rather than across them, indicating the persistence of distinct ideologies regarding state support for parents (Kang, 2019).

Taken together, the historical development of parenting leave policies reveals a gradual layering of objectives rather than a linear progression. Early systems prioritised duration and maternal protection. This was later complemented by income replacement to support labour market attachment and, more recently, by gender-equality-oriented features targeting both behaviour and norms. These evolving priorities are directly reflected in the three analytical dimensions – duration, payment, and gender equality – treated in this thesis. Outlining this historical trajectory provides the necessary context for understanding how different configurations of these dimensions complement each other and then affect employment, fertility, and health outcomes, as discussed in the following section.

2.2.2 Outcomes affected by parenting leave policies

Among the outcomes of interest that are consistently examined in the context with parenting leave policies are *female employment and gender equality* (Kleven et al., 2024; Olivetti & Petrongolo, 2017; Rocha, 2021), *fertility* (Gauthier, 2007; Gauthier & Gietel-Basten, 2025; Olivetti & Petrongolo, 2017; Thomas et al., 2022) as well as *parents' and childrens' health* (Heymann et al., 2017; Koslowski & O'Brien, 2022; Whitney et al., 2023). Each of these indicators went through changes in the past decades that can be connected to the evolution of different leave schemes outlined in the previous section. The focus in this section is to link the development of indicators *female employment and gender equality, fertility,* and *health* to the earlier identified dimensions of policy design (duration, payment, gender equality). This connection underscores the emergence of specific leave instruments in different periods, which are often introduced for specific outcome-related purposes.

2.2.2.1 Female employment and gender equality

Parenting leave policies have historically been closely tied to women's labour market participation and broader patterns of gender inequality. Early leave arrangements often reinforced traditional gender roles by encouraging mothers' withdrawal from paid work (Ruhm, 1998). Over time, policies increasingly aimed to support the reconciliation of employment and caregiving as female labour force participation rose (Olivetti & Petrongolo, 2017). Nevertheless, childbirth

remains a major turning point, as women's employment is more strongly disrupted by parenthood than men's, and excessively long leave durations have been linked to weaker long-term labour market attachment for women (OECD, 2011; Thévenon & Solaz, 2013).

These employment patterns are closely connected to persistent gender inequalities in earnings. Parenthood has been identified as a central driver of the gender pay gap, often described as the "motherhood penalty" and "fatherhood bonus" (Budig, 2014; Kleven et al., 2019; Yu & Hara, 2021). In response, many countries have introduced reforms aimed at promoting fathers' involvement through non-transferable leave and incentives for shared use of leave (Rocha, 2021; Tharp & Parks-Stamm, 2021), alongside more generous income replacement (Rocha, 2021; Saxonberg, 2013). The Nordic countries, particularly Sweden, are often cited as examples of more gender-egalitarian arrangements combining parental leave with extensive public childcare (Duvander et al., 2017; Lütolf, 2025).

However, comparative evidence suggests that similar policy designs do not automatically produce the same outcomes across contexts (Kleven et al., 2024). Even in contexts where overall gender wage gaps have narrowed, child-related disparities remain substantial and resistant to change, underlining the importance of cultural and institutional factors (Kleven et al., 2019). This indicates that inequalities are not only the result of policy design but are also deeply embedded in social norms regarding the division of paid and unpaid work (OECD, 2023). Overall, parenting leave can influence female employment and gender equality, but its effects are conditioned by broader societal structures and norms (Dobrotić et al., 2022; Esping-Andersen, 2012).

2.2.2.2 Fertility

The rapid fertility decline Western states have experienced in the past decades with total fertility rates falling below the replacement level of 2.1 children per woman (OECD Family Database, 2024) prompted governments to use parenting leave policies as a means to promote fertility (Gauthier, 2007; Thomas et al., 2022). Interestingly, countries choose diametrically different strategies to counteract declining fertility numbers. Conservative regimes put the traditional family in the spotlight and promote longer leaves to facilitate childcare at home. Progressive regimes on the other hand, prioritise work-family reconciliation through well-compensated leave and state subsidised childcare to build a landscape with a higher intended number of children (Gauthier, 2007).

The empirical evidence is mixed and causality between policies and fertility is difficult to examine (Thomas et al., 2022). Policy design features that promote *gender equality* and reduce career-related risks for women (e.g. non-transferable leave for fathers, job-protected leave) can reduce the opportunity costs of childbearing, especially for women, and create more favourable

conditions for work-family reconciliation. These measures have been linked to higher probabilities of lower-order births (OECD, 2011; Thévenon & Gauthier, 2011) and to small but positive effects on total fertility, estimated at approximately 0.1-0.2 children per woman (Gauthier & Gietel-Basten, 2025). Excessively long leave *durations* isolating the mother from the labour market on the other hand might discourage births due to career uncertainty (OECD, 2011; Thévenon & Gauthier, 2011; Thomas et al., 2022) while cash benefits alone have not been found to increase fertility numbers (Gauthier & Gietel-Basten, 2025).

Country patterns are consistent with these mechanisms: Contexts characterised by flexible leave arrangements and extensive childcare availability, such as France and the Nordic countries, tend to display comparatively higher fertility levels than countries with less supportive institutional frameworks (Gauthier, 2007; Gauthier & Gietel-Basten, 2025).

2.2.2.3 Health

Parenting leave bears the potential to promote the health and well-being of both children and parents. On the maternal side, access to paid maternity leave has been linked to better physical and mental health, including lower levels of stress and depressive symptoms (Dagher et al., 2014; Heshmati et al., 2023; Whitney et al., 2023). Similarly, fathers' uptake of paternity or non-transferable leave has been shown to improve not only paternal mental health (Kamerman & Moss, 2009; Koslowski & O'Brien, 2022) but also increase the likelihood of long-term involvement in childrearing, contributing to healthier family dynamics overall through reduced stress and promoted bonding by sharing the workload (Heymann et al., 2017; Petts et al., 2020). For children, longer periods of parental leave are associated with higher rates of timely immunisation and lower infant mortality in the short term (Ruhm, 2000; Whitney et al., 2023), as well as better health and developmental outcomes later in childhood (Danzer et al., 2022; Whitney et al., 2023).

Synthesising the described findings, parenting leave policies influence a range of outcomes, including female employment and gender equality, fertility, and parental and child health, with effects linked to the design of the leave system. Leave duration historically dominated policy design, particularly in early systems that emphasised extended time at home for mothers, often reinforcing traditional gender roles and affecting women's long-term labour market attachment. Income replacement became increasingly important to enable continuous labour market participation and reduce the financial costs of taking leave, which also affects fertility decisions. More recently, gender-equality-oriented features – such as non-transferable leave for fathers and incentives for shared use – have gained prominence, shaping both the division of paid and unpaid work and the likelihood of fathers' involvement. A more equal participation in childcare has been

linked to increased female employment, a slightly positive effect on fertility rates, and better child and parental health outcomes.

The interplay of duration, payment, and gender-equality-oriented instruments highlights that no single design feature operates in isolation. Moderate leave durations combined with sufficient income replacement can support female employment and fertility, while gender-equal entitlements promote shared caregiving and reduce long-term gender disparities. These interactions underscore the relevance of providing a combined view on the parenting leave policy landscape through the lens of duration, payment, and gender-equality elements.

2.2.3 Household economic theories in leave taking behaviour

A final background dynamic to understand is how parental leave policies interact with families' leave taking behaviour. It is essential to consider why couples continue to distribute (unpaid) work unevenly to understand the relevance of gender-equality-oriented leave design elements. The following section will give a brief overview of economic approaches incorporating human capital theory, bargaining models, and gender norms that try to explain why similar patterns in the split between paid market work and care work are present over time and across countries.

According to Becker's (1985) *human capital theory*, families seek to maximise joint utility by allocating market work to the higher earner – most often the father – while the lower earner – typically the mother – assumes greater childcare responsibilities (Chiappori & Mazzocco, 2017; Gough, 2017; K. Milligan, 2014; Wood et al., 2023). *Bargaining models*, by contrast, assume that household members aim to maximise their individual utility and that the division of labour depends on relative power and resources (Sullivan, 2021). Since money and other resources translate into negotiation power, the higher earner can more easily avoid unpaid work – which is considered to be less pleasant (Wood et al., 2023). However, both theories struggle to explain persistent gender gaps in childcare even among couples with similar incomes, suggesting that relative earnings and bargaining power alone cannot fully account for observed leave-taking behaviour (Costa Dias et al., 2020; Kleven et al., 2019; Sevilla-Sanz, 2010; Yu & Hara, 2021).

Another strand of literature highlights the role of *gender norms* and culturally embedded expectations in shaping intra-household divisions of labour. Although the male-breadwinner model has been weakened (Gleichen & Seeleib-Kaiser, 2018), persistent social norms continue to influence couples' behaviour independently of partners' relative earnings or employment status (Haberkern, 2007; Hager et al., 2025). Empirical evidence suggests that even in dual-earner couples with comparable incomes, women disproportionately take on unpaid care work, partly as a means of compensating for deviations from the primary male-earner norm and conforming to socially sanctioned gender roles (Hager et al., 2025). Conversely, men may reproduce

traditional role patterns by not increasing their contribution to unpaid work during periods of joblessness, thereby reinforcing existing gendered divisions of labour (Sullivan, 2021).

These norms vary considerably across national and cultural contexts. For instance, the German concept of the *Rabenmutter* (raven mother), referring to mothers who return to employment quickly, contrasts with the negatively connotated French stereotype of the *mère poule* (mother hen), describing mothers that stay at home for a long time (Spitzer, 2025). Furthermore, Scandinavian countries show strong norms around shared caregiving (Rostgaard & Ejrnæs, 2021). Parenting leave policy designs interact with such norms in complex ways, potentially reinforcing or mitigating traditional gender roles. Generously long and transferable leave entitlements may unintentionally stabilise conventional care arrangements, whereas well-compensated, non-transferable leave quotas for fathers tend to promote more equal paternal involvement in childcare (Hager et al., 2023; Wood et al., 2023). Consequently, an understanding of these household-level economic dynamics and norms is essential for assessing how specific policy design features shape parental decision-making and gender equality outcomes across national contexts – and understand the limits of what can be achieved through parenting leave policies, as cultural norms are difficult to transform through the means of policies.

2.3 Existing typologies

Building on the discussion of parenting leave policy instruments and their relationship to leave-taking behaviour and selected outcomes, this subsection reviews existing typologies of parenting leave policies. Specifically, the results from these classifications are presented, and country-specific differences are pointed out. In addition, existing typologies are examined with regard to their analytical dimensions and methodological approaches. This comparative assessment summarises the current research state and highlights methodological and temporal limitations in the existing literature, thereby motivating the construction of a new typology based on a novel methodological approach (k-means) and structured along the dimensions of duration, payment and equality.

Since this thesis is focussing on European countries, only statements about them are given in the upcoming overview, although many typologies include non-European countries as well. Also, to keep it short and general, only brief explanations of the different policy profiles identified by these typologies, as they are described plentifully in literature. A contextualisation of the typology presented in this thesis to existing works will be discussed in Section 6, after the empirical analysis. This subsection will first briefly introduce broad welfare regimes from seminal works, before summarising existing parenting leave typologies in more detail.

2.3.1 Welfare regimes

Esping-Andersen's (1990) "*Three worlds of welfare capitalism"* is one of the first broad frameworks, classifying welfare regimes and remains one of the most influential welfare state publications. While it treats welfare in general, parenting leave is one analytical aspect of its classification. The study identifies three regime types: *Socialist, conservative* and *liberal*. Typical ideas of socialist countries such as Sweden, Norway and Denmark, are "a high degree of autonomy, limiting the reliance on family and market" (Ferragina & Seeleib-Kaiser, 2011, p. 584). Most other European countries (Austria, Belgium, France, Germany, Switzerland, Netherlands, Finland) fall into the conservative category, characterised by traditional gender roles and a system designed to rely on family - with the Netherlands and Finland showing social-democratic signs in some respects. The lowest state support is given by liberal regimes, such as Ireland and the UK, which is limited to basic, limited support.

In a review article, Ferragina and Seeleib-Kaiser (2011) summarise 23 studies on welfare states and collect additional regimes that mostly stem from a wider geographic range. Most articles show high accordance in the classification and do not depart much from Esping-Andersen's clusters. Different regime names occur, but the cluster compositions are relatively stable across studies.

Regarding regime types, an additional *mediterranean* cluster is a finding of many authors, helping classify Spain, Portugal and Greece as well as Italy, which is also put into *conservative* by some (Powell et al., 2020). Unclassifiable cases such as the Netherlands or Switzerland are commonly collected in a *hybrid* type. While the conservative and especially the social-democratic cluster are rather small and show strong intra-cluster coherence, studies consistently assign the highest number of countries to the liberal cluster, which is the least homogeneous one (Ferragina & Seeleib-Kaiser, 2011).

A few countries can be identified, who show strong degrees of consistency in classifications across publications: Sweden, Norway and Denmark (Social-democratic) as well as France, Germany and Austria (Christian-democratic) are classified into these regimes by more than 80% of the included articles. Switzerland and the Netherlands seem to be the most difficult countries to assign to a group, with neither being put in the same regime by more than half of the studies (Ferragina & Seeleib-Kaiser, 2011).

A broader meta-analysis of reviews by Powell et al (2020) finds lower levels of accordance between typologies (maximum 70% for Sweden), but similar countries with high and low agreement. Sweden, France and Germany are the most homogeneously classified countries, while Switzerland, Portugal, Spain and the Netherlands find themselves in the same regime type

in no more than a third of proposed typologies. For Spain and Portugal, a driver of the inconsistency could be that the *mediterranean* regime is a relatively new type and not identified by all researchers. The case of Switzerland and the Netherlands suggests that a distinct "liberal European" cluster might be necessary, as the traditional liberal regime is dominated by non-European countries, whose understanding of liberal welfare differs from that of European countries (Powell et al., 2020).

With Eastern Europe, a whole region is consistently overlooked, as those countries typically did not pursue welfare strategies for a long time given their communist history. Authors specifically targeting this region find strong differences to the existing regimes such as low level of transfers and pronounced gender-roles and suggest an extra *Eastern-European* regime (Fenger, 2007), which could potentially be further divided into sub-clusters as former USSR countries (e.g. Lithuania, Estonia) developed differently from post-Communist-European countries (e.g. Czechia, Poland, Hungary) (Lauzadyte-Tutliene et al., 2018).

In summary, welfare-state theories mostly suggest 4 regime types in Europe: Social-*democratic, conservative, liberal* and *mediterranean*. The liberal regime shows the least homogeneous policy composition and broadest spectrum of countries, indicating that an extra cluster might be useful for a solid typology. Further potential for an extra cluster is shown by Eastern Europe, which represents an area left out of existing classifications. Going into more specific typologies of *parenting leave*, allows us to obtain a thematically deeper understanding of social policy types in Europe.

2.3.2 Parenting leave typologies

As mentioned in the introduction, a limited body of comparative research has sought to classify parenting leave and broader family policy arrangements across European countries. These contributions differ in the analytical dimensions they include and the methods of classification they use, ranging from theory-driven policy analysis (Keck & Saraceno, 2012; Lohmann & Zagel, 2016) and fuzzy-set ideal type matching (Ciccia & Verloo, 2012) to index-based evaluations (Dearing, 2016; Ray et al., 2010), and data-driven clustering approaches (Pezer, 2018) or principle component analyses (Thévenon, 2011). Reviewing these studies comparatively helps to clarify what country groupings appear under different focussed aspects of policy design and how coherent these classifications are across publications.

2.3.2.1 Theory-driven family policy analysis typologies

Keck and Saraceno (2009) adopt a policy analysis investigating the presence of familising and defamilising policies. These concepts describe whether policies increase or reduce the reliance

on family in childcare. Their framework integrates parental leave, father-specific instruments, and gendered financial support measures to distinguish between three regime types. Norway, Sweden, and Denmark show policies characterised by weak familising and strong defamilising elements such as gender quotas and moderate, well-paid leave durations. In contrast, a large group of Central and Eastern European countries show strong signs of familialism through long, lowly paid leave. Finally, countries with weakly developed policies such as Italy, Greece, Poland or Spain are classified as weak in both. Further countries including Belgium, France, the UK, the Netherlands and Slovenia are ambiguous cases, which fit neither category.

Lohmann & Zagel (2016) take a similar approach but additionally include into broader welfare state aspects related to childrearing such as public childcare to map countries on a two-dimensional axis without performing a classification. Countries that show clear signs of defamilialism, however, include Sweden, Finland, Norway, Estonia and Belgium, while the policies of Austria, Slovenia, and Germany nourish familialism.

2.3.2.2 Ideal-type approaches

Using fuzzy-set ideal type analysis, Ciccia and Verloo (2012) develop an influential parenting-leave-specific typology. Their approach is explicitly theory-driven: countries are matched to six predefined regime types derived from models of gendered divisions of labour by analysing four core dimensions: time to care for children (measured by total parental leave duration), monetary benefits, gender distribution of leave rights, and father-specific incentives to share leave.

The resulting typology distinguishes between male breadwinner, caregiver parity, supported/unsupported universal breadwinner, and limited/universal caregiver models. The most gender-equal *full universal caregiver* type*,* which values work and care equally with no gender roles in either of the activities type is not populated by any country. Nordic countries (Sweden, Norway, Iceland, Finland) and Portugal come closest and are classified as *limited universal caregivers*, combining relatively generous compensation with strong incentives for fathers. Like the universal caregiver types, *universal breadwinner* types assume both parents to work but promote the outsourcing of childcare instead of incentivising fathers to engage in it. High benefits in the *supported* (Denmark, Slovenia, Switzerland) universal breadwinner model distinguish it from the *unsupported* universal breadwinner model (Belgium, Cyprus, Greece, Ireland, Italy, Malta, the Netherlands). In contrast, the *male breadwinner model* – comprising a third of the analysed countries (Austria, Czechia, France, Estonia, Hungary, Latvia, Poland, Slovakia, Spain, and the UK) – and *caregiver parity model* – observable in Eastern European countries (Romania, Lithuania) – maintain traditional gender roles in the split between paid and unpaid work. Their difference lies in the stronger appreciation, value and support given to – in that case – mothers'

care work in the caregiver parity model. Finally, the authors identify several ambiguous cases with Germany and Luxembourg not clearly aligning with any ideal type, and the UK displaying characteristics of both male breadwinner and unsupported universal caregiver models (Ciccia & Verloo, 2012). These ambiguities underscore the hybrid nature of many national leave systems and outline the limits of predefined ideal types.

2.3.2.3 Index-based classifications focusing on gender equality and generosity

Two further studies rely on composite indices to assess how well leave policies support gender equality and/or generosity, classifying countries into broad performance categories rather than regime types.

Dearing (2016) constructs an additive index measuring how strongly countries' policy designs support gender equality in childcare based on three equally weighted components: total leave duration, the duration of well-paid leave, and the share of leave reserved for fathers. Countries are grouped into four categories: High, medium, low, and very low egalitarian gender-egalitarian orientation

High-performing countries include Slovenia, Sweden, and Iceland, all of which combine relatively generous leave provision with substantial father-specific entitlements. Medium performers encompass Norway, Denmark, Germany, Finland, Portugal, Ireland, Greece, and Italy and mostly lack strong equality designs in one of the dimensions, while low and very low categories include countries like Austria, France, the UK, Switzerland, and several Eastern European states and show few to no elements promoting gender equality of care. The results illustrate that an individual equality-oriented element alone does not ensure gender equality, rather it takes a set of coherent instruments.

Ray et al. (2010) take a related but more descriptive approach, constructing separate indices for leave generosity (measured as weeks of well-paid leave) and gender equality (based on fathers' entitlements, wage replacement rates, and sharing incentives). Their analysis does not produce clusters and therefore technically does not constitute a typology. Nevertheless, their rankings reveal clear patterns: Nordic countries and, surprisingly, Greece score high on both dimensions, challenging prevailing assumptions about Southern European family policy regimes (Ray et al., 2010). Spain, Portugal, France and Belgium show high gender equality but rather low generosity, while Germany shows high generosity with low gender equality focus. The remaining countries take intermediate positions in both indices. This two-dimensional analysis highlights the importance of examining multiple policy dimensions rather than relying on single indicators, as some countries show divergent values on the two indices.

2.3.2.4 Data-driven clustering and principal component approaches

Finally, some studies apply data-driven techniques to classify countries. Thévenon (2011) performs a principal component analysis, which transforms the data to identify key dimensions of variation in OECD countries' family policies. Although the resulting typology is not limited to parenting leave elements but broader family policy measures, leave-related characteristics such as duration, payment levels, and father-specific entitlements form a central component of the analysis. The principal dimensions along which countries policies differ are identified in leave generosity (e.g. duration and pay), support for working parents (e.g. childcare) and gender equality orientation (e.g. incentives for fathers). The authors findings are mostly coherent with existing typologies, most prominently finding a strongly separated Nordic cluster (Sweden, Norway, Finland, Denmark, Iceland) with support to working parents. Another cluster provides limited, targeted support to low-income families and strongly resembles Esping-Andersen's (1990) liberal cluster with Ireland, the UK and Switzerland included. Relatively generous benefits but hindrances in work-family reconciliation are present in a continental European cluster around Austria, Germany, Luxembourg, Belgium, France, and the Netherlands. Lastly, Southern European countries (Spain, Greece, Italy, Portugal) show even more limited support than the liberal cluster, while Eastern European countries (Hungary, Czechia, Slovakia, Poland) provide long, lowly paid leaves.

Pezer (2018) applies both hierarchical clustering as well as a principal component analysis to cluster countries along three dimensions: leave duration, generosity, and broader national context variables, such as GDP per capita, household characteristics, or education levels. Both methods lead to the same country groupings, the resulting clusters are however only vaguely described, limiting the typologies interpretative value. The study identifies Western European, Mediterranean, Central and Eastern European, and Nordic clusters. However, the inclusion of numerous contextual variables, blurs the distinction between policy design and outcomes, making the clusters less suitable as a pure parenting leave typology.

2.3.2.5 Common patterns and implications

Across these diverse approaches, several recurring patterns emerge. Nordic countries are consistently identified as distinct, combining relatively generous leave provision with a strong gender equality orientation. Central European countries such as Austria, France or Germany are commonly classified as providing long leave but lacking a gender equality orientation. Southern and Eastern European countries often cluster together due to limited compensation or traditional gender norms, although individual cases such as Greece or Slovenia frequently challenge these generalisations. Importantly, ambiguous cases which are not easily classifiable occur across

studies, particularly the Netherlands, the UK, Belgium and Italy, suggesting that parenting leave policies often combine elements associated with different normative models.

Theoretical frameworks suggest 4-5 broad schemes of leave, which is largely confirmed by empirical evaluations of parenting leave data. At the same time, existing typologies vary substantially in the dimensions they prioritise, the methods they employ, and the time span analysed. Some publications rely on predefined ideal types or embed parenting leave within broader family policy frameworks. In addition, the collection of typologies describes a narrow time frame, ranging from 2004 to 2014, thus limiting the evaluation of temporal changes, but providing comparability. These limitations further motivate the present thesis's focus on a systematic, longitudinal typology of parenting leave policies, which treats duration, payment, and gender equality as analytically distinct dimensions and applies a data-driven clustering approach to trace similarities, differences, and change over time. The following parts will – starting with the description of the data – treat the construction of a new typology that adds to the existing body of research in the methodical, geographical and temporal scope.

3 Data

3.1 Choice of the dataset

The basis for answering the research question regarding a new typology of parenting leave policies based on the dimensions of gender equality, duration and payment is data taken from the European Parenting Leave Policies (EPLP) database (Spitzer et al., 2025). Containing information on various aspects of parenting leave in 21 European countries (Denmark, Sweden, Norway, Finland, the UK, Ireland, France, Belgium, the Netherlands, Germany, Austria, Italy, Spain, Greece, Poland, the Czech Republic, Slovakia, Hungary, Slovenia, Estonia, and Lithuania), the database covers each year from 1970 to 2024. It includes basic measures like the length of maternity or parental leave and financial transfers connected to parenting leave, as well as more detailed information on incentives to split the leave more equally amongst parents and whether parts of the leave are earmarked for the second parent.

The collection of countries and variables included in the EPLP database provides the necessary information for an analysis along the dimensions of duration, payment, and gender equality. Comparable datasets, such as the OECD family database (2024) or Gauthier's Comparative Family Policy Database (2011) include non-European countries – which fall outside of the geographical scope of this thesis – but exclude several former communist European countries. Furthermore, information on payment schemes and incentives to share parts of the leave is less detailed than in the EPLP. Overall, the EPLP offers the most suitable combination of countries,

time span, and variables for the purposes of this thesis. The following two paragraphs highlight the advantages of the EPLP over the OECD and Gauthier data more precisely.

The OECD database comprises a wide range of family policy-related indicators and includes extensive information on parenting leave. Most of the information required to construct a new typology along the dimensions of duration, payment, and equality is offered there, albeit with some important limitations. Although leave duration is expressed for each parent individually to allow for a gendered analysis, only a single payment indicator is provided for each leave type: A rate expressing the percentage of earnings replaced relative to the average national income. By contrast, the EPLP dataset distinguishes between flat rate benefits and earnings-related replacement rates. As discussed in Section 2.1.2, differentiating between these forms of payment is analytically relevant, as they are associated with dissimilar implications for parents' - particularly fathers' – leave-taking behaviour, thus being connected to gender equality. In addition, the EPLP captures the coexistence of multiple leave schemes within countries by structuring information on duration and payment across three so-called "dimensions." (the term "dimensions" has a different meaning to that used in this thesis). Dimension 1 "identifies the paid parental leave scheme with the longest possible duration, regardless of the benefit type provided during this period" (Spitzer et al., 2025, p. 15). Dimensions 2 and 3 capture the leave schemes with the highest flat rate and highest replacement rate benefits, respectively (Spitzer et al., 2025). This structure provides a concise overview of parental leave systems and of the dimensions relevant to this thesis.

Similar advantages apply when comparing the EPLP with Gauthier's Comparative Family Policy Database. Two additional factors further support the choice of the EPLP for this thesis: First, it is more up to date: while Gauthier's data ends in 2010, the EPLP data was published more recently and includes data up to 2024. Second, the inclusion of Eastern European and former USSR countries in the EPLP dataset offers potential for the revelation of interesting dynamics along the change from a communist to a free market economy. In summary, the EPLP dataset strikes a balance between extensiveness and analytical clarity by offering well-organised information on all the dimensions and instruments within the geographical and temporal scope considered in this study.

The harmonisation of information on parenting leave into the specific leave types maternity leave, co-parent leave, parental leave, and parental leave earmarked for the second parent as carried out by Spitzer et al. (2025) ensures comparability but comes with some concessions. The allocation of national leave design elements, which contain country-specific schemes and terminology in local languages, into the specific leave types of maternity leave, co-parent leave,

parental leave, and parental leave earmarked for the second parent simplifies the landscape but drops specificities which are unique to each country. Additionally, regional variations are disregarded, and instead only national entitlements are considered.

The differing nature and heterogeneity of national leave arrangements pose a challenge when comparing leave elements. In several countries, parents can choose from different leave schemes that vary in duration and level of financial compensation. As mentioned earlier, the EPLP accounts for this institutional diversity by distinguishing between various leave schemes within countries across different "dimensions". As a primary aim of this thesis is to examine differences in leave duration, the analysis is restricted to the scheme that allows for the *longest* possible duration of paid leave (dimension 1 in the EPLP dataset). In many cases, prolonged leave comes with reduced financial benefits, which is an important factor in achieving equality, as the background section has shown. Consequently, the analysis misses out on some aspects of leave, particularly in shorter but more generously compensated schemes. However, cross-national comparability is enhanced by focusing on a clearly defined policy scenario: the maximum duration of paid leave available and the level of remuneration associated with it.

As established in the background section, two different types of benefits are frequently offered by countries: replacement rates and flat rates. Research suggests that replacement rates are more effective than flat rates in supporting families financially and in encouraging a more equal uptake of leave between parents (see Section 2.1.2). Moreover, replacement rates offer greater analytical consistency, as they are expressed as a percentage of prior earnings, making them directly embedded in each country's economic context. In contrast, flat rates are defined in nominal terms, differ across currencies, and are subject to differences in purchasing power, which complicates cross-country comparisons.

For the purposes of the empirical analysis conducted to construct a new typology of parenting leave policies, the focus is placed exclusively on earnings-related replacement rates, while flat rate payments are excluded. This restriction does not diminish the suitability of the EPLP dataset. In fact, the explicit distinction between different payment types allows for a transparent and theoretically motivated selection of the relevant indicators. Unlike datasets that only provide a single, aggregated payment measure, the EPLP enables the assessment and justification of which payment component is most relevant to the research question. While excluding flat rate benefits leaves out certain elements of parental leave provision, family policy research indicates that replacement rates are more strongly associated with fathers' leave taking behaviour (Karu & Tremblay, 2018; Moss, 2018; Rocha, 2021) and thus more closely linked to the gender equality

dimension examined here. Nevertheless, the presence of flat-rate payments is briefly discussed in the era division section of the results (see 5.1.6)

3.2 Variables

Several variables that describe policy instruments along the lines of the analytical dimensions of duration, payment, and gender equality were identified. These variables are designed at an individual level rather than a family level, which serves the purpose of this thesis. As outlined in the background section, arranging parenting leave policy instruments in this way facilitates the analysis of the gender equality dimension. The variables from the EPLP dataset (Spitzer et al., 2025) employed in this analysis are presented below and organised by the policy instruments they represent as well as the analytical dimension (duration, payment, equality) into which they are organised. Unless stated otherwise, a variable's unit is *weeks,* representing a *paid* period.

3.2.1 Duration variables

3.2.1.1 Maternity leave

The EPLP dataset reports maternity leave across four distinct variables. It distinguishes between *voluntary* and *mandatory* entitlements as well as separating leave periods available *before* and *after* birth.

mat_m_ld_bb Mandatory maternity leave duration before birth

mat_m_ld_ab Mandatory maternity leave duration after birth

mat_v_ld_bb Voluntary maternity leave duration before birth

mat_v_ld_ab Voluntary maternity leave duration after birth

As I am interested in the overall duration of maternity leave, the values are added together to obtain the total maternity leave duration.

3.2.1.2 Paid parental leave

As clarified in the background section, this thesis analyses parental leave entitlements on an individual level. The variable *par1_ld* is a variable from "dimension 1" of the EPLP and captures the longest possible paid leave duration available to the first parent. Recalling the terminology described in Section 2.1, this leave is ungendered and transferable between parents. Empirically, as pointed out in the background section, paid leave is mostly taken by mothers (e.g. Olsson et al., 2023; Tharp & Parks-Stamm, 2021) and the narrative I am building implicitly assumes the mother to be the first parent.

3.2.2 Job-protected leave

The variable *jp_ld_m* aggregates the post-birth period during which the mother is guaranteed a right to return to her job. It can go beyond the sum of maternity and paid parental leave, as usually there is the possibility to take unpaid but job-protected leave (Spitzer et al., 2025). As it is not a policy instrument per se but an aggregated measure it will not be included in the variable set for creating the new typology. Its development over time, however, provides meaningful information for deciding how to split the policy landscape into eras, which will be elaborated in the results Section 5.1.

3.2.3 Payment variables

3.2.3.1 Earnings replacement rate

The variable *par1_rr* reflects the share of the prior earnings that is reimbursed during paid parental leave. It is tied to "dimension 1" reflecting the scheme that offers the longest leave duration.

3.2.3.2 Flat rate payments

The variable *par1_fr* states the amount of benefits per month that parents receive in the setting with the maximum leave duration ("dimension 1"). It is expressed in the respective country currency. As explained in Section 3.1, flat rates will not be included in the analysis. Nevertheless, a brief overview of the presence of flat-rate benefits is provided in the results section (see 5.1.6).

3.2.4 Equality variables

3.2.4.1 Co-parent leave

The variable *co_ld* reports the maximum co-parent leave duration and is not limited to paid or job-protected periods. Additionally, it does not distinguish between the gender of the birth mother's co-parent. In many countries however, only fathers are eligible for this leave and can thus be viewed as *paternity leave* for most cases (Spitzer et al., 2025).

3.2.4.2 Paid parental leave earmarked for the second parent

The variable *par1_second_parent* captures paid parental leave entitlements earmarked for the second parent. This variable represents the additional time available to the second parent if the first parent takes the maximum available to them (Spitzer et al., 2025). It therefore reflects a non-transferable component of parental leave. The values of p*ar1_ld* and *par1_second_parent* can be added together to compute the maximum duration of paid parental leave on a family level.

For a better understanding of the dynamic between the two paid parental leave variables, an illustrative example derived from the EPLP documentation (Spitzer et al., 2025) is provided: "If *par1_ld* equals 10 weeks and *par1_second_parent* equals two weeks, the total family leave is

10+2=12 weeks. However [...], the leave is not fully flexible: One parent can take a maximum of ten weeks, and the remaining two weeks have to be taken by the second parent – otherwise, they are forfeited." (Spitzer et al., 2025, p. 11)

Parental leave earmarked for the second parent is particularly interesting when considered in relation to the total parental leave duration available to a family. The share of overall leave earmarked for the second parent (Equation 1) is an important indicator for the gender equality dimension, more so than absolute values.

Equation 1: Computation of the share of parental leave earmarked for the second parent

$$\frac{par1\_second\_parent}{par1\_second\_parent + par1\_ld}$$

3.2.4.3 Sharing incentives

The dataset includes a categorical variable *par_incentives* which indicates whether countries offer monetary or duration incentives to encourage parents to share leave more equally. These incentives are applied in ways that are unique and tailored to each country, which is why the variable only vaguely captures their presence with the values "no", "monetary", "duration incentive", "both" (Spitzer et al., 2025). For methodological reasons explained in the methods section, the variable is transformed into a numerical scale (0-2), where 0 indicates that no incentives are offered, 1 indicates that *either* duration *or* monetary incentives are offered, and 2 indicates duration *and* monetary incentives exist in a country's portfolio.

4 Methods

This thesis has two interrelated methodological objectives: The demarcation of distinct historical eras in the development of European parenting leave policies, and the construction of a policy typology for each identified era. These objectives are addressed through a sequential mixed-methods strategy that combines a descriptive longitudinal analysis with a quantitative clustering technique.

A two step-approach is carried out: First, historical eras are identified through a descriptive analysis of indicators' development over time. After splitting the data into the identified eras, the second part of the analysis focuses on country-level variation. Within each era, countries are classified into distinct clusters using *k-means clustering*. This quantitative clustering approach groups countries together according to similarities in their policy configurations along the selected dimensions. The exact procedure of the descriptive analysis, and a description of the k-means method and its implementation are described in detail in the following.

4.1 Descriptive analysis

As defined in the introduction, an era refers to a period during which a broadly similar policy landscape prevails across countries, or during which policy development follows similar dynamics and trajectories. To identify temporal boundaries between these eras, the first part of the analysis examines longitudinal trends in the set of analytical indicators identified in sections 2.1 and 3.2, which capture the key dimensions of parenting leave policy treated in this thesis (duration, payment, gender equality). Specifically, indicator values are averaged for each year across countries, to produce time series reflecting the overall development of individual policy instruments over time. Although this approach disregards country-specific variation, it is well suited to the purpose of era demarcation, which prioritises temporal change over cross-national differences. Country-level variation is addressed explicitly in the subsequent typology analysis.

The era division is carried out in two steps. First, the development of individual policy instruments is examined separately using graphical representations to identify periods of stability and phases of change as well as trend breaks to identify potential demarcation years between eras. Second, these instrument-specific developments and breaking points are synthesised to derive an aggregated era classification that reflects broader shifts in parenting leave policy design over time.

4.2 k-means Clustering

Clustering is an umbrella term for computational methods, which aim at finding groups of similar data points in multidimensional datasets. A broad range of clustering methods have been invented, among the oldest and most popular ones is *k-means clustering*. The term can be traced back to MacQueen (1967), several other authors refined the technique (e.g. Hartigan, 1975; Hartigan & Wong, 1979; Lloyd, 1982; G. W. Milligan & Cooper, 1987), for an extended overview see Hastie et al. (2009) and Hennig et al. (2015). The name is derived from the underlying mechanism: The user defines into how many (*k*) clusters the data should be grouped, the algorithm then proceeds to find an optimal partition that minimises the *within cluster variance* using Euclidean distances from the mean of each cluster.

One reason why *k-means* remains one of the most popular clustering methods is its simple applicability, few data prerequisites and low computational effort compared to other clustering methods (Jaeger & Banks, 2023). As it is an easy-to-use standard method most statistical software contains functions for performing *k-means*. Considerations and assumptions for the use of *k-means* will be discussed in subsection 4.2.4.

4.2.1 Algorithm

The algorithm aims at minimising the sum of squared distances within each cluster (*within-cluster sum of squares; wss)* which is achieved through an iterative process, stopping once the algorithm converges (i.e. no data points switch cluster anymore) (Hennig et al., 2015).

The following steps are included in the procedure:

0. *k* initial starting positions in the object space chosen randomly. Those positions are the first cluster centroids (i.e. geometric center point of data cloud (Amelio & Tagarelli, 2019)).
1. Assign each data point to the centroid it is closest to using Euclidean distance.
2. Calculate new cluster centers as the mean of all points allocated to the cluster.

Steps 1 and 2 are repeated until no points switch to another cluster anymore. Different starting positions can lead to different final partitions, in rare cases that depend on the data structure and starting positions the algorithm does not converge, meaning that for endlessly many iterations data points switch to another cluster. For such cases a termination condition is included in software functions that stops the algorithm after a certain number of iterations (Amelio & Tagarelli, 2019). To get a robust result, the algorithm is run multiple times with different randomly chosen starting positions and the run with the lowest *wss* is selected for the final allocation of data points into clusters (Jaeger & Banks, 2023).

For a better understanding, Figure 2 visually displays the procedure in a two-dimensional space.

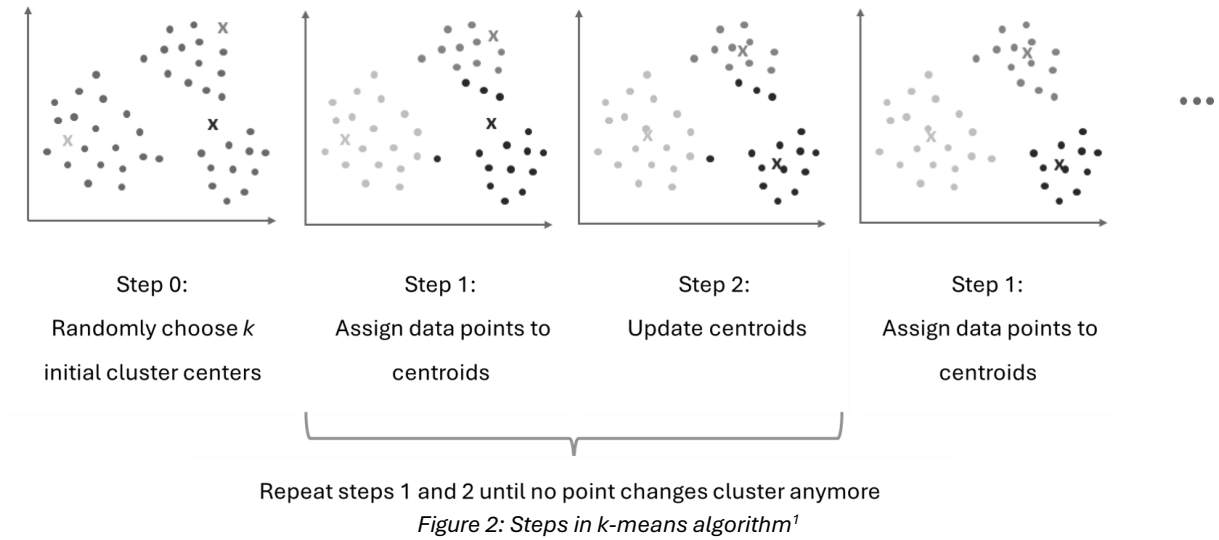

Figure 2: Steps in k-means algorithm[1]

For the calculation of the *wss,* the squared distances of each data point to its respective centroid (i.e. the geometric center point of the cluster the data point belongs to) are summed (Hennig et

[1] this graphic was originally published by Datatab (2025) and adapted by the author.

al., 2015). Equation 2**Fehler! Verweisquelle konnte nicht gefunden werden.** formulates the calculation mathematically, where *x* are the individual data points, *j* is the index iterating through the individual clusters, C_j denotes the set of data points assigned to cluster *j* and μ_j is the centroid of cluster *j*. In other words, first the sum of squared distances to the center is calculated for each cluster, which gives the within-cluster variance for each cluster, before summing all within-cluster variances up to arrive at the total *wss*.

Equation 2: Within-cluster sum of squares (Hennig et al. (2015))

$$wss(x, C, \mu) = \sum_{j=1}^{k} \sum_{x \in C_j} (x - \mu_j)^2$$

4.2.2 Choosing the right number of *k*

One essential decision in k-means clustering must be made by the user manually: the choice into how many clusters the data should be grouped. This choice directly influences the results, i.e. the final cluster constellations. Generally, a higher *k* results in a lower *wss*. In the extreme case where *k* = N (N = number of observations) each observation is put in its own cluster resulting in a *wss* of 0. In clustering applications, one aim is to simplify the data by finding groups of similar data points, so the user typically wants to choose a rather low *k*. One tries to find a sweet spot between high explanatory value of the clusters (low *wss*), and simplification of the data (low *k*).

For most applications, such as in the one in this thesis, the choice of *k* requires domain specific knowledge (Jaeger & Banks, 2023). A priori, the number of clusters in parental leave policies is unclear and finding out how many parental leave cluster there are, is stated as one of the aims of this thesis. Existing research has identified a variety of compositions ranging from 3-5 clusters (see Section 2.3).

To facilitate the choice of k, several auxiliary diagnostic measures have been developed, among which the elbow-method (Kodinariya & Makwana, 2013), and the Silhouette score (Rousseeuw, 1987). In addition, the NBclust function (Charrad et al., 2014) available in the statistical software *R* collects provides 24 indices based on mathematical properties of the dataset (e.g. distance between clusters, variance within clusters, distribution of the data set compared to uniformly distributed data points). The elbow-method will act as the main decisive tool, with the other indices serving as supportive robustness checks. These diagnostic measures are presented in more detail in the following.

4.2.2.1 Rule of thumb

A first rule of thumb gives $\sqrt{\frac{N}{2}}$ as a rough estimation for an optimal *k* (Kodinariya & Makwana, 2013). For large datasets this quickly becomes infeasible, as it does not simplify the data enough to leave

an interpretable number of clusters. In smaller datasets on the other hand, it provides a useful approximate value. This approach is not data-specific and just uses the number of observations as a guideline. In the EPLP dataset with N = 21 countries the rule of thumb gives 3.24, suggesting 3 or 4 clusters, which is in line with the number of clusters found by existing research (see Section 2.3).

Further diagnostic measures consider the data structure, specifications and distribution and are thus more sophisticated. All the following methods rely on a comparison of the best cluster partition for different values of *k* using diverse metrics.

4.2.2.2 Elbow-method

The elbow-method is a well-known variance-based approach for identifying the optimal *k* (Kodinariya & Makwana, 2013). Reasons for its popularity are its simple yet powerful application and interpretation. Unlike other indicators, it does not rely on complex mathematical properties but focuses on the *within-cluster sum of squares (wss)* – the central element in k-means clustering. *The wss* is plotted against increasing numbers of *k* (Figure 3). By design, the *wss* decreases with increasing *k*. The aim of the elbow-method is to visually identify the sweet spot between high explanatory value of the clusters (low *wss*) and simplification of the data (low *k*). One tries to find the *k* for which the curve shows a bend ("elbow"). At this point, the explanatory value of an additional cluster is marginally less that for the previous *k*'s and is thus chosen to be optimal (Kodinariya & Makwana, 2013). In Figure 3, this bend is visible at k = 3. Until here, the drop in *wss* is high for increasing k's, while choosing higher k's only gives a marginally lower *wss*.

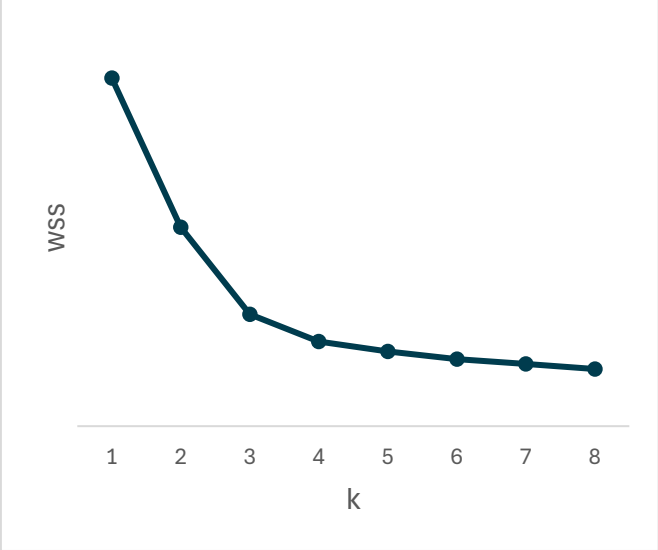

Figure 3: Elbow-method sketch [2]

[2] At k = 3 a clear bend is visible

4.2.2.3 Silhouette score

Rather than looking at within-cluster cohesion, the silhouette method (Rousseeuw, 1987) focuses on density and separation of clusters, i.e. how tightly packed data in a cluster is and how far clusters are apart from each other. The *silhouette score* ranging from -1 to 1 can be calculated for each observation in each cluster, where negative values indicate a cluster with a better fit exists and higher positive values indicate a strong belonging to the cluster. Taking the average silhouette width of all observations gives the overall silhouette width for the cluster partition. This overall silhouette width is calculated for different values of *k* and the *k* with the highest silhouette score is chosen to be optimal, showing the strongest clustering structures.

4.2.2.4 NBclust R package

A group of researchers (Charrad et al., 2014) developed a package for the statistical software *R,* including a single function combining 24 existing indices that are commonly used in literature to decide on the right value of *k* (including the silhouette score). Fed with data, the function returns an overview of which methods choose which *k* to be optimal and how many times each *k* is considered optimal. Information on the included indices is given in the authors' publication (Charrad et al., 2014), a more extensive mathematical description in Milligan and Cooper (1987). All the described indices focus on different aspects of the data structure, which is why they often do not suggest the same *k*.

4.2.3 Standardisation of variables

An important step in the process is the standardisation of variables. Observations need to be brought to the same scale, otherwise variables that run on a larger scale will dominate the clustering procedure (Mohamad & Usman, 2013). When minimising the sum of squared distances (see Section 4.2.1), the effect of a variable on the scale of e.g. 0-100 strongly outweighs that of a variable on the scale of 0-10, thus the algorithm will perform the cluster split along the 0-100 variable with minimal impact of the 0-10 variable. The different leave types in the EPLP show great differences in scale, with co-parent leave typically being only a few weeks, while paid parental leave routinely exceeds the 100 weeks mark. To ensure an equal influence of all variables on the clustering results, each of the variables is standardised. The need to standardise the variables is also part of the reason, why the *sharing incentives* variable had to be converted from a categorical variable to a numeric variable.

Different standardisation scores exist, with range-based standardisation having the best properties for clustering (G. W. Milligan & Cooper, 1988; Mohamad & Usman, 2013). The minimum value of a variable is deducted from each observation before dividing it by the range of the variable

(Equation 3). This standardises the variable to a scale from 0 to 1, where the highest observation is 1 and the smallest 0.

Equation 3: Min-Max standardisation (G. W. Milligan & Cooper, 1988, p.185)

$$z = \frac{x - Min(X)}{Max(X) - Min(X)}$$

Notes: x = value of one observation, X = all observed values of variable

For example, in 2024 Norway offered 20 weeks of paid parental leave. The maximum number of weeks of paid parental leave in that year is 113,57 (Austria), the minimum is 0 for several countries that do not offer paid parental leave. Thus, Norway's value is standardised to $\frac{20-0}{113{,}57-0} = 0.176$

For the interpretation of clusters, the variables are transformed back to their original values after the clustering has been carried out with the standardised values.

4.2.4 Considerations and assumptions

While k-means is a popular, straightforward approach in finding clusters, it comes with some caveats. Firstly, the data needs to be spherical - meaning that points within a cluster are distributed evenly in all directions from the center, making the cluster geometrically look like a sphere (Brodinová et al., 2019; Wani, 2024). A related requirement is that the data points are closer to their own center than others, which is not strictly the case when clusters have non-convex shapes – for instance, when they are curved or ring-shaped rather than compact and round (Brodinová et al., 2019). Figure 4 shows an example of convex (left) and non-convex (right) data structures. For the non-convex data, k-means would fail to detect the two clusters (inner ball and outer ring) which are visible to the human eye. Additional fabricated examples where k-means fails to detect plausible clusters have data arranged in the shape of concentric circles (Hastie et al., 2009) or a spiral (Koplik, 2017). While such data formations are not suitable for k-means clustering, they are rare in natural datasets (Hennig et al., 2015; Wani, 2024).

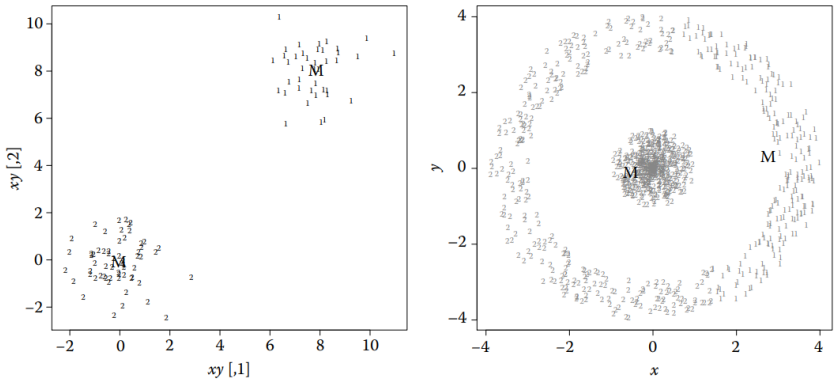

Figure 4: Convex vs. non-convex data arrangements (Hennig et al., 2015).

Another issue that arrives in high-dimensional datasets is the “curse of dimensionality”. With each added dimension, the mathematical space increases exponentially while only linear information growth through added data is achieved. As a result, the distance between any two data points converges with increasing dimensions, making a distance-based clustering method such as k-means clustering meaningless, as all points become equally far away from each other. (Hennig et al., 2015; Koplik, 2017). Wani (2024) tested the boundaries of k-means with the result that the method performs reliably for up to 20-30 dimensions (variables). The data I use in this thesis consists of 6 variables and 21 observations, which is well below the threshold for being affected by the curse of dimensionality.

Finally, the method is limited to numerical variables only, since it is based on calculating distances between data points. For categorical variables, no mathematical notion of distance exists. Ordinally scaled categorical variables are commonly and defensibly transformed to numeric scores and treated as continuous for distance-based methods like k-means (Robitzsch, 2020), which is what I did with the *sharing incentives* variable, by transforming it into a count variable describing how many different types of sharing incentives there are (see 3.2.4.3).

5 Results

5.1 Era division

The first step of the analysis is to find demarcation years between eras. As described in the methods section (see 4.1), this is carried out by descriptively looking at the development of different indicators of parenting leave over time. More precisely, the average value across countries for each year is calculated for each indicator and graphically represented, to visually identify breaking points, in which the landscape shows changes.

Before starting with the individual indicators, a glimpse into the timeline of reforms allows to find years in which the legislative conditions faced a lot of change. Figure 5 shows – for each year – the number of countries in which at least one variable changed. Overall, an increasing trend is visible with certain years standing out. A first spike is seen in 1989 with almost half of the countries changing parts of their parenting leave legislature. The early 2000s experience several years with changes. Finally, in more recent times, 2016 and more importantly 2022 and 2023 show a high number of reforms.

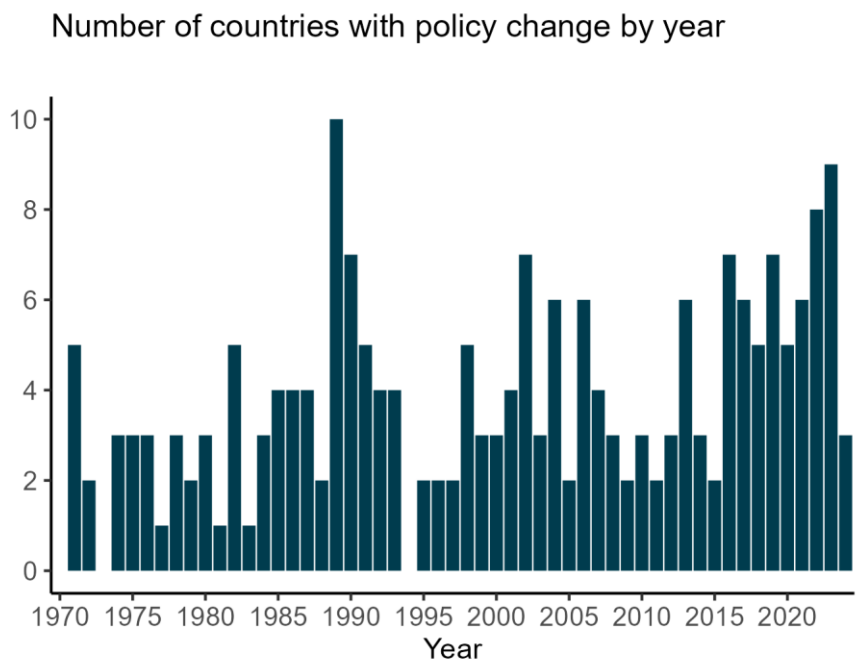

Figure 5: Number of countries with policy change by year

As discussed in the background and data sections, the parenting leave landscape in a country cannot be broken down to one duration measure, without leaving out valuable information. Instead, multiple variables will be investigated individually to find demarcation years for each one before an overall era split is determined. Schemes and measures change at different times, potentially staggered by countries. The final division accounts for these differences while prioritising the bigger picture, meaning that for some variables in isolation the final era split that is based on all indicators might not be the optimal era split for that single variable. Furthermore, the split is supported by qualitative information from literature.

The development of the selected parenting leave variables is plotted over time on the following pages. The investigation is carried out by averaging across all countries year by year with vertical dotted lines placed at years, in which a visible trend break occurs. These plots provide valuable insights into the general dynamics of different measures, disregarding country differences - of which there are plenty. Dissimilarities between countries will be discussed in more detail in Section 0 after the clustering has been carried out.

5.1.1 Job-protected leave

The development of job-protected leave, illustrated in Figure 6, reveals a gradual increase in average leave duration from approximately 30 weeks to 50 weeks between 1970 and 1988. In 1989, a pronounced upward shift is observed, with values surging to around 70 weeks, followed by a further increase to over 90 weeks by 2013. After these periods of increase, the duration of job-protected leave stabilised, remaining at around 90 weeks for the remainder of the observation

period. Overall, the trend indicates a substantial expansion of job-protected leave over time, 1989 marks a clear structural break while 2013 represents the end of the expansion phase.

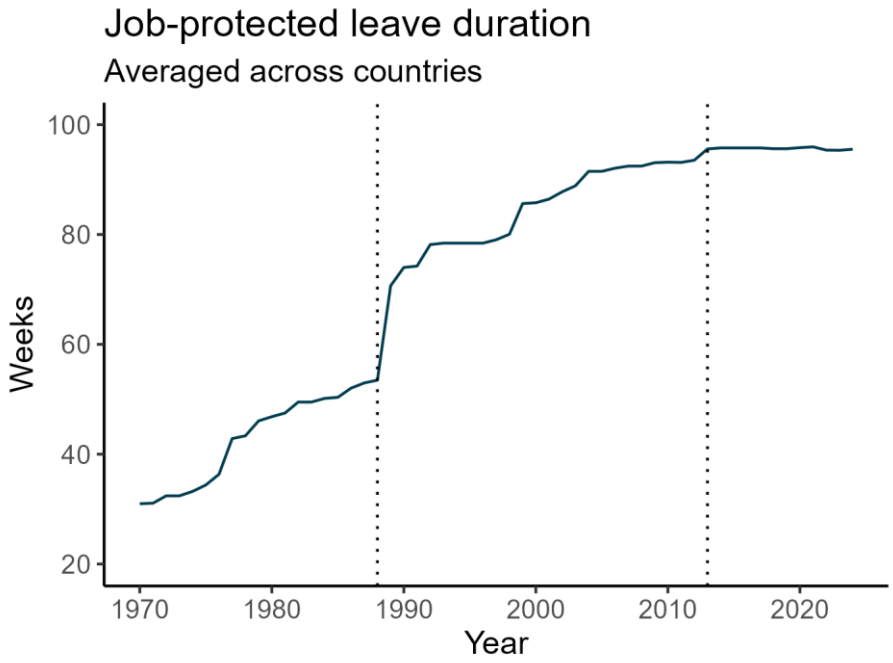

Figure 6: Average job-protected leave duration over time

5.1.2 Maternity leave and paid parental leave

Maternity leave and paid parental leave are aggregated here, as together they represent the maximum duration of *paid* leave available to birth mothers. While these two components could be analysed separately, the duration of maternity leave remains relatively stable over time (see Figure 14), suggesting that the observed dynamics are largely driven by changes in paid parental leave.

In the early years of the observation period, the combined indicator follows a similar pattern to job-protected leave, gradually increasing to around 45 weeks before expanding sharply to approximately 65 weeks between 1988–1991. Paid leave duration continued to rise thereafter, reaching a peak of around 70 weeks shortly after the turn of the millennium. From this point onwards, the trend reverses, with moderate fluctuations and an overall decline, before stabilising at approximately 52 weeks after 2019.

This trajectory indicates three successive phases of policy development. The first phase is characterised by a gradual expansion of paid leave duration up to 1988. This is followed by a second phase of more pronounced growth between 1988 and 2001, during which time the paid leave entitlements for birth mothers rose rapidly. From 2001 onwards, the trend reverses, with

declining paid leave durations reflecting a shift in policy orientation towards equality-focused instruments, as will be discussed in the subsequent graphs.

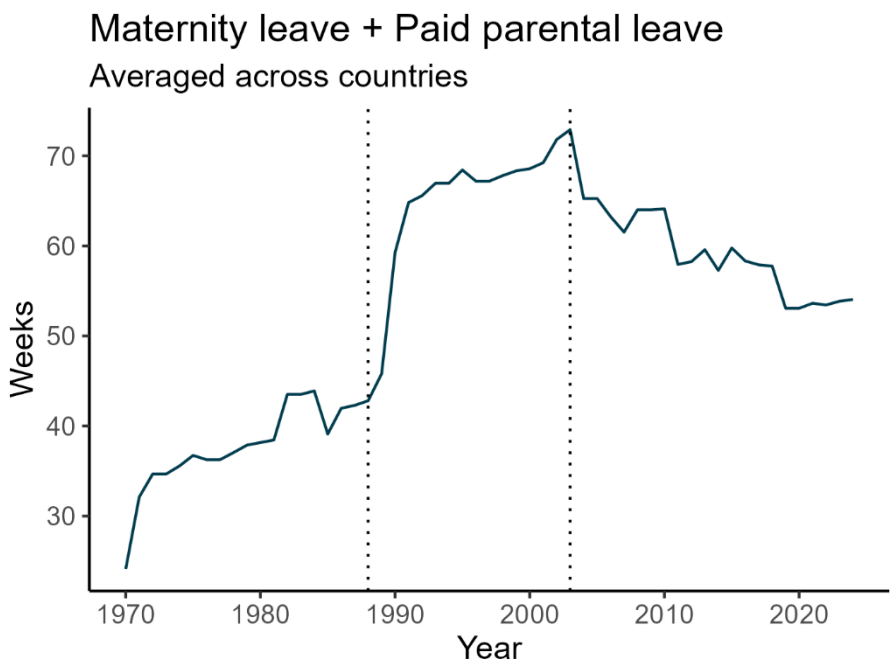

Figure 7: Average maternity leave + paid parental leave duration over time

5.1.3 Co-parent leave

Co-parent leave shows a very different development compared to job-protected leave and paid parental leave (see Figure 8). Not only are the absolute values substantially lower, but the leave type did not exist initially, increasing only gradually to around one week by 2001. A phase of accelerated expansion then becomes evident, with the average duration nearly tripling over the subsequent 15 years. This is followed by an even more pronounced increase, with co-parent leave doubling from around 2.5 to approximately five weeks in just eight years between 2016 and 2024. This recent acceleration suggests a growing emphasis on gender equality objectives in parenting leave policy design, particularly in the later years of the observation period.

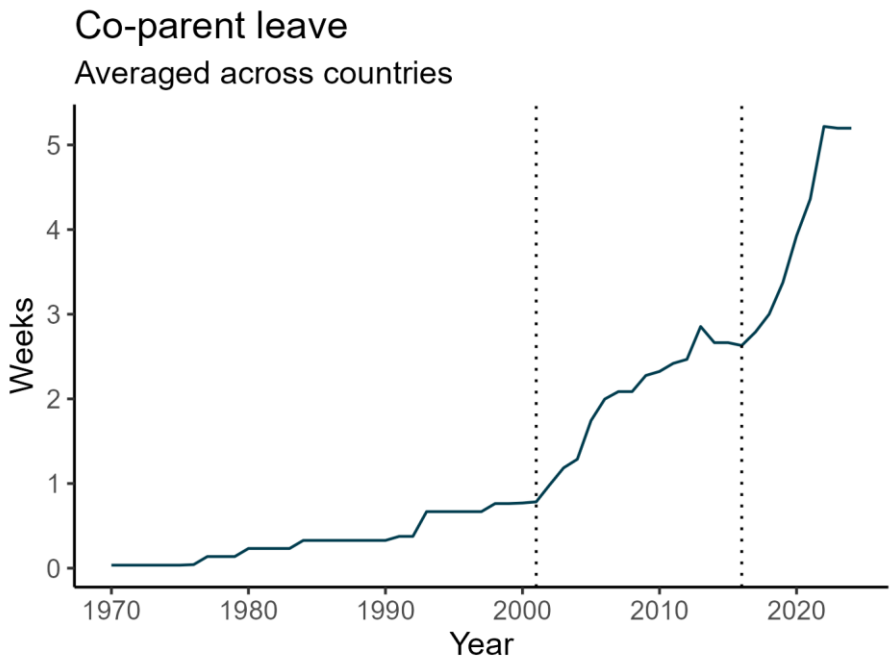

Figure 8: Average co-parent leave duration over time

5.1.4 Paid parental leave earmarked for the second parent

The increasing emphasis on gender equality in recent years is further supported by the development of paid leave entitlements reserved for the second parent (Figure 9). This policy instrument first appeared in 1995, with average weeks slowly increasing until 2014. In 2015, a surge is observed, which is followed by an even sharper increase after 2020.

When expressed as a proportion of the total paid leave duration (Figure 10) available to parents, the initial modest expansion reaches 7% in 2015, 10% in 2019 and 25% in 2024. This is a strong indicator of a recent era break in the last ten years, characterised by a growing policy orientation towards promoting gender-equal leave take up through the earmarking of leave entitlements for the second parent.

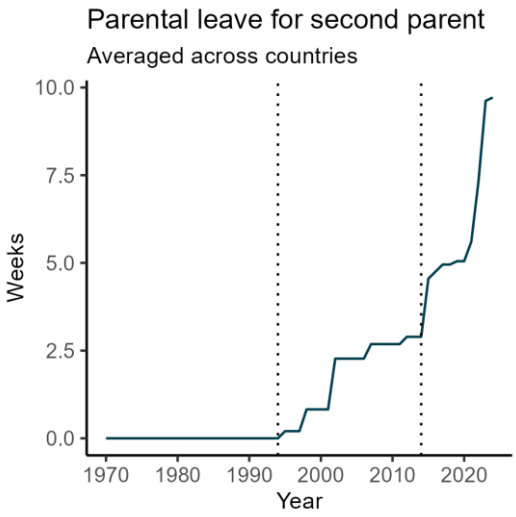

Figure 9: Average duration of paid parental leave earmarked for the second parent over time

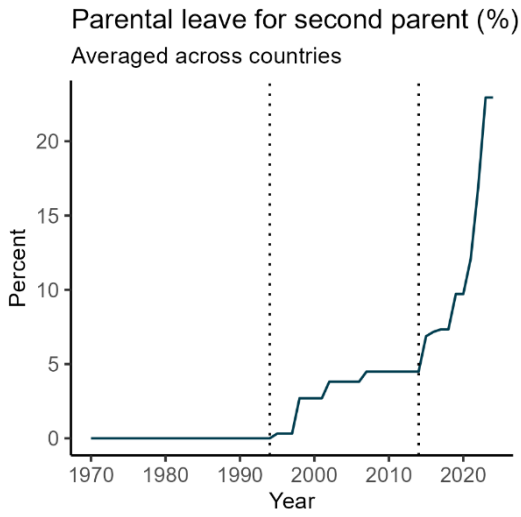

Figure 10: Average share of leave duration earmarked for the second parent over time

5.1.5 Incentives to share

The last equality variable is a rare sight in the policy landscape. Six different countries have had periods with financial or duration-based incentives to share parts of the leave. Norway was the first country to introduce a duration incentive, enabling couples to extend their leave if both parents took time off work. Italy followed in 2000, while Finland offered such incentives between 2003 and 2012. From 2008 to 2016 Sweden gave out a monetary "gender equality bonus" to couples which increased with a more equal division of leave uptake. This bonus was cancelled in favour of longer earmarked leave for the second parent (Rosenqvist, 2024). Since 2017, Austria has offered a similar bonus to couples who split leave uptake at least 40%-60% (meaning each partner takes at least 40% of the total couple leave) (Bundeskanzleramt, 2024). As of 2024, Germany is the only country to offer both types of sharing incentive, adding monetary incentives in 2015 to the duration incentives that have been in place since 2007. Apart from the absence of incentives before 1993, no clear temporal patterns can be observed due to the rare occurrence of sharing incentives in national policies.

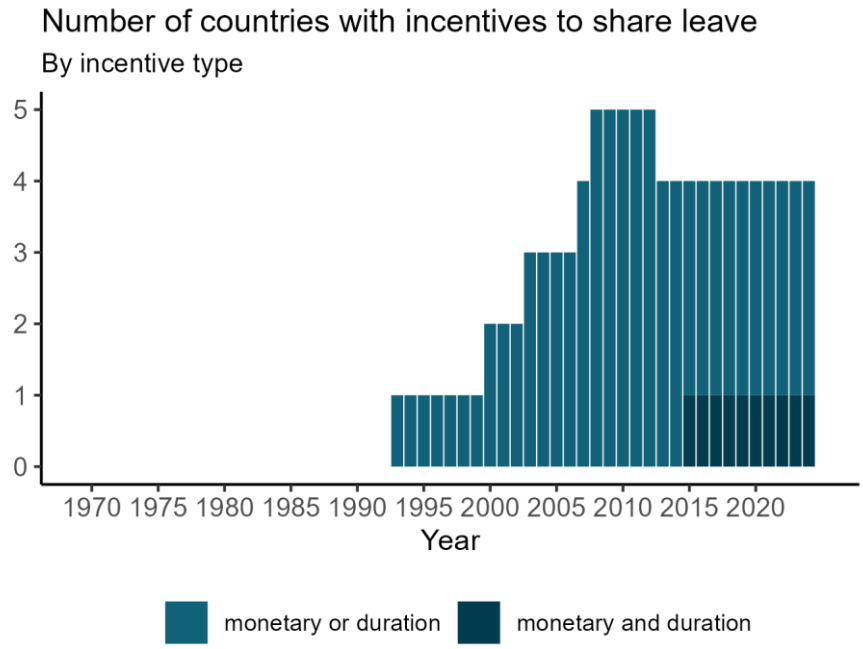

Figure 11: Number of countries with incentives to share over time

5.1.6 Presence of payment schemes

Paid parental leave has not been a universal feature of leave policies throughout the observation period. Figure 12 shows the number of countries offering paid parental leave in each year, distinguishing between flat-rate payment schemes, earnings-related replacement rate schemes, and combinations of both. Over time, earnings-related schemes have become increasingly prevalent, whereas flat-rate schemes have remained stable at low levels. In most years, no more than four to six countries have relied exclusively on flat rates. Since the early 2000s in particular, replacement rate schemes have expanded substantially relative to flat-rate arrangements, as of 2024 more than half of the included countries have a replacement rate scheme in place.

Another notable development is the gradual disappearance of unpaid parental leave regimes. While paid leave was still the exception in 1970, by 1985 only eight countries (Belgium, France, Greece, Ireland, the Netherlands, Poland, Spain, and the United Kingdom) had not introduced it. This number remained largely unchanged until the late 2010s. By 2024, only four countries lacked paid parental leave entitlements: Czechia and Slovakia abolished their payment schemes in 2004 and 2011, respectively, while Spain and the United Kingdom never introduced payment for extended parental leave.

As explained in the data section (see 3.1), flat-rate payment schemes are not further investigated further in this thesis. The following section therefore focuses in greater detail on the temporal development of earnings-related replacement rates.

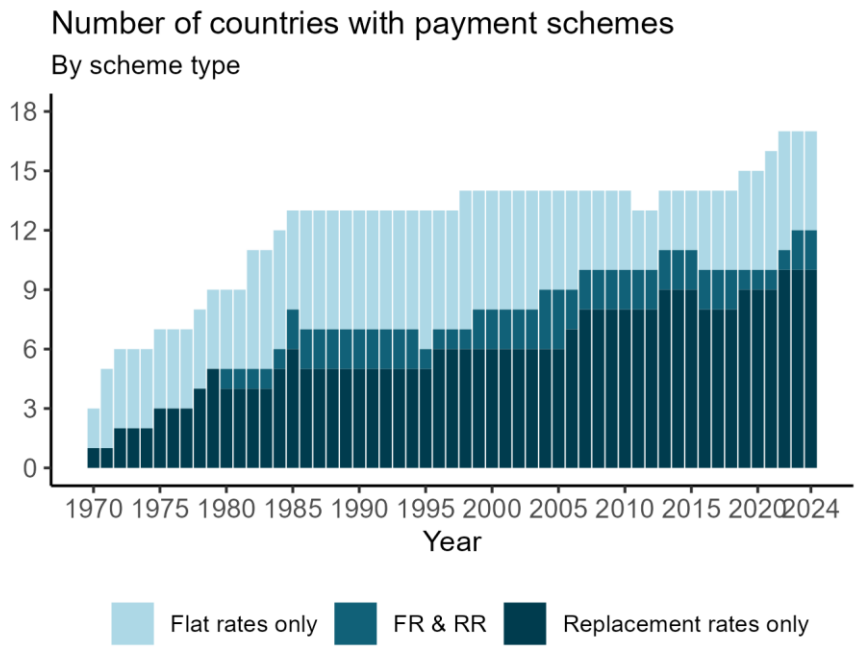

Figure 12: Overview of availability of payment schemes over time[3]

5.1.7 Replacement rate

The average replacement rate of countries with replacement rate schemes in place is plotted in Figure 13. In 1970, Sweden was the only country providing earnings-based remuneration of 80%. Over the following decades, further countries have introduced replacement rates at different levels leading to a volatile average rate. Neglecting the dip caused by Italy introducing a comparably low rate of 30% in 1972, early years show a high average replacement rate of over 80%. In the mid-80s the average rate started a descent to just below 70% in 2024, resulting from a few countries lowering the replacement rate before the turn of the millennium as well as Poland and the Netherlands introducing rates on a low level towards the end of the observation period. A temporary increase in the 2000s was caused by Estonia introducing full compensation as well as several countries adjusting the rate to a higher level.

[3] FR = flat rates, RR = replacement rates

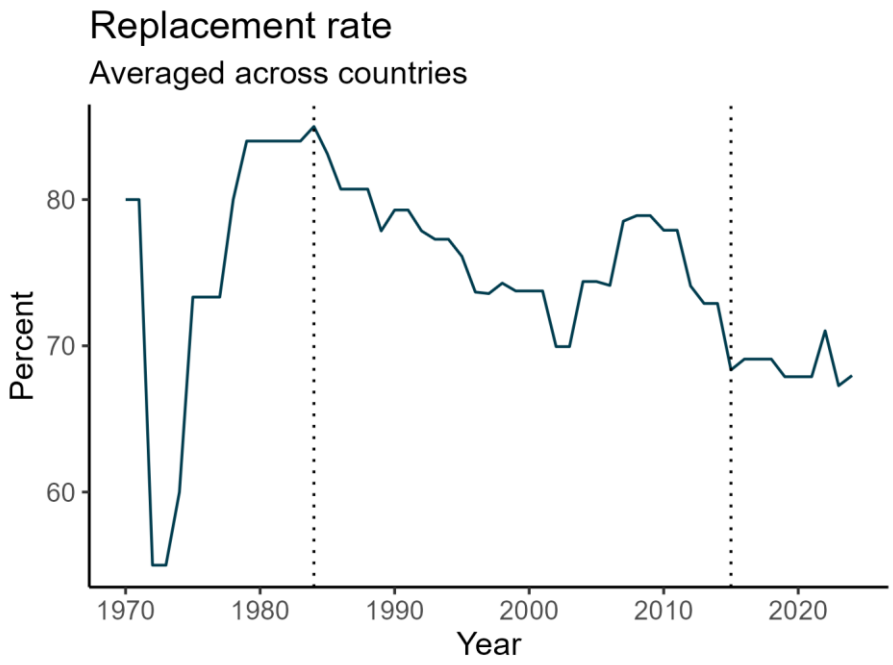

Figure 13: Average replacement rate of countries with scheme in place

The development of the presence of payment schemes as well as the development of average replacement rates in particular hint at two transition points. One around 1984, when the first expansion of paid schemes had ended and average replacement rates started to decline. A second one in the second half of the 2010s when more further countries introduced paid schemes and the average replacement rate stabilised at around 70%. The years in between are characterised by little change in the number of countries offering paid schemes and a gradual decline in the average replacement rate.

5.1.8 Final era division

Looking at the variables individually, most of them show two trend breaks at different years. The duration variables in relation to the first parent (maternity leave, paid parental leave) as well as job-protected leave show a first trend break around 1990 where a vast expansion of leave duration is recorded. In 2003, a second trend break is visible as leave duration peaked and started to decline from that year onwards. By contrast, the gender equality variables in relation to the second parent (co-parent leave, paid parental leave earmarked for the second parent) only begin to show up notably around the years 1995-2000. For those variables, there is a more pronounced trend break around 2015, when the average values started to rise sharply. Lastly, the average replacement rate representing the payment dimension first quickly increased until 1985, followed by a decline of average rates that lasted until 2015 when the average rate stabilised at around 70%.

To support the chosen era breaks, Figure 14 summarises the development of the total leave available to a family, differentiating by leave type. Since the overall leave generally increased over

time, a graphical representation displaying each leave type as a proportion of the total leave helps identify shifts in the relative prominence of individual entitlements (Figure 15). These charts give an aggregated overview of the described development of the different leave components and complement the analysis carried out for each indicator in isolation. In both graphs, vertical dotted lines are placed at years 1990 and 2015, which are the final era demarcation years.

Table 2 provides an overview of the trend breaks identified in the previous analyses. In chronological order, it lists years in which the individual indicators show a changing trend in the columns 'First trend break' and 'Second trend break'. Years highlighted in bold italics indicate the decisive breakpoints used to determine the final era demarcation. Years shown in brackets denote less pronounced trend changes, which are not treated as defining breaks but are included as supporting evidence for the chosen era split.

Synthesising the developments across the individual indicators, the European parenting leave policy landscape can be divided into three distinct eras with years **1990** and **2015** identified as demarcation years. The first era break in 1990 is largely associated with a changing landscape of the duration variables reflecting a broad expansion of entitlements. In contrast, the second era break in 2015 is primarily driven by an expansion the gender-equality-oriented policy instruments, accompanied by a decline in the values of the duration variables.

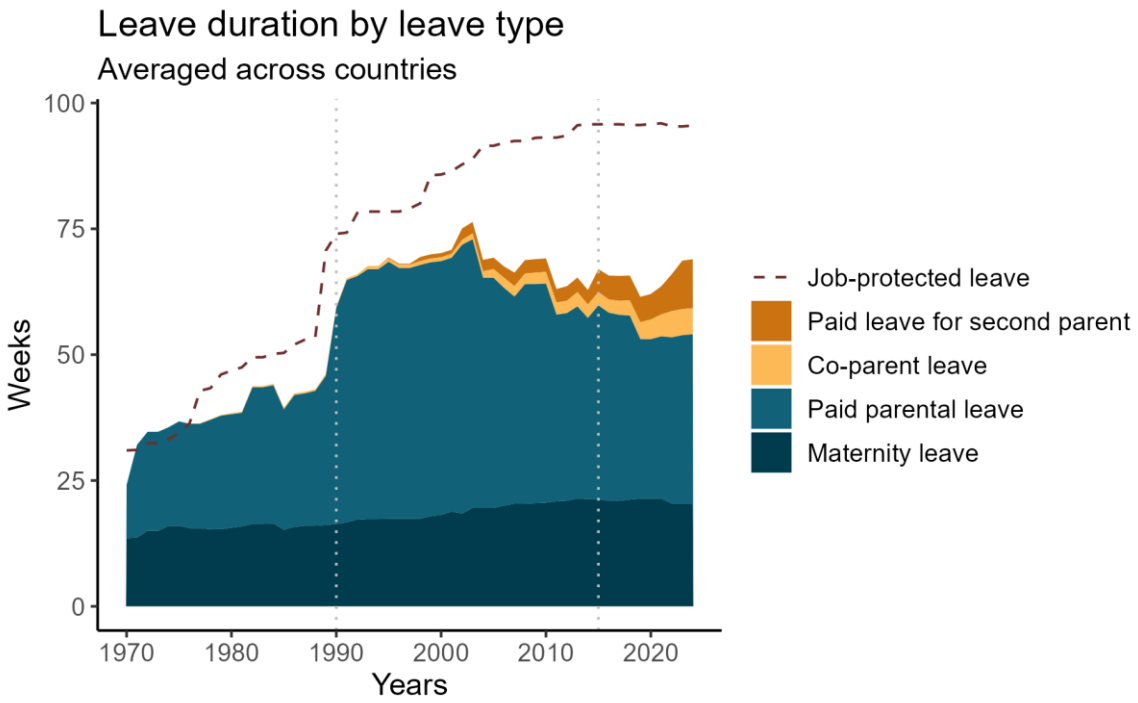

Figure 14: Total leave duration by leave type[4]

[4] Vertical dotted bars are placed at years identified as era breaks

Table 2: Overview of variables trend breaks + final era decision.

Measure	First trend break	Second trend break	Notes
Job-protected leave	***1989***	[2013]	*First trend break*: Sharp expansion; Decisive split between eras 1&2 Second trend break: Stabilisation
Maternity Leave & Paid parental leave	***1990***	2003	*First trend break:* Sharp expansion; Decisive split between eras 1&2 *Second trend break:* Start of decline in leave duration
Co-parent leave	[2001]	***2016***	*First trend break:* year of initial appearance *Second trend break:* Sharp expansion; Decisive split between eras 2&3
Paid leave earmarked for the second parent	[1995]	***2015***	*First trend break:* year of initial appearance *Second trend break:* Decisive split between era 2&3
Sharing incentives	[1993]		*First trend break*: Year of initial appearance. No clear patterns visible
Replacement rate	1985	[Late 2010s]	*First trend break:* Supports break between eras 1&2 *Second trend break:* Supports break between eras 2&3
Number of policy changes	1989	2016	See Figure 5

Notes: Years highlighted in bold italics indicate sharp trend break. Years in brackets indicate a trend break is not very pronounced.

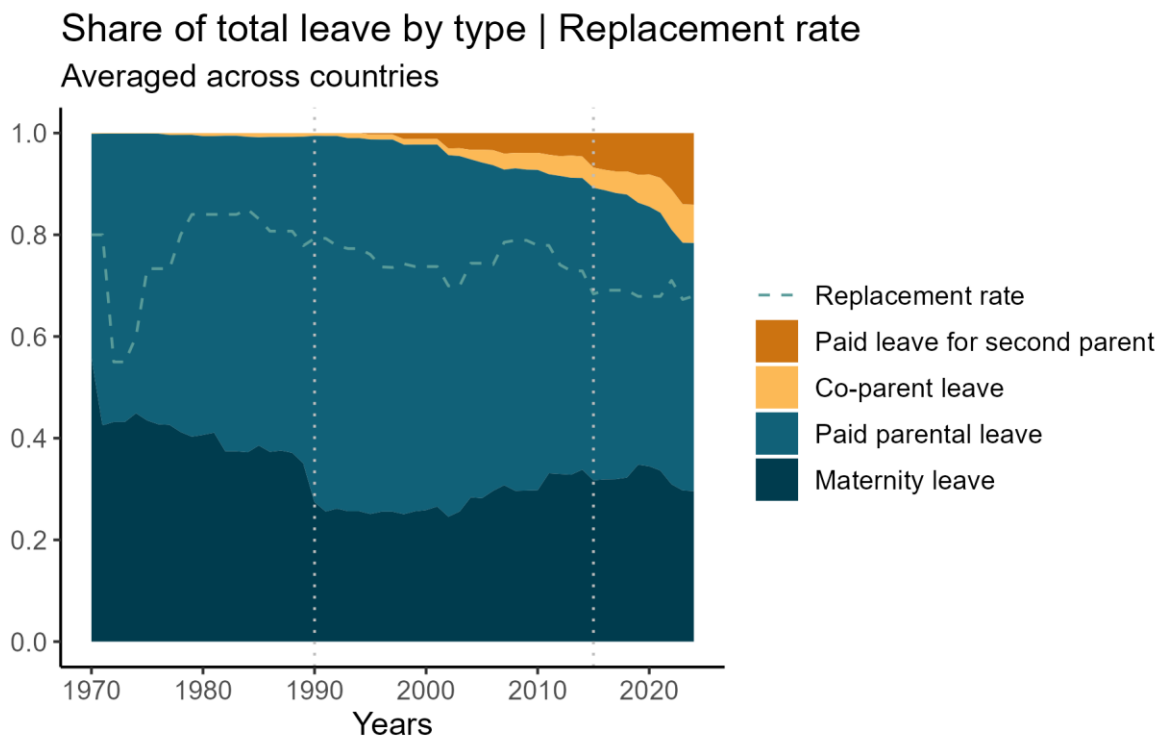

Figure 15: Share of total leave duration by leave type & average replacement rate[5]

I take the increase in duration variables, especially paid parental leave, that stands out until 1990 to take that year as the end of a first era and beginning of a second. Payment variables support this demarcation, as most years until then show a common dynamic. The biggest increase in the number of paying schemes as well as highest average replacement rates fall into that era, their stalling or decline only start towards the end of this era. Neither co-parent leave nor paid leave for the second parent are yet on the landscape.

Zooming out to the general political landscape, Europe in the 1990s was a continent in change. The collapse of the Soviet Union, Yugoslavia and Czechoslovakia caused several new independent countries to appear, while Germany was reunified. Meanwhile, Hungary and Poland transitioned from a communist regime to a market-oriented democracy. A third of the countries in the dataset faced radical structural changes which trickle down to family policies. This caesura might be the reason for such a pronounced change in the leave dynamic on offer around 1990. Investigating the years after 1990 in its own era, allows to capture the changes implemented by post-communist countries effectively.

The 1990s and 2000s are characterised by a fluctuating paid parental leave duration following a downward trend. Part of the decrease can be explained by schemes popping up that dedicate a

[5] Vertical dotted bars are placed at years identified as era breaks

portion of the leave specifically to the second parent. These schemes become very prominent in the late 2010s which is why 2015 serves as the break between eras 2 and 3. Again, the payment dimension supports this era split, as in the final period a bunch of countries introduced paying schemes and average replacement rate stabilises at around 70%.

In summary, three eras of parenting leave can be observed. Era 1 lasted from **1970-1989**, with a high share of maternity leave and increasing paid parental leave for the first parent serving as a defining characteristic, from which the name *"Era of maternal leave"* can be derived. Era 2 from **1990-2014** is a transition period in which the duration of paid parental leave for the mother is constantly changing, and countries experiment with leave types dedicated to the second parent. Newly formed countries add to this changing landscape. Overall, this era can be called the *"Era of transition"*. The last era (**2015-2024**) is driven by the explosion of co-parent leave and non-transferable leave earmarked for the second parent. Recalling the findings from the literature section in terms of the impact of these variables on a more egalitarian labour division, I name this period the "*Era of equality"*.

5.2 Clustering results

Having carried out the division into distinct eras of parenting leave, this section describes the results of the clustering procedure for each era in order to propose a new typology of parenting leave policies.

The clustering results section is split into two parts. The first part identifies how many clusters of parenting leave policies can be found in each era. The second part then presents the results of the clustering process for each era by giving an overview of the clusters and their country compositions era by era. It is furthermore outlined, which elements of parenting leave are most characteristic for each cluster and what development different countries go through from era to era.

Given that sharing incentives have rarely been included in countries policies throughout the years (see 5.1.5), I set up two different models to feed the clustering algorithm – one including sharing incentives, one excluding them. Excluding incentives only leads to one minor shift in the country-cluster allocation but gives a clearer optimal number of clusters based on the auxiliary diagnostic measures described in Section 4.2.2 (elbow-method, silhouette score, NBclust). For that reason, the model without sharing incentives is employed for the typology creation. I will address the differing results in Section 5.2.2 when describing the clusters in more detail. Job-protected leave is not included in the clustering either, since it is a composite variable calculated by a

combination of measures making it is correlated with other included variables which can bias the clustering algorithm.

5.2.1 Number of clusters

As described in the methods section, the choice of *k* (i.e. into how many clusters should the algorithm group the data) is a vital step for k-means clustering that must be performed manually. Although auxiliary methods have been developed, the choice of *k* requires domain specific knowledge. Most existing typologies presented in the background Section 2.3 find three to five parenting leave regimes, while the rule of thumb ($\sqrt{\frac{N}{2}} = 3.39$) gives three to four clusters as optimal. Thus, three to five clusters serve as an orientation about the number of clusters in each era.

In the following, plots from the auxiliary diagnostic measures (elbow-plot, silhouette score, NBclust package) are presented era by era to find the optimal number of clusters. The elbow-plot is taken as the primary decision tool, being the most common measure in the literature for choosing *k*. The *silhouette score* as well as the *NBclust* R package are consulted as robustness checks to support the elbow-plot.

5.2.1.1 Era of maternal leave

The diagnostic measures for the first era (Figure 16) offer no clear indication of the optimal number of clusters. The elbow plot shows a fairly smooth curve with only a slight bend at k = 2. Similarly, the silhouette score reaches a maximum score of around 0.6 at k = 2, with values for k = 3 and k = 6 only marginally lower at around 0.5. Finally, eight additional indices from the NBclust package predominantly favour k = 2, while k = 3 and k = 6 are also favoured by six and seven measures respectively. Overall, the statistical evidence indicates weak cluster separation in this era, with k = 2, k = 3 and k = 6 emerging as the most defensible solutions.

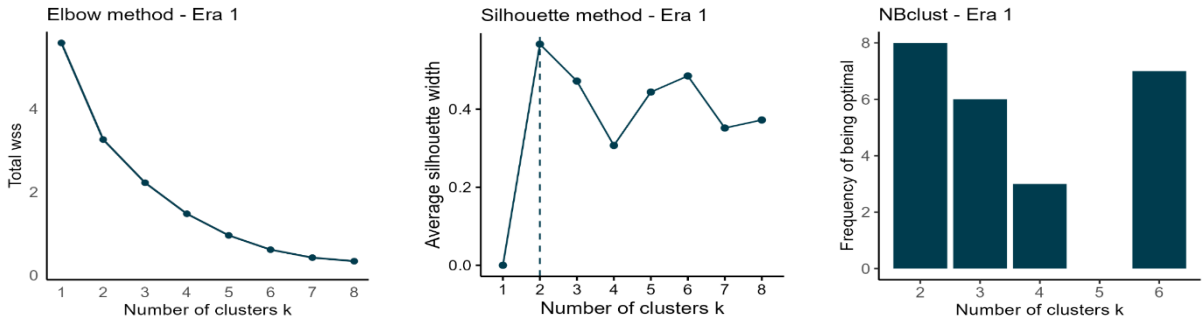

Figure 16: Diagnostic measures for choosing the optimal number of k (era 1)

In substantive terms, a two-cluster solution results in an imbalanced division, with Norway and Sweden forming a distinct cluster, while the remaining countries are grouped together. While this exemplifies the exceptional position of these two Nordic countries, such an uneven division

provides little analytical value for building a typology. Solutions with k = 3 and k = 6 perform only marginally worse according to the diagnostic criteria and are therefore preferred. Selecting six clusters for a sample of 21 observations exceeds the previously defined acceptable range of three to five clusters. Consequently, ***k = 3*** is chosen as the number of clusters for this era. This balances statistical adequacy with interpretability while acknowledging that the underlying clustering structure may be weak and reflect a relatively uniform distribution of observations.

5.2.1.2 Era of transition

For the second era, the diagnostic measures (Figure 17) provide a clear and consistent indication of the optimal number of clusters. The elbow plot shows a distinct bend at k = 4. The silhouette score would allow for a variety of choices since all options between k = 3 and k = 8 provide a high score around 0.4, nevertheless the maximum silhouette value is observed at k = 4. The majority of the NBclust measures also select 4 clusters to be optimal. Taken together, the diagnostic indicators strongly support the selection of ***k = 4*** as the optimal number of clusters for this era.

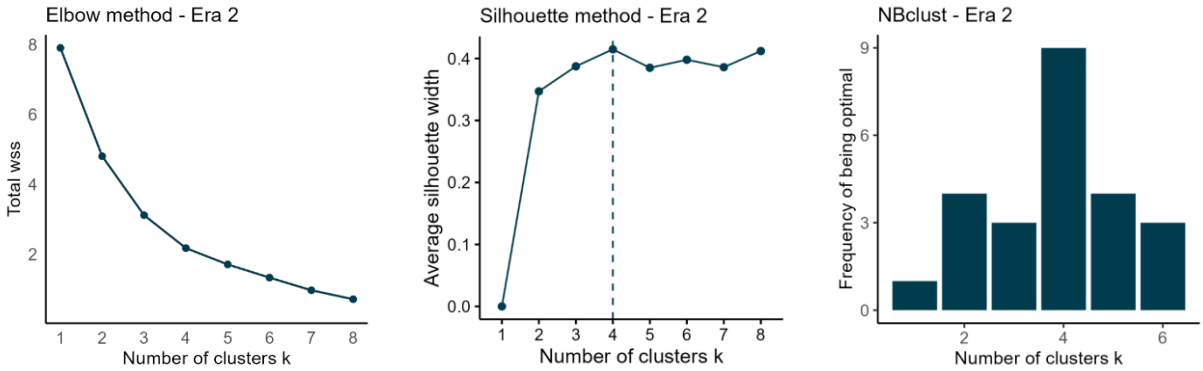

Figure 17: Diagnostic measures for choosing the optimal number of k (era 2)

5.2.1.3 Era of equality

The determination of the optimal number of clusters in the final era is less straightforward. The elbow plot shows a clear bend at k = 2 and a less pronounced one at k = 4 (Figure 18). Similar to era 1, a two-cluster solution results in imbalanced clusters with low analytical value. The silhouette analysis yields approximately 0.35 as its highest value at k = 5, though solutions with k = 2, k = 3, or k = 4 also achieve high scores of over 0.3. The majority of the NBclust measures supports k = 4 as the optimal number of clusters. Consequently, ***k = 4*** provides the best option based on the elbow method supported by the silhouette method and NBclust measures.

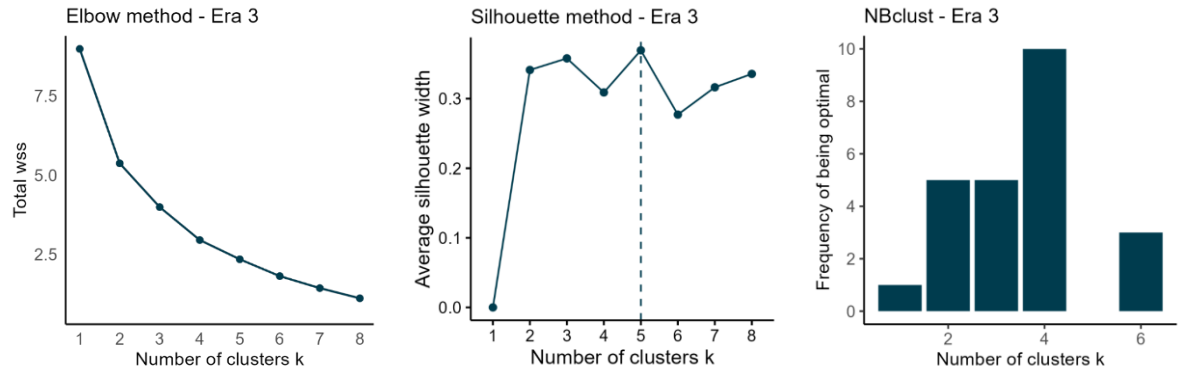

Figure 18: Diagnostic measures for choosing the optimal number of k (era 3)

In summary, *three* clusters are identified for the era of maternal leave, *four* clusters for the era of transition, and *four* clusters for the era of equality. These cluster solutions form the empirical basis for the typology of parenting leave policies developed in the following section.

5.2.2 Clusters

As identified in the previous subsection, the first era (1970-1989) consists of three distinct clusters whereas both the second (1990-2014) and third (2015-2024) eras contain four clusters. These clusters are not static over time. Rather, their composition (i.e. the countries assigned to each cluster) and their substantive meaning (i.e. the configuration of parenting leave instruments) vary across eras. Despite the temporal change in the absolute values of indicators over time, however, recurring cluster profiles that exhibit stable characteristics across eras, emerge. This stability in the clusters nature allows them to be viewed as evolving policy profiles over time, in contrast to completely different policy types in each era.

Because the overall duration of leave increased at the beginning of the observation period and equality-oriented instruments became more prominent in later years (see Section 5.1), attributes describing the level of an instruments' such as 'low', 'high', or 'generous', should be understood as relative to the era and relative to the policy instrument. For example, a co-parent leave duration categorised as 'low' in the third era may exceed what was categorised as 'high' in the first era. Additionally, the scales of indicators vary considerably, so while 5 weeks would be considered high in relation to co-parent leave, it would reflect a very low value for parental leave. This relative interpretation ensures that cluster comparisons maintain interpretability primarily within each era.

Before turning to a more detailed discussion of the clustering results in the following subsections, Table 3 provides an overview of the cluster profiles identified, and the countries associated with them in each era. Together, these cluster profiles capture the various combinations of policy priorities found in European parenting leave systems and represent the newly created longitudinal typology of parenting leave policies in Europe from 1970 to 2024.

Throughout the eras, Cluster 1 shows medium values in the duration dimension (maternity leave and paid parental leave), but comparatively high values in both replacement rate and co-parent leave. Research outlined in the background Section 2.1 has linked high replacement rates (Karu & Tremblay, 2018; Rocha, 2021) and extended non-transferable leaves for the second parent (Albrecht et al., 2024; Rocha, 2021) to increased gender equality in childcare, which is why this cluster is referred to as the ***egalitarian cluster***.

Cluster 2 is characterised by consistently long parental leave durations, combined with medium to low values for gender equality and payment indicators. Such a combination of instruments resembles ***conservative*** policy regimes previous typologies have identified (Esping-Andersen, 1990; Thévenon, 2011).

Cluster 3 is named the ***basic support cluster***, which provides long maternity leave but low to medium values across all other observed instruments in each era, indicating limited policy intervention that goes beyond maternal protection around childbirth.

While cluster 4 only appears in the second and third eras and only consists of Belgium (eras 2 and 3) and France (era 3), it is so distinct in its characteristics compared to other clusters. More specifically, it is defined by exceptionally high values in the share of parental leave earmarked for the second parent, as both countries introduced an equal division of parental leave entitlements. This standalone feature offers the name ***leave sharing cluster***.

As a reminder the payment dimension only considers replacement rate schemes with flat rates being left out. Thus, it is not possible to deduce statements about the overall generosity of payments. The background section (see 2.1.2) outlined that replacement rates offer a higher potential in transforming the equality landscape (Albrecht et al., 2024; Rocha, 2021). Therefore, the presence of high replacement should rather be thought of as an indication of a payment schemes with the potential to promote gender-equal uptake of leave.

Conversely, the absence of replacement rates does not generally denote unpaid schemes, but rather a lack of payments linked to equality. For example, Cluster 4 in eras two and three (see Table 5 and Table 6, respectively) has a replacement rate of 0% but still has paid parental leave in place, Here, financial transfers occur in the form of flat rates – which are excluded from the analysis as explained in Section 3.1.

The following pages describe the clusters and the country allocation in more detail. For each era, a table listing the countries in each cluster and their average values for all variables are presented. Additionally, distributional plots for each dimension (duration, payment, equality) are provided to illustrate along which dimension the clusters differ most in each era. For the duration and equality

dimension, this is illustrated by scatterplots of maternity leave and paid parental leave as well as co-parent leave and paid parental leave for the second dimension, respectively. The payment dimension, only captured by replacement rates, is visualised by a stripchart grouped by cluster. These descriptive results and visualisations are further contextualised by describing countries' trajectories from era to era.

5.2.2.1 Era 1 - Era of maternal leave (1970-1989)

The first era reflects a policy landscape characterised by limited diversification of parenting leave instruments, as the literature Section 2.3 as well as the longitudinal analysis in Section 5.1 have shown. Measures promoting gender equality were largely absent: earmarked leave for the second parent had not been introduced yet and co-parent leave only existed in few countries. Instead, the dominant policy instruments were maternity leave and parental leave, which was largely taken by mothers in these decades according to literature (e.g. Olsson et al., 2023; Tharp & Parks-Stamm, 2021). Average values for each indicator and country can be taken from Table 4.

Norway and Sweden constitute the most clearly separated *egalitarian* cluster 1. What strongly distinguishes them from other countries, is the presence of a week of co-parent leave and more importantly high replacement rates (59% and 86% respectively). Combined with short maternity leave and medium parental leave the cluster resembles structures in which both parents participate more equally in childcare (Albrecht et al., 2024; Karu & Tremblay, 2018; Rocha, 2021).

A contrary *conservative* cluster 2 forms around Hungary and the former Czechoslovakia with high maternity and parental leave but low replacement rates and no co-parent leave. This resembles dynamics earlier described in the context of conservative regimes, from which the cluster name is derived. Exceptionally long 150 weeks of parental leave are observed in Hungary. Italy and Finland are part of this cluster as well, but represent odd ones out, providing shorter parental leave of only 23 and 6 weeks, respectively. While these shorter leave durations do not fit the rest of the cluster, their average replacement rates (27% and 20%, respectively) are too low to put them into the egalitarian cluster.

Table 3: Overview of clusters

Cluster	Era of maternal leave (1970-1989)	Era of transition (1990-2014)	Era of equality (2015-2024)
Cluster 1 **'Egalitarian'** Defining characteristic: *High replacement rates & long co-parent leave*	Norway (NO) (a) Sweden (SE) (a)	Norway (NO) (a) Sweden (SE) (a) Denmark (DK) (c) Finland (FI) (c) Slovenia (SI) (c)	Norway (NO) (a) Sweden (SE) (a) Denmark (DK) (c) Finland (FI) (c) Slovenia (SI) (c) Estonia (EE) Poland (PL)
Cluster 2 **'Conservative'** Defining characteristic: *Very long parental leave*	Czech Republic (CZ) (b) Slovakia (SK) (b) Hungary (HU) (b) Finland (FI) Italy (IT)	Czech Republic (CZ) (b) Slovakia (SK) (b) Hungary (HU) (b) Austria (AT) (c) Germany (DE) (c) Lithuania (LT) (c) Estonia (EE)	Austria (AT) (c) Germany (DE) (c) Lithuania (LT) (c)
Cluster 3 **'Basic support'** Defining characteristic: *Long maternity leave, low values in all other indicators*	Spain (ES) (a) Greece (GR) (a) Ireland (IE) (a) Netherlands (NL) (a) United Kingdom (UK) (a) France (FR) (b) Poland (PL) (b) Austria (AT) Germany (DE) Estonia (EE) Lithuania (LT) Denmark (DK) Slovenia (SI) Belgium (BE)	Spain (ES) (a) Greece (GR) (a) Ireland (IE) (a) Netherlands (NL) (a) United Kingdom (UK) (a) France (FR) (b) Poland (PL) (b) Italy (IT) (c)	Spain (ES) (a) Greece (GR) (a) Ireland (IE) (a) Netherlands (NL) (a) United Kingdom (UK) (a) Italy (IT) (c) Czech Republic (CZ) Slovakia (SK) Hungary (HU)
Cluster 4 **'Leave sharing'** Defining Characteristic: *High share of leave earmarked for the second parent*	-	Belgium (BE) (c)	Belgium (BE) (c) France (FR)

Notes: (a) indicates countries that stayed in the same cluster throughout all 3 eras, (b) indicates countries that belong to the same cluster in eras 1 and 2, (c) indicates countries that belong to the same cluster in eras 2 and 3

The *cluster of basic support* (cluster 3) is the largest group with 14 countries and largely consists of countries with weakly developed policies. All instruments but maternity leave are low here. This limited support setting focuses on maternal protection around childbirth. Some countries, however, mark exceptions, but none display a combination of indicators that aligns with the other clusters: Austria provides above average parental leave of 45 weeks, Denmark shows signs of an egalitarian orientation with 0.6 weeks of co-parent leave and a slightly raised replacement rate of 27%, and Germany shows a medium replacement rate level of 35%. A curious case is posed by Slovenia, which is similar to Norway and Sweden (cluster 1) in parental leave duration (18 weeks) and replacement rate (75%). The absence of co-parent leave, and an inflated maternity leave duration (15 weeks), however, mean it fits better into the basic support cluster.

Table 4: Clustering results era of maternal leave (era 1)

cluster	country	ML	PL	Co-parent leave	PL second parent (share)	Replacement rate	era
1	NO	8.40	8.10	1.30	0.0%	59.0%	1
1	SE	6.00	37.29	1.00	0.0%	88.0%	1
1	**mean**	**7.20**	**22.69**	**1.15**	**0.0%**	**73.0%**	**1**
2	CZ	26.30	65.19	0.00	0.0%	0.0%	1
2	FI	25.19	6.58	0.00	0.0%	20.0%	1
2	HU	12.00	150.54	0.00	0.0%	19.0%	1
2	IT	20.97	23.48	0.00	0.0%	27.0%	1
2	SK	26.30	65.19	0.00	0.0%	0.0%	1
2	**mean**	**22.15**	**62.20**	**0.00**	**0.0%**	**13.0%**	**1**
3	AT	15.20	44.58	0.00	0.0%	0.0%	1
3	BE	14.00	0.00	0.60	0.0%	0.0%	1
3	DE	14.00	14.71	0.00	0.0%	35.0%	1
3	DK	16.00	2.80	0.60	0.0%	27.0%	1
3	EE	16.00	22.18	0.00	0.0%	0.0%	1
3	ES	13.50	0.00	0.24	0.0%	0.0%	1
3	FR	16.00	0.00	0.00	0.0%	0.0%	1
3	GR	12.65	0.00	0.00	0.0%	0.0%	1
3	IE	14.70	0.00	0.00	0.0%	0.0%	1
3	LT	14.40	17.67	0.00	0.0%	0.0%	1
3	NL	12.00	0.00	0.00	0.0%	0.0%	1
3	PL	15.60	0.00	0.00	0.0%	0.0%	1
3	SI	15.00	18.51	0.00	0.0%	75.0%	1
3	UK	12.00	0.00	0.00	0.0%	0.0%	1
3	**mean**	**14.36**	**8.60**	**0.10**	**0.0%**	**10.0%**	**1**

Notes: ML = maternity leave, PL = parental leave for the first parent, PL second parent (share) = share of overall parental leave earmarked for the second parent. Numbers represent averages over the whole era. ML, PL & co-parent leave values represent weeks.

The distributional plots (Figure 19) visually clarify the dimensions along which the clusters are split. The equality variables and the replacement rate clearly separate the egalitarian cluster (cluster 1) from the others, while clusters 2 and 3 show much overlap here. The separation between clusters 2 and 3 instead happens along duration variables where cluster 2 populates the high ends of the scale, while cluster 3 takes a compact intermediate position. Overall, the first era

reveals a policy landscape dominated by maternity and parental leave, with limited orientation towards gender equality in childcare only found in the egalitarian cluster.

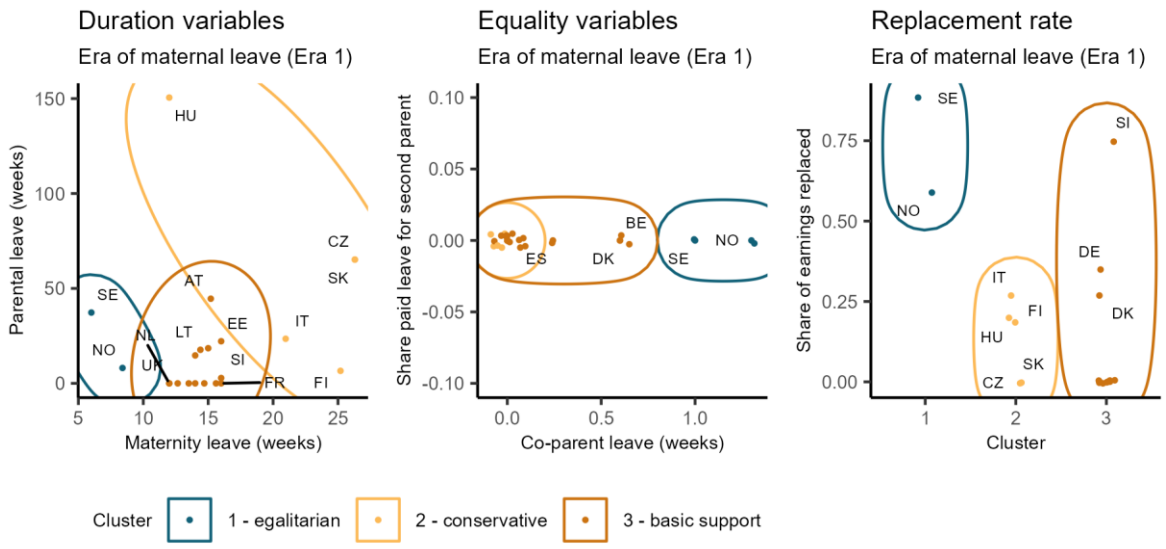

Figure 19: Distributional plots of indicators grouped by cluster (era 1) [6]

5.2.2.2 Era 2 – Era of transition (1990-2014)

The second era marks a period of substantial transformation in European parenting leave policies. The appearance of non-transferable leave and the collapse of several communist unions led to significant changes in the policy landscape, comprising a wide expansion of policies across all dimensions.

A fourth *leave sharing* cluster with Belgium alone appears, which introduced an equal split (50%-50%) of leave available to either parent in 1998. The value 34% in Table 5 reflect the average over the whole era. Apart from that, however, Belgium shows low values in all other measures. The remaining countries spread out more evenly across the clusters compared to era 1, with 5, 7, and 8 countries populating clusters 1, 2, and 3 respectively.

The interpretation of the *egalitarian* cluster 1 largely remains the same: High replacement rates (avg. 83%), extended co-parent leave (avg. 4 weeks), low maternity leave (avg. 13 weeks) and medium parental leave (avg. 38 weeks). While maternity leave and parental leave numbers have gone up, they remain relatively low compared to other clusters. Denmark, Finland, and Slovenia join Sweden and Norway in this cluster – a development that was already hinted at in the era of maternal leave. Interestingly, Sweden is the only country in that cluster to provide some form of

[6] The instrument of parental leave earmarked for the second parent was not yet introduced in era 1, thus data points for the equality variables are all at 0 on the y-axis. A small jitter for the y-axis was added to the datapoints for a better view of overlapping data points. In the replacement rate plot, a jitter was added to the x-axis for the same reason.

non-transferable leave for the second parent, which is an element strongly associated with gender equality (Albrecht et al., 2024; Earle et al., 2025; Rocha, 2021).

Table 5: Clustering results era of transition (era 2)

cluster	country	ML	PL	Co-parent leave	PL second parent (share)	Replacement rate	era
1	DK	18.00	28.72	2.32	0.0%	84.0%	2
1	FI	17.50	26.49	3.20	0.0%	70.0%	2
1	NO	9.28	37.24	7.56	0.0%	80.0%	2
1	SE	6.80	60.86	2.00	8.0%	81.0%	2
1	SI	15.00	37.14	5.40	0.0%	99.0%	2
1	**mean**	**13.32**	**38.09**	**4.10**	**2.0%**	**83.0%**	**2**
2	AT	16.00	109.92	0.00	9.0%	0.0%	2
2	CZ	28.00	94.12	0.00	0.0%	0.0%	2
2	DE	14.00	79.09	0.00	5.0%	32.0%	2
2	EE	18.96	153.41	1.04	0.0%	44.0%	2
2	HU	23.04	115.26	0.37	0.0%	60.0%	2
2	LT	17.92	64.01	1.57	0.0%	51.0%	2
2	SK	28.96	113.01	0.00	0.0%	0.0%	2
2	**mean**	**20.98**	**104.12**	**0.43**	**2.0%**	**27.0%**	**2**
3	ES	16.00	0.00	0.88	0.0%	0.0%	2
3	FR	16.00	11.48	1.13	0.0%	0.0%	2
3	GR	16.48	0.00	0.21	0.0%	0.0%	2
3	IE	27.92	0.00	0.00	0.0%	0.0%	2
3	IT	21.74	26.09	0.01	0.0%	30.0%	2
3	NL	16.00	0.00	0.16	0.0%	0.0%	2
3	PL	18.56	2.08	0.32	0.0%	5.0%	2
3	UK	36.08	0.00	0.96	0.0%	0.0%	2
3	**mean**	**21.10**	**4.96**	**0.46**	**0.0%**	**4.0%**	**2**
4	BE	14.96	9.39	1.33	34.0%	0.0%	2
4	**mean**	**14.96**	**9.39**	**1.33**	**34.0%**	**0.0%**	**2**

The defining feature of the *conservative* cluster 2 remains very long parental leave, but internal diversity started to increase. Austria, Germany, Estonia and Lithuania moved here through a strong expansion of parental leave rights to accompany Hungary, Czechia and Slovakia (now as separate states following the collapse of Czechoslovakia). Four countries (Austria, Czechia, Estonia, Hungary, and Slovakia) provide more than 100 weeks of parental leave, while a few countries (Germany, Estonia, Hungary, and Lithuania) started providing high replacement rates between 70% and 100% at different points in time during that era (again, the numbers in Table 5 are reduced because they represent the average over the whole era). Austria and Germany include some earmarked parental leave for the second parent.

The *cluster of basic support* (cluster 3) shrank in size as several countries (Austria, Germany, Belgium, Denmark, Estonia, Lithuania, and Slovenia) expanded their policies and moved to other clusters. It again shows little intervention in all instruments except for maternity leave, for which it shows the highest average across all clusters in this era and now consists of 8 countries. Italy moved from being the odd one out in the conservative cluster in era 1 to being the odd one out in

the basic support cluster in era 2, taking a unique position as the only country to include notable parental leave (avg. 26 weeks) and replacement rates (avg. 30%) in their policies. The remaining countries in the cluster are Spain, Greece, France, Poland, UK, Ireland and the Netherlands.

Figure 20 visualises the distribution of countries indicator values, grouped by cluster. Countries spread out more evenly in the scatterplot of the duration variables compared to era 1. Clearly identifiable is cluster 2 positioning itself on the upper side of the parental leave axis. All other countries populate the bottom part with much overlap between the clusters visible, indicating that what distinguishes clusters 1, 3, and 4 is not driven by differences in the duration dimension. The distribution of the equality variables visualised in underscores Belgium's unique policy landscape, being the only country to populate the upper part of the plot, while high replacement rates are what most clearly separates cluster 1 from the rest.

Notes: ML = maternity leave, PL = parental leave for the first parent, PL second parent (share) = share of overall parental leave earmarked for the second parent. Numbers represent averages over the whole era. ML, PL & co-parent leave values represent weeks

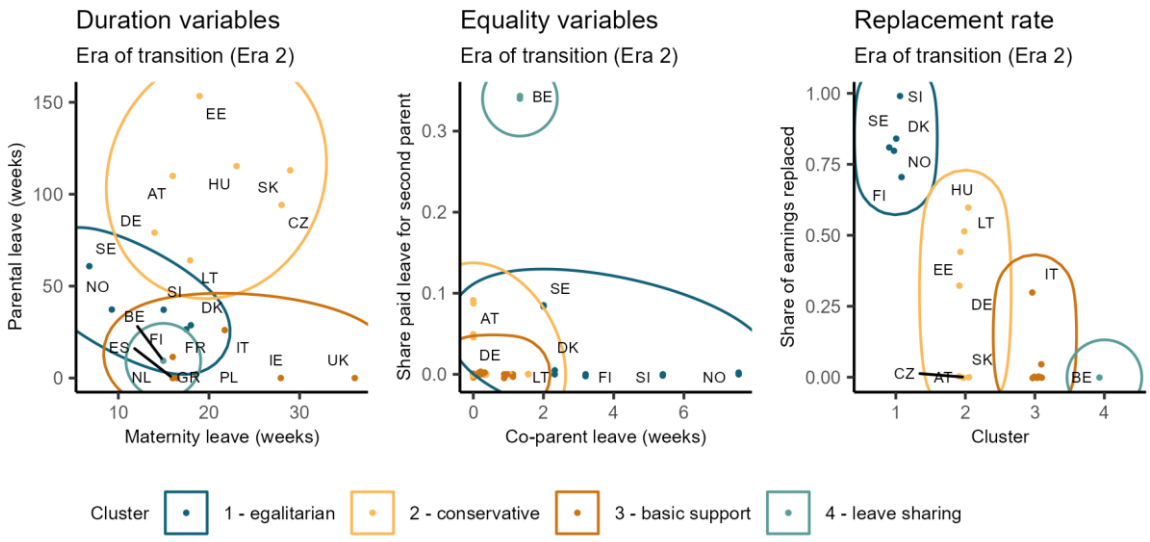

Figure 20: Distributional plots of indicators grouped by cluster (era 2)[7]

5.2.2.3 Era 3 – Era of equality (2015-2024)

The final era shows a stabilisation of cluster's duration variables (parental leave and maternity leave) but a large expansion in equality variables, particularly parental leave earmarked for the second parent. Overall, more heterogeneity in countries policy compositions is observed, but the

[7] In the replacement rate plot, a small jitter for the x-axis was added to the datapoints to have a better view of overlapping data points.

substantive interpretation of the individual clusters remains largely consistent with the previous eras, which allows to use the same cluster names.

The focus on more gender equality in this era is reflected by a growing *egalitarian cluster*. Estonia and Poland move here through an expansion of replacement rates to. Although Estonia's 101 weeks of parental leave stand out in the cluster, full compensation of benefits (100% replacement rate) fit well into the cluster. As of 2024, Denmark and Slovenia are the only other countries that provide full compensation.

The *conservative cluster* 2 shrank to Austria, Germany and Lithuania. These countries continue to provide exceptionally long parental leave of around 100 weeks with moderate replacement rates (Germany and Lithuania) and some co-parent leave (Austria and Lithuania). Lithuania has similar values to Estonia, which moved to cluster 1, in all variables except for the replacement rate, which is 46%, and too low for it to be put into cluster 1. Notably, earmarked leaves, which are classified as an equality variable, are more prominent here than in cluster 1, underscoring the complexity of policy combinations.

As stated in the chapter introduction, implementing an additional model that includes sharing incentives would lead to a minor change throughout the entire clustering process. This occurs in the current era of equality and affects Lithuania, which would be moved to cluster 1 in the alternative model because, unlike Austria and Germany, it does not have sharing incentives in place.

The *cluster of basic support* becomes increasingly heterogeneous in its policy combinations and country trajectories. Some countries Czechia and Slovakia fully removed paid parental leave, while Hungary drastically cut back on it just before the era break in 2014. In contrast, Ireland, Greece, and the Netherlands only started to expand replacement rates and leave earmarked for the second parent, while Spain sharply increased co-parent leave to 16 weeks in 2024 and an average of just under 10 across the whole era – the second highest value across all clusters. Italy remains a unique borderline position, showing higher values of parental leave and replacement rate than the rest of the countries in the cluster. Despite divergent trajectories, the countries in this cluster continue to provide comparatively low levels of support across all instruments but maternity leave.

Finally, the *leave sharing cluster* includes France, following the introduction of an equal division of parental leave in 2015, alongside Belgium. Together, these countries represent a distinct policy model focusing on symmetry in parental leave entitlements.

Table 6: Clustering results era of equality (era 3)

cluster	country	ML	PL	Co-parent leave	PL second parent (share)	Replacement rate	era
1	DK	16.80	42.70	2.00	6.0%	79.0%	3
1	EE	18.29	101.61	3.14	0.0%	100.0%	3
1	FI	14.25	29.58	6.30	9.0%	71.0%	3
1	NO	18.90	24.60	17.30	0.0%	80.0%	3
1	PL	20.60	31.40	2.00	4.0%	62.0%	3
1	SE	7.00	56.14	2.00	18.0%	78.0%	3
1	SI	15.00	37.14	5.57	4.0%	99.0%	3
1	**mean**	**15.83**	**46.17**	**5.47**	**6.0%**	**81.0%**	**3**
2	AT	16.00	115.35	3.48	20.0%	0.0%	3
2	DE	14.00	104.36	0.00	14.0%	50.0%	3
2	LT	18.00	96.36	4.35	2.0%	46.0%	3
2	**mean**	**16.00**	**105.35**	**2.61**	**12.0%**	**32.0%**	**3**
3	CZ	28.00	0.00	1.00	0.0%	0.0%	3
3	ES	16.00	0.00	9.73	0.0%	0.0%	3
3	GR	17.00	3.48	0.97	20.0%	0.0%	3
3	HU	24.00	6.46	0.86	9.0%	9.0%	3
3	IE	42.00	3.20	1.80	30.0%	0.0%	3
3	IT	21.74	26.09	0.87	7.0%	32.0%	3
3	NL	16.00	2.70	3.21	15.0%	21.0%	3
3	SK	34.00	0.00	8.40	0.0%	0.0%	3
3	UK	52.00	0.00	2.00	0.0%	0.0%	3
3	**mean**	**27.86**	**4.66**	**3.20**	**9.0%**	**7.0%**	**3**
4	BE	15.00	17.39	2.60	50.0%	0.0%	3
4	FR	16.00	26.09	2.97	50.0%	0.0%	3
4	**mean**	**15.50**	**21.74**	**2.79**	**50.0%**	**0.0%**	**3**

Notes: ML = maternity leave, PL = parental leave for the first parent, PL second parent (share) = share of overall parental leave earmarked for the second parent. Numbers represent averages over the whole era. ML, PL & co-parent leave values represent weeks

Distributional plots (Figure 21) visualise the solidification of the duration dimension. The egalitarian cluster 1 is oriented along the parental leave axis, with low maternity leave values, while the basic support cluster 3 shows the opposite pattern, scoring low on the parental leave axis and spreading out along the maternity leave axis. The equality-oriented instruments show diffusion, as clusters 1, 2, and 3 widely overlap, while replacement rates show an unchanged picture compared to the previous era. Overall, the era reflects a broad expansion of the gender equality related policy instruments.

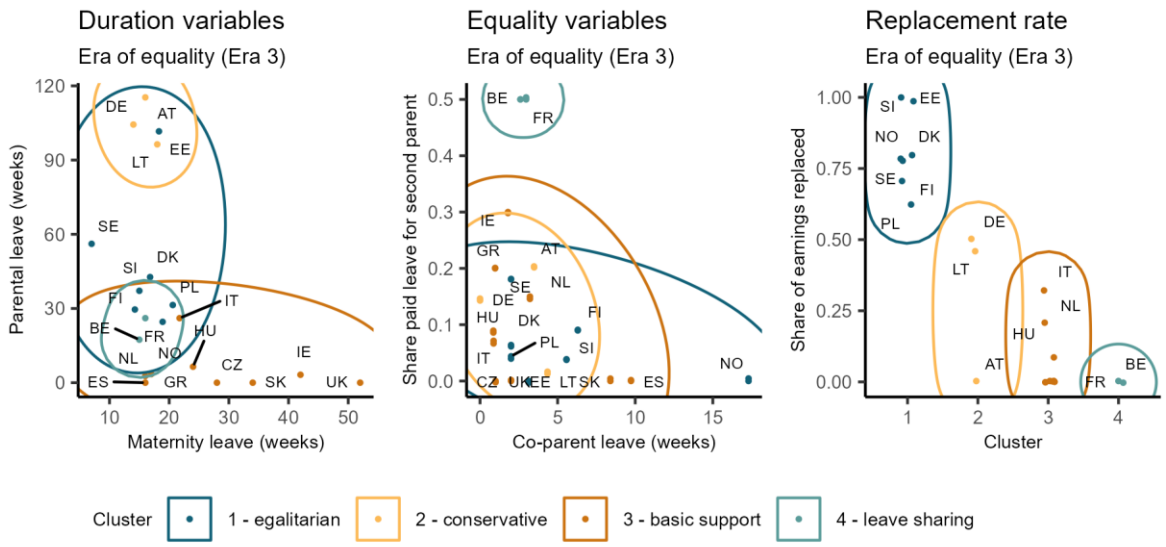

Figure 21: Distributional plots of indicators grouped by cluster (era 3)[8]

6 Discussion

The aim of this thesis is to develop a new, longitudinal typology of European parenting leave policies spanning the period from 1970 to 2024. By focusing on three analytically distinct yet interrelated dimensions – leave duration, payment generosity, and gender equality – the thesis seeks to capture both the historical development and cross-national variation of parenting leave design in Europe. Methodologically, this objective is pursued through a two-step analytical strategy. First, a descriptive temporal analysis is conducted by tracing the development of the selected indicators averaged across countries which identifies three eras of parenting leave. Second, within each identified era, a k-means clustering approach is applied to country-level averages to identify groups of countries with similar policy configurations. This results in a longitudinal typology of three clusters, which show a rather stable substantive interpretation across eras but changing country compositions from era to era, and one additional small cluster in the last two eras with a distinct policy setting focussing an equal sharing of leave.

This combined temporal and cross-sectional design allows for an examination of parenting leave policies not only as static institutional arrangements but as evolving policy instruments shaped by shifting social norms, economic conditions, and political priorities. The discussion that follows interprets the empirical findings in light of the existing literature on family policy, gender equality in childcare, and policy development. More specifically, it discusses the observed stability of the

[8] In the replacement rate plot, a small jitter for the x-axis was added to the datapoints to have a better view of overlapping data points

cluster profiles, the cluster profiles themselves, the country composition of the clusters in contextualisation with existing typologies, and, briefly, the identified eras of parenting leave. In addition, the discussion reflects on the limitations of the proposed typology.

6.1 Discussion of the stability of cluster profiles

One of the most striking findings of the longitudinal typology is the persistence of clearly identifiable cluster profiles across all three eras, despite substantial changes in the generosity and design of policies across eras. While the policy landscape evolves markedly over time, the underlying patterns that differentiate groups of countries remain remarkably stable. This persistence is particularly noteworthy given that the clusters are generated independently for each era, and that the k-means clustering approach does not rely on predefined ideal types or regime categories.

At first glance, the coexistence of profound era-specific shifts in policy design and stable cluster profiles may seem contradictory. The era of maternal leave is characterised by mother-centred protection, the era of transition by the expansion and diversification of policy instruments, and the era of equality by a sharp expansion of gender-equality-oriented instruments. One might therefore expect the cluster profiles themselves to change fundamentally across eras. Instead, the analysis reveals that while the *content* of policies changes, the *ways* in which countries combine policy instruments and their relative positioning in relation to other clusters remain consistent.

This apparent contradiction can be further resolved by distinguishing between absolute policy generosity and the substantive interpretation of a cluster from a relative perspective. Cluster stability does not imply that countries maintain identical leave durations or replacement rates over time. Rather, it suggests that the underlying policy logics within clusters – such as prioritising maternal support in the basic support cluster or favouring long leave durations over earmarked leave types in the conservative cluster – remain intact. In this sense, clusters are stable in their internal structure and in relation to other clusters, even though their absolute indicator values tend to increase over time.

This interpretation aligns with research on convergence in family policy design. While studies generally identify convergence in family policies over time (Adema et al., 2014; Gauthier, 2002), this convergence occurs primarily *within* clusters rather than across them (Kang, 2019). The present study's finding of stable cluster profiles reinforces this distinction by demonstrating that countries may adopt similar tools but deploy them in ways that preserves a distinct ideological positioning.

The persistence of cluster profiles is, furthermore, consistent with established insights from the literature on path dependence in family policy. Rather than being reinvented in response to new social challenges, parenting leave policies evolve along path-dependent trajectories shaped by enduring institutional contexts and normative assumptions about care, gender roles and state responsibility (Mohun Himmelweit, 2023; Pfau-Effinger, 2008). Path dependence may restrict the implementation of policies that break away from the underlying regime. For example, policymakers in the UK, which shows a rather liberal welfare orientation, encountered institutional challenges as they planned to expand earmarked entitlements for fathers in the early 2010s (Baird & O'Brien, 2015). Instead, a portion of maternity leave was made transferable (thus functioning as paid parental leave) which keeps a mother-centred focus aligned with the country's family policy ideology.

Path departure in parenting leave policies is possible, but it requires alignment across related policy domains (Pfau-Effinger, 2011). Such alignment may occur either through a broader shift in the underlying welfare orientation or through a weakening of established development paths, creating space for policy change. Germany's moving from the basic support cluster to the conservative cluster, may have partly been enabled by the reunification, which weakened institutional continuity and to allow for a departure from established parenting leave trajectories (Pfau-Effinger, 2011). In combination, the concepts of path departure and path dependence may partly explain countries' observed policy trajectories.

Finally, the stability of cluster profiles can be connected to policy stability as a vital component of policy construction (Gauthier, 2019). Policies aimed at shaping long-term outcomes usually require time to produce results, as both individuals and institutions must adapt to new rules and incentives. For instance, following the introduction of non-transferable leave for fathers in Sweden, a country widely regarded as a role-model in gender-egalitarianism (Lütolf, 2025), it took a considerable amount of time before an increase in paternal leave uptake was registered (Duvander et al., 2017). As such, stability in countries' policy landscapes ends in distinct, stable cluster profiles over time.

Overall, the identification of distinct policy profiles that hold up over time is consistent with the concepts of path-dependence, within-cluster policy convergence, and a broader embedding of parenting leave into family policy and welfare domains.

This central finding of stable cluster profiles over time enables the typology to function simultaneously as a cross-sectional and longitudinal analytical tool. Cross-sectionally, clusters can be compared within an era to identify dissimilar policy logics coexisting at a given point in time. Longitudinally, the 'big picture' can be observed by tracing how clusters and policy logics

evolve, how countries move between clusters and how new policy instruments are integrated into existing frameworks. Such longitudinal comparisons would not be possible if each era showed entirely different cluster profiles.

The discussion now proceeds with a cross-sectional view by comparing cluster profiles in relation to each other and situating the findings within other typologies.

6.2 Discussion of cluster profiles, country compositions and alignment with existing typologies

Having established that clusters maintain their distinct meaning over time, the substantive meaning of these clusters can now be discussed. In addition to situating the clusters within the broader landscape of existing parenting leave typologies, they will also be evaluated using a gender-equality related framework developed by Brighouse and Wright (2008). This framework assesses the substantive meaning of policy profiles through the lens of gender equality, which is a central dimension of this thesis, and provides theory-founded context for the clusters.

Brighouse and Wright (2008) distinguish between three types of systems: *equality-impeding* systems, which actively preserve women's caregiving role through a strong focus on maternity leave and often unpaid leave, *equality-enabling* systems, which allow for gender equality through long parental leave but do not actively encourage fathers' participation, and *equality-promoting* systems, in which earmarked leave for fathers and high replacement rates actively incentivise men's engagement in care. The clusters identified in the present study align well with these classifications, which will be expanded on in the following cluster-by-cluster discussion.

The egalitarian cluster

The egalitarian cluster is the most clearly defined and internally coherent cluster across all three eras, in terms of both country composition and substantive meaning. In terms of composition, it is the only cluster to continuously grow over time, and from which no country leaves once included. Substantively, it displays a consistent configuration of instruments oriented towards shared care, even before the formal introduction of parental leave earmarked for second parents. This cluster shares most characteristics with Brighouse and Wright's (2008) equality-promoting systems through its combination of high replacement rates and extensive co-parent leave provisions, however, it misses an essential component in their framework, as non-transferable parental leave for the second parent remains comparatively underdeveloped

The absence of a pronounced proportion of non-transferable leave in the egalitarian cluster challenges common assumptions about the centrality of earmarking for gender equality. Of

particular interest are Nordic countries, who are often considered as role-models, when it comes to gender equality (Olsson et al., 2023), yet do not show high proportions of leave earmarked for the second parent, which is often portrayed in the literature as central to achieving gender equality in leave uptake (Earle et al., 2025; Rocha, 2021). This apparent dissonance suggests that formal policy design alone does not fully capture the mechanisms driving gender-equal outcomes.

Indeed, gender norms and cultural expectations strongly shape how parents respond to policy incentives, (Kleven et al., 2024; Rostgaard & Ejrnæs, 2021). In the Nordic countries, where norms around shared caregiving are comparatively strong, fathers are more likely to take leave even in the absence of quotas or high earmarking (Rostgaard & Ejrnæs, 2021). In contrast, Slovenia continues to exhibit comparatively traditional and gendered patterns of care despite its egalitarian policy design (Stropnik & Humer, 2015). Research in the field of family economics shows that, while important, economic incentives and non-transferable leave entitlements are insufficient to explain fathers' leave behaviour in isolation (Hager et al., 2023; Kleven et al., 2019). This implies that the effectiveness of equality-oriented policy instruments depends not only on their formal design but also on the norm context in which they operate.

The distinctiveness and coherence of the egalitarian cluster is reinforced by its consistent detection across existing typologies, regardless of whether they employ theory-driven, ideal-type, or data-driven approaches. This cluster closely corresponds to Esping-Andersen's (1990) social-democratic welfare regime, Keck and Saraceno's (2012) defamilialised policy configuration, Lohmann and Zagel's (2016) defamilialist orientation, and Ciccia and Verloo's (2012) limited universal caregiver model. Thévenon (2011) and Pezer (2018) similarly identify a Nordic cluster characterised by support for working parents and gender-equality orientation. This convergence across diverse methodological approaches suggests that these countries maintain a constellation of policy instruments that fits well into specific theoretical ideal types while also displaying distinct quantifiable characteristics detectable by data-driven techniques. However, some variation in country composition arises[9]: Finland (Dearing, 2016; Keck & Saraceno, 2012), and Slovenia (Keck & Saraceno, 2012; Thévenon, 2011), for instance, are sometimes placed in different regimes, reflecting both methodological differences and genuine ambiguities in policy configurations. Nevertheless, all investigated typologies detect a cluster fundamentally characterised by strong orientation towards gender equality, confirming the robustness of this policy profile.

[9] Given that the compared typologies are static, while my clusters vary in composition across eras, I compare each external typology to the era of my own typology that corresponds to the year for which that external typology makes its classifications, which is mostly era 2. This goes for all cluster profiles discussed.

The conservative cluster

The conservative cluster, characterised by exceptionally long parental leave combined with moderate to low payment and weaker equality orientation, aligns closely with Brighouse and Wright's (2008) equality-enabling systems. While its defining feature – extended paid parental leave duration – remains stable, internal heterogeneity in the country composition increases over time. In the era of transition, several countries join this cluster, while it shrinks considerably in the era of equality, signalling a broader shift away from extensive but gender-divided leave systems. This finding is debated in the literature. While a decline in orientations towards traditional gender roles and familialism is documented (Giuliani, 2022; Pfau-Effinger, 2018), they nevertheless remain a resilient concept in Europe (Daly, 2022; Giuliani, 2022).

This cluster's policy logic corresponds to what existing typologies identify as familialised or conservative family policy arrangements, however, country compositions differ. Two existing contributions show a rather similar cluster arrangement characterised by a maintenance of traditional gender roles in the "male-breadwinner model" (Ciccia & Verloo, 2012) and the "strong supported familialism & weak defamilialistation model" (Keck & Saraceno, 2012), with Austria, Czechia, Estonia, Hungary, Slovakia members of these clusters. In other classifications, however, these countries are spread across different clusters. For example, Thévenon (2011) finds distinct Eastern European (Czechia, Hungary, Slovakia) and Continental European (Austria, Germany) clusters, while in other typologies (Dearing, 2016; Lohmann & Zagel, 2016; Pezer, 2018; Ray et al., 2010), these countries spread out across multiple different clusters. This suggests a weaker, but still observable coherence in cluster affiliation compared to the egalitarian cluster.

The basic support cluster

In contrast, the basic support cluster – corresponding largely to Brighouse and Wright's (2008) equality-impeding arrangements through its strong focus on maternity leave – displays the least clearly defined profile and the greatest movement in country composition across eras. This cluster consistently shows low values across most indicators except for maternity leave, with countries often excluding paid parental leave altogether or providing only very short durations. However, its internal heterogeneity suggests that it may function partly as a residual or hybrid category, collecting countries which do not fit into any other cluster. Italy, for example, is placed here in the era of transition and the era of equality, despite having a considerably longer parental leave and higher replacement rate than is characteristic for this cluster. This interpretation resonates with findings from existing typologies, which frequently identify ambiguous cases or hybrid clusters capturing countries that do not fit neatly into dominant regime types. Countries commonly described as ambiguous or inconsistently classified in the literature (Ciccia & Verloo,

2012; Keck & Saraceno, 2012; Lohmann & Zagel, 2016), such as Italy, the UK, and the Netherlands, tend to be grouped within the basic support cluster.

Italy stands out as having particularly weak fit to this – or indeed any – cluster across all eras in this analysis. Regardless of which cluster it is assigned to, it consistently occupies an intermediate position: providing more support than other basic support countries, shorter leave durations than conservative regimes, insufficient earmarked leave to align with the leave-sharing cluster, and replacement rates too low for the egalitarian cluster. Interestingly, Italy is often more comfortably placed in Southern European clusters in typologies that explicitly distinguish such a category (Ciccia & Verloo, 2012; Ferragina & Seeleib-Kaiser, 2011; Pezer, 2018; Thévenon, 2011). Where no Southern European cluster exists, it is frequently classified as low-support (Keck & Saraceno, 2012) or explicitly noted as ambiguous (Lohmann & Zagel, 2016). Similarly, the Netherlands represents a persistent classification challenge across the literature: while commonly classified as liberal and weakly oriented towards gender equality (Dearing, 2016; Esping-Andersen, 1990; Ray et al., 2010), other studies explicitly describe it as an ambiguous or unclassifiable case within both parenting leave typologies (Keck & Saraceno, 2012; Lohmann & Zagel, 2016) and welfare regime frameworks more broadly (Ferragina & Seeleib-Kaiser, 2011; Powell et al., 2020). The UK's placement in this cluster aligns with its typical classification in liberal or low-support categories (Esping-Andersen, 2012; Ray et al., 2010; Thévenon, 2011), although Ciccia and Verloo (2012) as well as Keck and Saraceno (2012) mark it as ambiguous. The difficulty of placing these countries within stable clusters highlights both the limitations of rigid regime frameworks and the usefulness of clustering approaches that allow ambiguity to emerge empirically rather than forcing countries into predefined categories. However, it also emphasises a limitation of k-means clustering, since the method does not detect countries that do not fit well and simply allocates them to the cluster, they are closest to, even if that cluster may be very different, as the case of Italy exemplifies. Still, ambiguous cases can be detected by investigating which countries show a weak cluster fit.

Moreover, diverging trajectories in the era of equality suggest that the cluster profile may be undergoing transformation: while some countries (Czechia, Hungary, Slovakia) cut back on several policy instruments across dimensions, others (Greece, Ireland, the Netherlands, Spain) expand their leave policies more actively. This divergence raises the possibility that the basic support cluster may fragment in the future, either through movement of some countries into existing other clusters or through the emergence of a new cluster with a different policy configuration altogether.

The leave sharing cluster

Finally, the leave-sharing cluster presents a distinctive policy configuration that does not fit neatly into Brighouse and Wright's (2008) framework. Appearing only in the last two eras and spanning only Belgium (eras 2 and 3) and France (era 3), this cluster is characterised by a high proportion of paid parental leave earmarked for the second parent (50%), which signals a gender equality orientation through mandatory leave sharing. However, this cluster scores low on other equality-related components such as overall replacement rates and co-parent leave duration, distinguishing it from the egalitarian cluster. The leave-sharing cluster thus represents an alternative conceptualisation of gender equality in parenting leave policies: one focused on strictly symmetric entitlements rather than combining lower proportions of earmarked leave with generous replacement rates. Importantly, since Belgium does not provide replacement rates, the overall payment generosity of this cluster cannot be evaluated. Nevertheless, the background section has explored that even high flat rate payments are not associated with gender equality, thus the payment dimension of this cluster does not align with a gender-equality-oriented setting in any case.

This cluster's configuration of policies is rarely captured in existing typologies, which may reflect both temporal and methodological factors. Most comparable parenting leave typologies (Ciccia & Verloo, 2012; Dearing, 2016; Keck & Saraceno, 2012; Pezer, 2018; Ray et al., 2010) analysed data from the 2000s to mid-2010s, a period when earmarked leave provisions were less developed and the leave-sharing approach had not yet crystallised as a distinct policy model. Where Belgium and France appear in existing classifications, they are often classified differently. Belgium sometimes alongside defamilialised countries (Lohmann & Zagel, 2016), sometimes as ambiguous (Keck & Saraceno, 2012), and France typically in conservative groupings (Ciccia & Verloo, 2012; Thévenon, 2011). The emergence of this cluster in the present analysis demonstrates how a longitudinal, data-driven approach can reveal policy innovations and alternative pathways toward gender equality that may not be detected in static, theory-driven frameworks. The leave-sharing cluster's theoretical significance lies in challenging the assumption that high earmarking must coincide with other egalitarian features such as generous replacement rates or extensive co-parent leave, suggesting multiple possible routes to promoting fathers' leave uptake.

Taken together, the cluster profiles identified in this analysis demonstrate substantial alignment with existing typologies while also revealing important nuances. The egalitarian cluster corresponds closely to well-established regime types detected across diverse methodological approaches, confirming the robustness of the policy configurations of countries classified here.

While clusters similar to the conservative cluster of this thesis are present in most existing typologies, the country composition is less coherent. The basic support cluster identifies similar countries with lowly developed policies, it also appears to accumulate ambiguous cases, which require careful treatment in this cluster. The emergence of the distinct leave-sharing cluster suggests that rigid and static regime frameworks may prevent meaningful variation which is present in the data. The data-driven clustering approach employed here allows unique policy constellations to be detected empirically. Ambiguous cases – while not detected as unclassifiable per se – can still be spotted through a weak cluster fit. This flexibility, combined with the typology's longitudinal dimension, enables the analysis to capture both stable policy configurations and gradual reorientations, providing a more dynamic understanding of European parenting leave policy variation than static classifications can offer.

6.3 Discussion of eras and era breaks

The identification of three historical eras, distinguished by distinct developments of parenting leave instruments, was carried out through a descriptive analysis of aggregate policy indicators. The findings suggest that European parenting leave policies reflect not merely quantitative expansion in entitlements, but more fundamentally, shifting policy paradigms and a gradual layering of objectives: from maternal protection to labour market reconciliation to gender equality. Each era reflects a dominant and largely different understanding of what parenting leave is for and who it is meant to support. The era demarcations in 1990 and 2015 therefore mark turning points at which specific dimensions of parenting leave gained or lost prominence at the aggregate level, fundamentally reshaping the overall policy landscape.

Current research on parenting leave policies suggests, that in the era of maternal leave, parenting leave was not yet a fully developed standalone policy domain (Ciccia, 2022). Instead, its policy instruments descended primarily from labour protection and maternal health regulation rather than being designed to pursue explicit family policy agendas (Kamerman & Moss, 2009). This changed in the era of transition (1990-2014), in which parenting leave evolved into a more complex and diversified policy domain. New instruments, such as earmarked leave for second parents, pursue clear objectives. Furthermore, the empirical surge in the duration of paid parental leave observed between 1988 and 1992 coincides with profound political transformations, particularly through the collapse of Yugoslavia, Czechoslovakia and the USSR (Dobrotić & Stropnik, 2020) supporting 1990 as a turning point in parenting leave policies

The second era break in 2015 is less clearly tied to discrete political events but marks a qualitative shift in policy logic, as gender equality transitioned from being one of many objectives to a central policy orientation. Family policies have long lagged behind normative shifts in gender relations

(Van Lancker & Nieuwenhuis, 2020) and changing family forms (Bogenschneider, 2024). The exponential growth of non-transferable leave entitlements for the second parent beginning in 2015 suggests that when this adaptation finally occurred, it did so rapidly rather than gradually. Importantly, the sharpness of the 2015 break contrasts with the more gradual expansion characteristic of earlier periods. When this adaptation finally started to increasingly happen, it did so in a fast-paced fashion, as non-transferable leave entitlements started to grow exponentially in 2015. The sharpness of the increase may furthermore be facilitated by policy learning, as accumulating evidence from early adopters like Sweden and Norway demonstrated that non-transferable leave effectively promotes fathers' uptake facilitated (Duvander et al., 2017).

6.4 Limitations

The present study has several limitations that should be acknowledged. First, while the data-driven nature of k-means clustering offers clear advantages, the method requires the researcher to specify the number of clusters in advance, which introduces a degree of subjectivity. Although domain knowledge from existing typologies as well as quantitative diagnostic tools were factored into the decision, other researchers might detect a different number of clusters in each era.

Second, k-means clustering assigns each country to the nearest cluster, even when cases are ambiguous or display hybrid characteristics. Italy's persistent misfit across eras suggests that some countries may not align well with any single cluster, yet the method does not provide a clear way to identify such cases.

Third, the analysis focuses on earnings-related replacement rates and excludes flat-rate payment systems. This choice is based on the theoretically founded assumption that proportional replacement rates are more closely linked to gender equality outcomes. However, flat-rate systems may follow different policy logics, placing greater emphasis on universal access rather than income maintenance. Excluding these systems may therefore obscure relevant policy variation, particularly in countries with mixed payment schemes.

Fourth, the analysis focuses on the parenting leave setting which allows for the longest possible leave duration. Schemes, which offer shorter but more generously compensated leave are thus not captured by the analysis and might lead to different cluster partitions.

Fifth, the typology focuses on three policy dimensions (duration, payment, and gender equality) while other potentially relevant dimensions, such as flexibility in leave-taking, remain outside the scope of the analysis. The exclusion of flexibility indicators, such as part-time options or fragmented use of parental leave times, may leave important nuances to parenting leave regimes undetected.

Finally, the identification of era breaks relies on descriptive analysis which, while empirically drawn, may be sensitive to unprecise demarcation. The years around 1988–1992 saw substantial policy change across Europe, coinciding with German reunification and the collapse of Yugoslavia, Czechoslovakia and the USSR. The decision to place the first era break at 1989/1990 reflects observable patterns in aggregate policy development, however, several other years would be reasonable era breaks which could produce different cluster configurations.

7 Conclusion

The main aim of this thesis is to propose a new typology of European parenting leave policies by clustering countries based on gender equality, payment, and duration from 1970 to 2024 using a data-driven k-means clustering approach.

To achieve this, the selected policy instruments of maternity leave, paid parental leave, replacement rates, co-parent leave, and paid parental leave earmarked for the second parent were analysed descriptively to identify three distinct historical eras, each characterised by a fundamentally different policy landscape. The era of maternal leave (1970-1989) represents a period in which parenting leave primarily served maternal protection and labour market regulation rather than constituting a fully developed policy domain. The era of transition (1990-2014) marks the expansion and diversification of leave instruments, as parenting leave evolved into a more complex policy field with emerging gender-equality-oriented instruments. Finally, the era of equality (2015-2024) demonstrates a sharp expansion of gender-equality-oriented measures, particularly through the exponential growth of non-transferable leave entitlements reserved for second parents.

Using k-means clustering, distinct country groupings representing fundamentally different policy logics were identified: The *egalitarian cluster*, characterised by high replacement rates and extensive co-parent leave, prioritises shared caregiving through well-compensated leave, the *conservative cluster*, defined by very long parental leave durations, emphasises extended care periods, the *basic support cluster*, featuring high maternity leave but minimal development of other instruments, maintains a mother-centred approach, and the *leave-sharing cluster*, appearing only in eras 2 and 3, pursues a gender equality through a symmetric leave design, earmarking 50% of the overall paid parental leave duration to the second parent.

The most significant finding is the stability of these cluster profiles across all three eras despite substantial changes in absolute policy values. While the policy landscape transforms from mother-centred protection to diversification to equality orientation, the underlying patterns differentiating country groups remain consistent. Clusters maintain their interpretative meaning

relative to one another across time, even though what constitutes "high" or "low" values changes substantially between eras.

This stability represents a central contribution to parenting leave policy research, as it enables the typology to function simultaneously as both a longitudinal and cross-sectional analytical tool. Longitudinally, the framework allows to trace how countries and clusters evolve in their absolute characteristics, how countries move between clusters, and how new policy instruments integrate into existing configurations. Cross-sectionally, clusters, which represent distinct policy logics, can be compared within each era. The simultaneous view of these two dimensions has not been achieved within a single framework and presents a valuable tool for future researchers to use in the comparison of parenting leave policies in Europe

The longitudinal dimension reveals diverse patterns of policy development. Some countries demonstrate remarkable stability, remaining in the same cluster throughout all three eras despite substantial absolute policy changes (Norway, Sweden, Spain, Greece, Ireland, Netherlands, United Kingdom). Others transition between clusters, reflecting departures from path dependences. Estonia represents the most trajectory, appearing in a different cluster in each era – a finding only possible through the inclusion of Eastern European countries, which are often excluded from existing typologies.

Comparing the new typology to existing works substantively, the cluster profiles, both alignment and deviations in cluster meanings as well as country compositions are observed. The egalitarian cluster is the most robust one, corresponding closely to well-established regime types detected across diverse methodological approaches, such as social-democratic welfare regimes, defamilialised policy configurations, and limited universal caregiver models. The conservative cluster aligns with familialist or caregiver parity models identified in the literature, though country composition varies across studies. The basic support cluster identifies countries with minimally developed policies similar to liberal or weak-familialist classifications in existing typologies but also contains ambiguous countries that other works struggle to categorise consistently, such as Italy, the Netherlands, and the United Kingdom.

The emergence of the distinct leave-sharing cluster, populated only by Belgium and France, represents the most significant departure from existing frameworks. This small but coherent grouping pursues gender equality through a fundamentally different mechanism than the egalitarian cluster, prioritising equal leave division over generously paid entitlements.

The data-driven clustering approach employed here allows such unique policy constellations to emerge empirically rather than classifying countries into predefined categories. Combined with

the typology's longitudinal dimension, this flexibility enables to capture, stable policy configurations, gradual reorientations, or new policy profiles altogether. This provides a more dynamic understanding of European parenting leave policy variation compared to static classifications.

The longitudinal typology developed in this thesis demonstrates that European parenting leave policies have undergone profound transformation over five decades, evolving from poorly developed, mother-centred measures to expanded policy constellations focusing increasingly on gender equality in childcare. The analysis reveals that this transformation has not proceeded uniformly but along the lines of distinct policy profiles, prevailing over time. The transformation of parenting leave policies towards a more gender-equal future in childcare is ongoing, but most certainly not completed. Becoming a parent remains one of the most transformative moments in a person's – and especially a mother's working life.

8 References

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