Early Childhood Education and Care (ECEC) and its long-term effects on educational and labour market outcomes

Janna van Belle

Preface

This policy brief was developed by RAND Europe, which in 2011 was commissioned by the European Commission's Directorate-General for Employment, Social Affairs and Inclusion to provide content and technical support for the European Alliance for Families platform, which became the European Platform for Investing in Children (EPIC) in 2013.

The European Platform for Investing in Children (EPIC) was set up to explore demographic and economic challenges in the EU from a child and family-focused perspective. Its purpose is to share the best of policymaking for children and their families, and to foster cooperation and mutual learning in the field. This is achieved through information provided on the EPIC website, which enables policymakers from the Member States to search evidence-based child-focused practices from around the EU and to share knowledge about practices that are being developed, and also by bringing together government, civil society and European Union representatives for seminars and workshops to exchange ideas and learn from each other.

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The document is designed to provide insights into issues of interest to policymakers and practitioners. It has been reviewed externally by an EPIC expert in child and family policy, and internally, following RAND's quality assurance processes.

The opinions expressed do not necessarily reflect the position of the European Commission.

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Executive summary

- US studies have shown that the provision of Early Childhood Education and Care (ECEC) is associated with positive social and economic outcomes, both in the short and long term. This brief reviewed the available evidence on the short and long term outcomes of ECEC within the European context: how do existing differences between EU countries in ECEC implementation relate to outcomes?
- Outcomes related to ECEC attendance depend on policy decisions with regards to the number of hours that are offered, the age at which the entitlement starts, the type of ECEC care, and the costs for parents from various backgrounds.
- Optimizing the potential outcomes related to ECEC attendance depends on the successful integration of different policies: Increasing the number of places where ECEC is provided from an early age up to school age within one integrated setting will contribute to higher quality ECEC. At the same time, lowering the age of guaranteed access and providing sufficient financial support to bridge the gap between sufficiently paid parental leave and the age of guaranteed access will contribute to higher participation.

1. Introduction

The increase in single parent households and higher levels of female labour market participation have led to a widespread use of non-parental childcare in the EU. In 2014, 28 per cent of children under three years old and 83 per cent of children between three and compulsory school age were in some form of Early Childhood Education and Care (ECEC) (Eurostat 2016a). These figures, however, are still below the Barcelona targets for 2010, which set aims of 33 per cent participation by children below three and 93 per cent participation by children between three and school age. Participation and access to ECEC varies widely among European countries for a number of reasons. In this brief we will discuss reasons for differences in participation between countries, and how this relates to differences in outcomes related to ECEC participation in different countries.

Where previously a main goal of ECEC provision was to encourage female labour market participation, more recently attention has turned to the child outcomes related to ECEC participation. The majority of evidence on the effectiveness of ECEC on a wide range of children's outcomes comes from studies conducted in the US. It shows that ECEC is effective both in the short and long term in improving educational and labour market outcomes, reducing the level of poverty and social exclusion, and lowering the risks of criminal behaviour (Heckman et al. 2010; Karoly et al. 2011; Barnett & Masse 2007; Reynolds et al. 2011). This research has shown that investments in young children produce much higher returns in human capital than similar investments at an older age.

Although many European countries now provide ECEC, long-term evaluation outcomes at the European level are not yet available. This policy brief reviews the results from European studies on short- and medium-term outcomes of ECEC.

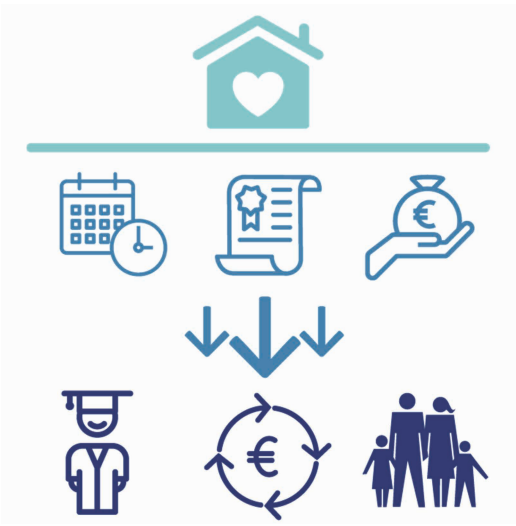
We have based our conceptualisation of ECEC on the 4-A (Availability, Accessibility, Acceptability, Adaptability) framework, which has previously been used by the UN to describe governmental obligations corresponding to the right to education (Tomaševski 2001).

Within the 4-A framework, Availability refers to a government's commitment to provide ECEC. Accessibility refers to the ability of all children to attend education, which in the case of ECEC primarily means an obligation to make non-compulsory education affordable. Acceptability refers to the obligation to provide good-quality ECEC. Adaptability refers to the government's obligation to provide education that is inclusive of all children; in this brief we will interpret this as the obligation to ensure suitable ECEC services, adapted to the diverse needs and capacities of families, taking into account their socioeconomic or ethnic background.

This is a good framework, because it describes how education policy needs to address not only the right to education, in terms of availability and accessibility, but also the rights in education, in terms of acceptability and adaptability. Although this framework was not designed to describe predictors of ECEC outcomes, it captures the idea that positive outcomes of ECEC follow both from intrinsic characteristics of ECEC provision, and from extrinsic characteristics, i.e. conditions that affect participation.

The aim of this brief is twofold. Firstly, in Section 2 we discuss the concept of ECEC, focusing on how it is understood and implemented in Europe. Differences in ECEC implementation among European countries can be described in terms of the number of hours that are offered, the age at which the entitlement begins, the type of ECEC care available, and the costs for parents from various backgrounds. We will discuss how these differences relate to availability, accessibility, acceptability and adaptability in ECEC provision.

Secondly, this policy brief examines the various outcomes of ECEC, and how these outcomes are related to policy choices in the implementation of ECEC. Section 3 thus discusses how outcomes of ECEC vary between countries as a function of availability, accessibility, acceptability and adaptability. Three different types of outcomes are discussed:



- Educational and labour market outcomes related to ECEC, for example increases in educational attainment in children who attend ECEC for a longer period of time.
- Long-term economic outcomes of ECEC. This relates to the Return On Investment (ROI) that can be expected from ECEC. Some examples are increased earnings and lower welfare dependency later in life for children who have attended ECEC.
- Social economic outcomes of ECEC, i.e. the broader effects of ECEC, such as higher fertility rates and increased female workforce participation in countries with good access to ECEC.

2. ECEC in Europe

Early Childhood Education and Care (ECEC) refers to any type (i.e. public, private or voluntary) of preschool childcare provision that is subject to a national regulatory framework.[1] One of the policy priorities defined by both the European Commission and the European parliament in order to meet the Europe 2020 targets is to "ensure universal provision of ECEC" (European Parliament 2011; European Commission 2011). To understand differences in outcomes of ECEC, it is important to understand differences among European countries in how universal provision of ECEC is implemented. Some key differences are:

How universal provision of ECEC is organised within countries. This affects *availability* of and *access* to ECEC.

How ECEC provisions are set up within countries. This affects the *acceptability* of ECEC.

The extent to which ECEC is available and effective for all children who have a right to education. This relates to the adaptability of ECEC.

As we will describe below, these factors necessarily interact with one another; for example, a country's policy on ECEC provision will affect the average age at which children receive ECEC, and similarly the effects of quality (acceptability) are mediated by the average number of years that children receive ECEC. This brief does not try to disentangle the unique effects of these factors. Rather, this brief aims to describe how (the combination of) factors that differ among European countries explain differences among countries in higher education and labour market participation as outcomes of ECEC, both in the short and long term.

Universal provision can be ensured by *compulsory attendance* or *legal entitlement*. Compulsory ECEC (i.e. a guaranteed place) refers to the obligation for children to attend ECEC settings when they reach a certain age. In the case of legal entitlement, public authorities guarantee a place for each child whose parents demand it, regardless of their employment, socioeconomic or family status; however, there is no obligation for the child to attend (European Commission/EACEA/Eurydice 2014).

Differences among countries in availability and access to ECEC are linked to how universal provision of ECEC is organised. Differences arise through the following mechanisms:

- The **age** at which a child can attend. As can be seen from **figure 1**, the few countries that offer compulsory ECEC do so from a relatively late age, i.e. four years onwards. Countries that offer legal entitlement do so at different ages.
- The **number of hours** that are offered.
- How parents are **compensated**.

[1] This is the definition used in the Europe 2020 Joint Assessment Framework (JAF): http://www.akeuropa.eu/en/publication-full.html?doc_id=316

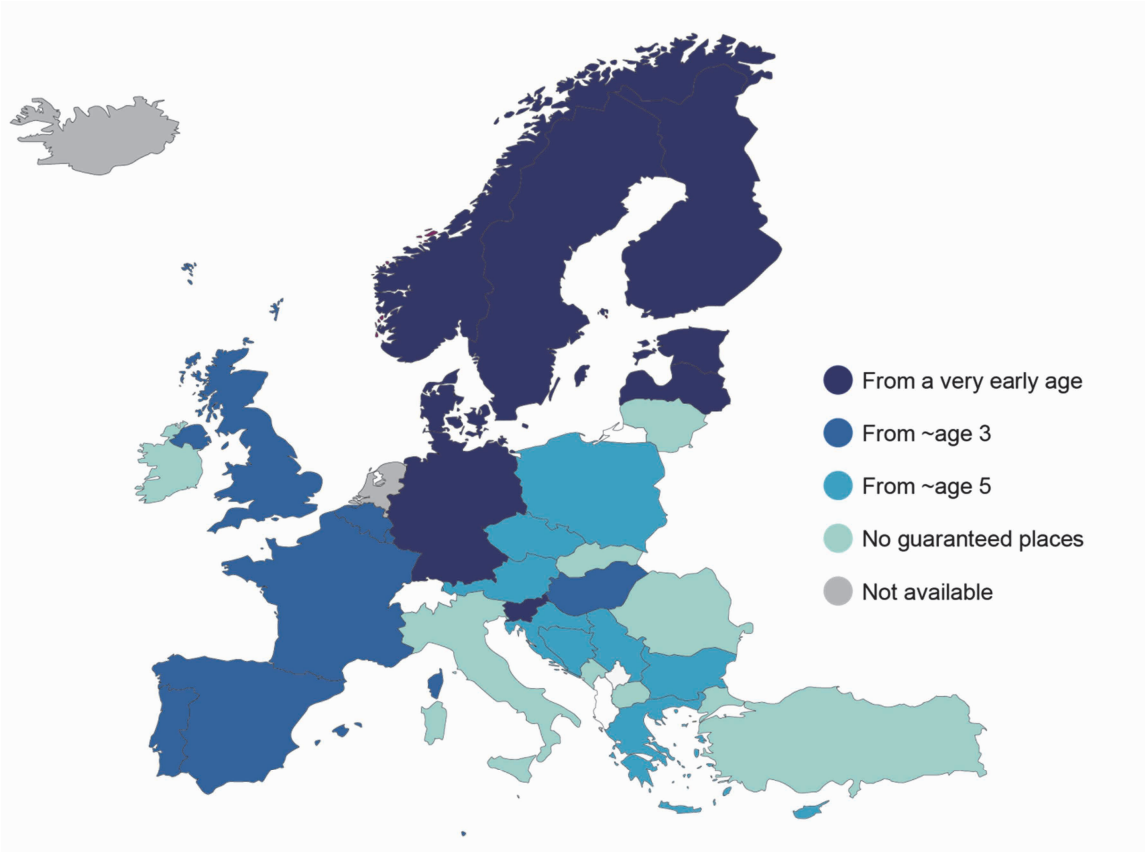


Figure 1: Age at which ECEC is guaranteed, 2014/2015 (from European Commission /EACEA/Eurydice 2015).

The **age** of legal entitlement affects both availability and access to ECEC places. As can be seen from **figure 2**, the availability of places for children who are below the age of legal entitlement is lower than the demand in almost all countries. Not only are there less places available, the costs for families with children who are below the age of legal entitlement are higher than for those with older children because in most European countries ECEC is free or subsidised from the age of legal entitlement.

Because there are large differences among countries in the number of hours that are offered as part of the legal entitlement, ranging from 15–20 hours in Austria to 40 hours in Denmark, the **number of hours** directly influences the costs for families with children who have reached the age of legal entitlement.

Combined, differences among countries in policies directed at ECEC availability result in large differences in the level of access to ECEC, primarily by affecting ECEC affordability. These differences among countries in the affordability of ECEC depend primarily on the gap between sufficiently paid parental leave and legal entitlement age, and the number of hours under either legal entitlement or compulsory attendance. In about two-thirds of the 28 EU Member States, there is a gap between adequately compensated childcare in the form of parental leave and legal entitlement to an ECEC place (European Commission /EACEA /Eurydice 2015). The other third of countries offer a legal entitlement to ECEC from a very early age.

This results in large between-country differences in the financial burden that ECEC places on families. Across the OECD, ECEC costs 12 per cent of an average family's income, with the UK (27 per cent) and

Switzerland (50 per cent) being the most expensive for families (Melhuish et al. 2015). For children who are below the age of legal entitlement costs are highest in countries with a split-system (see the next section) and a large private sector, such as in Luxembourg, the UK, Cyprus and Malta, where 60–100 per cent of children below legal entitlement age attend private (self-funded) ECEC. The differences among countries in affordability of ECEC are mediated by differences in how parents are **compensated**. Tax relief is the most common form of financial support to help parents with ECEC costs, but there are large between-country differences in the qualifying criteria, which are often tied to the type of setting and a child's age. It is important to note that tax relief does not benefit those who earn below the tax limit, and thus does not benefit the very poor. As can be seen from **figure 3**, there is a strong relationship between the amount of public spending on ECEC and participation.

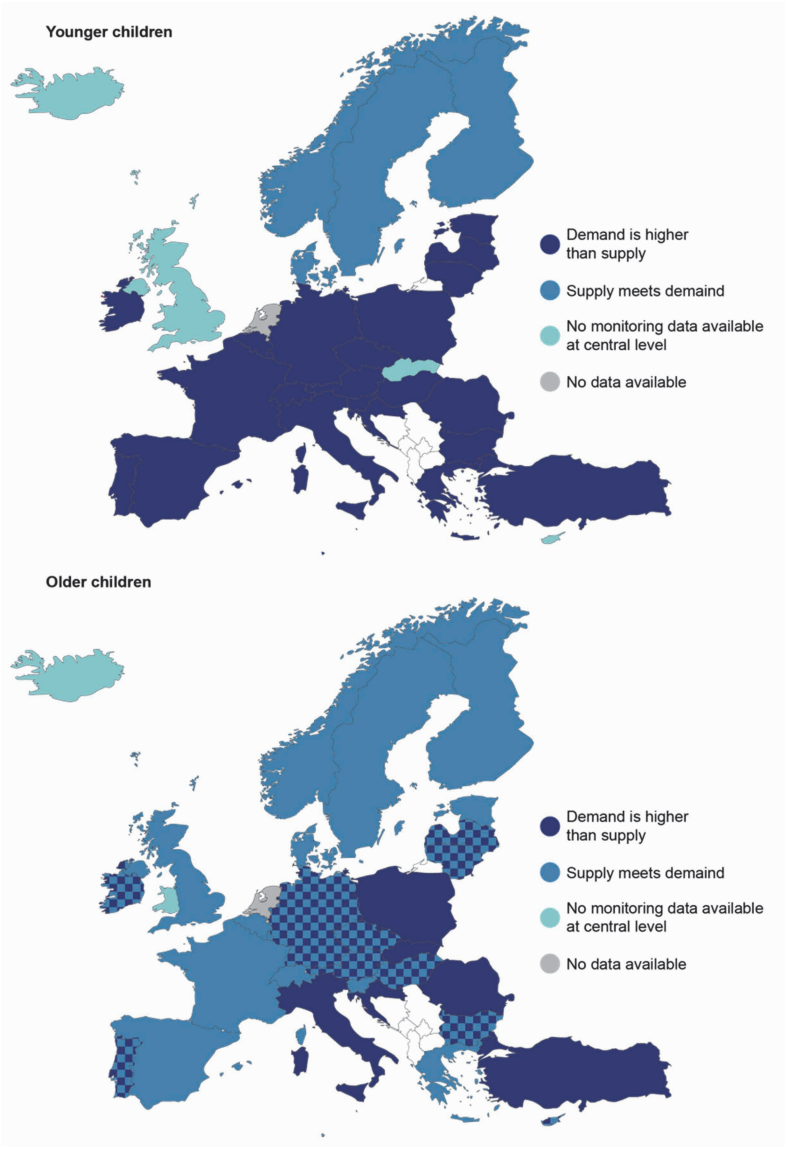


Figure 2: Demand and supply of places in publicly subsidised centre-based ECEC settings, 2013 (from European Commission/EACEA/Eurydice 2014).

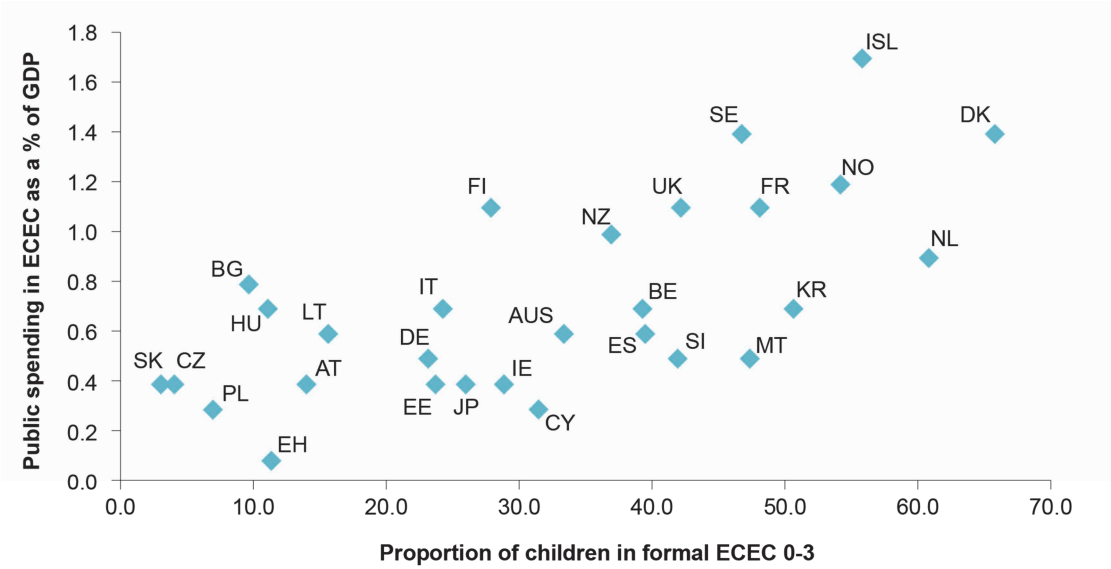


Figure 3: Public Spending on ECEC and Participation for Ages 0 to 3 in 2011/2010 (figure based on Akgündüz et al. 2015; data source OECD family database 2014).

Box1. There are various reasons why ECEC participation of children below the age of legal entitlement differs between EU countries. The EPIC website* has country profiles that describe in detail how ECEC is organised within different countries. Some examples are:

In **France**, childminders are a popular and subsidised solution to childcare. Of the 28 per cent of children under the age of three looked after within the institutional system, two-thirds (over 19 per cent) are taken care of by childminders at their home (2013 data). Parents who choose this childcare option receive a monthly allowance, the level of which varies according to the status and remuneration of the childminder, the child's age and household income. Preschool is from age three onwards, is free, and benefits 92 per cent of children aged between three and six years.

In **Denmark**, legal entitlement starts early and is full time (40hrs/week). 89 per cent of children aged one or two and 98 per cent of children aged from three to five years are enrolled in ECEC. Municipalities are obliged by law to offer a full-time place in a day-care centre for all children from the age of 26 weeks until the start of school. The parents' payment is kept low by the municipalities since it must not exceed 25 per cent of the average gross operation cost for the specific type of day care in the municipality.

In **Germany,** the emphasis is on the compatibility of family and career, which aims to allow parents to work as much, or as little, as they choose. In addition to an early age of legal entitlement (one year, since 2013) parents receive a parental allowance, which replaces the parents' loss of income after a child's birth for a maximum of 14 months. Since July 2015 this has been supplemented by 'Elterngeld Plus', which mainly supports parents who start working part-time again soon after the birth of a child and also means parents can receive parental allowance for a longer period, beyond the fourteenth month of the child's life. Furthermore, a partnership bonus was introduced: if both parents are working between 25 and 30 hours per week for four months at the same time, they will receive an additional payment of the new parental allowance for these months. This is to better promote couples who share work and family responsibilities equally.

*European Platform for Investing in Children: http://europa.eu/epic/index_en.htm

The **type of provision** for ECEC is related to: 1) whether countries handle a unitary or a split system for ECEC provision, and 2) home-based versus centre-based provision. In most European countries ECEC is split in two different phases according to age, and provision is delivered in separate systems for younger (from birth to three years of age) and older children[2] with large differences among countries in the transition age, which varies between two and a half and four years old. Home-based and centre-based ECEC provisions exist in parallel in almost all European countries (European Commission/EACEA/Eurydice 2014).

In the majority of countries, the authorities that are responsible for governance, regulation and funding differ between different provision types, which leads to differences between provision types in certain structural indicators linked to ECEC quality.

These indicators include:

- **The extent to which educational guidelines apply.** In about one quarter of European countries there are no common educational guidelines or curricula provided for settings for children up to the age of two years old. In addition, fewer than half of the countries where home-based provision exists use educational guidelines for this type of setting. For those countries that have educational guidelines, there are substantial between-country differences in the flexibility with which they are applied in ECEC settings, and the level at which responsibility is held for their execution (i.e. national, regional or local).

- **Staff ratios.** The maximum number of children per staff member within ECEC centres is most often prescribed by central regulations. Total group size is also sometimes dictated. The maximum number of children allowed per adult often doubles when children reach three years of age; below three years there are significant differences among countries, ranging from four children under the age of one per caregiver in the Netherlands, to eleven in Portugal (European Commission/EACEA/Eurydice 2014) (see **figure 4**).

- **Staff qualification.** Lastly, staff qualification requirements similarly differ between the type of ECEC provision: in more than a third of European countries, there must be at least one staff member who has tertiary level education in educational sciences for all groups of children across the entire phase of ECEC, whereas in another third of the countries this requirement only holds for children aged three years and over. Additionally, working conditions have been shown to be an important factor in ensuring a high quality workforce (OECD 2010), resulting in differences among countries where working conditions are not centrally regulated across ECEC provision types.

[2] The international term of classification for pre-primary education is ISCED 0. Within ISCED 0 there is a distinction between programmes aimed at children from birth to two years of age, and from three years old to school age. However, the age of transition between these programmes differs between countries. The majority of data sources that compare EU countries distinguish between birth to three years of age and three years old to school age, reflecting this heterogeneity. Here we will use these same age categories throughout the text instead of ISCED level.

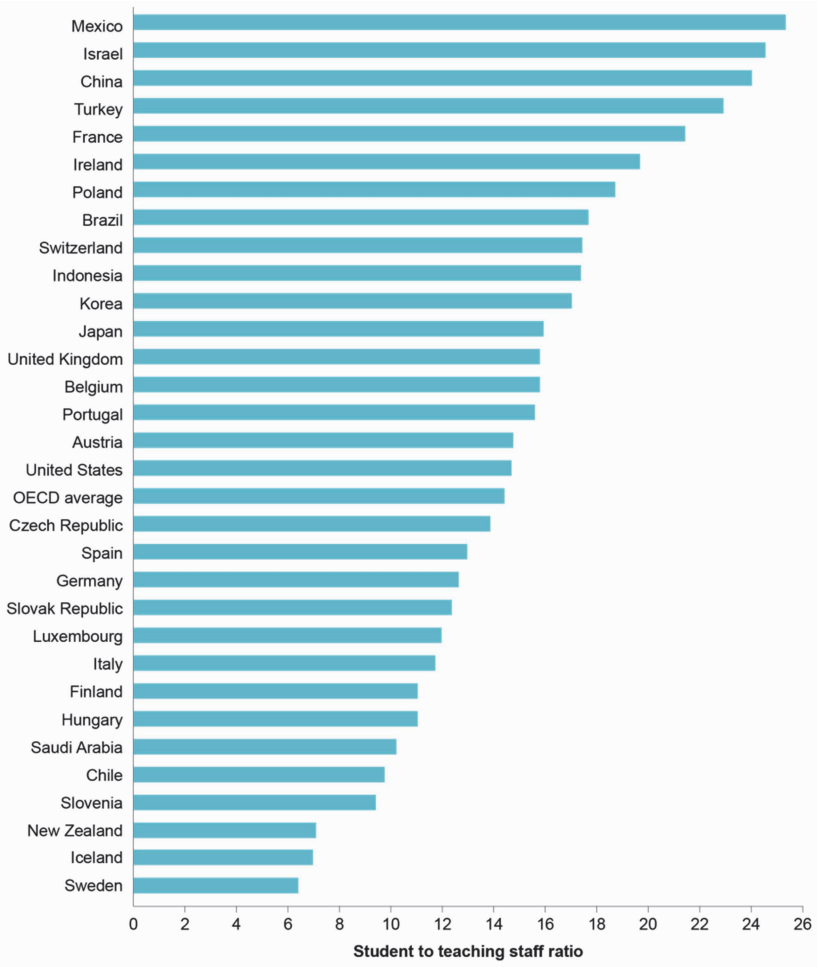


Figure 4: Ratio of pupils to ECEC teaching staff in OECD countries in 2010, public and private institutions (from OECD 2013).

The extent to which ECEC is available and accessible to all children, regardless of their economic and ethnic background relates to ECEC adaptability. Differences between countries in ECEC adaptability follow from differences among countries in the policies aimed at encouraging ECEC participation of children who may not attend ECEC otherwise. Policies aimed at improving access can either target families, or ECEC provisions.

Family policies include:

- Financial assistance made directly to households, for example through reduced taxes or exemptions
- Reductions in fees that may be charged by providers of ECEC
- Special family allowances to cover expenses related to ECEC.

As can be seen in figure 5, most countries offer tax relief, although it is important to note that tax relief may not benefit the very poor if they do not earn enough to pay taxes. Some countries offer a combination of tax relief and some other form of family specific support.

Policies aimed at ECEC provisions include:

- Additional financial assistance and/or additional staffing for ECEC settings.
- Financial incentives for staff working with children at risk or in settings where the majority of children are from groups at risk.
- Allocated budgets from central government to local authorities, where allocation criteria takes regional demographic and socioeconomic factors into account (Eurydice & EACEA 2009).

Recent data indicate that on average nearly 26 per cent of children living in EU member states are at risk of poverty or materially deprived; the proportions range from one in fifteen children in Denmark (16 per cent), to every second child in Bulgaria and Romania (51.8 per cent and 49.1 per cent respectively) (Davies 2013).

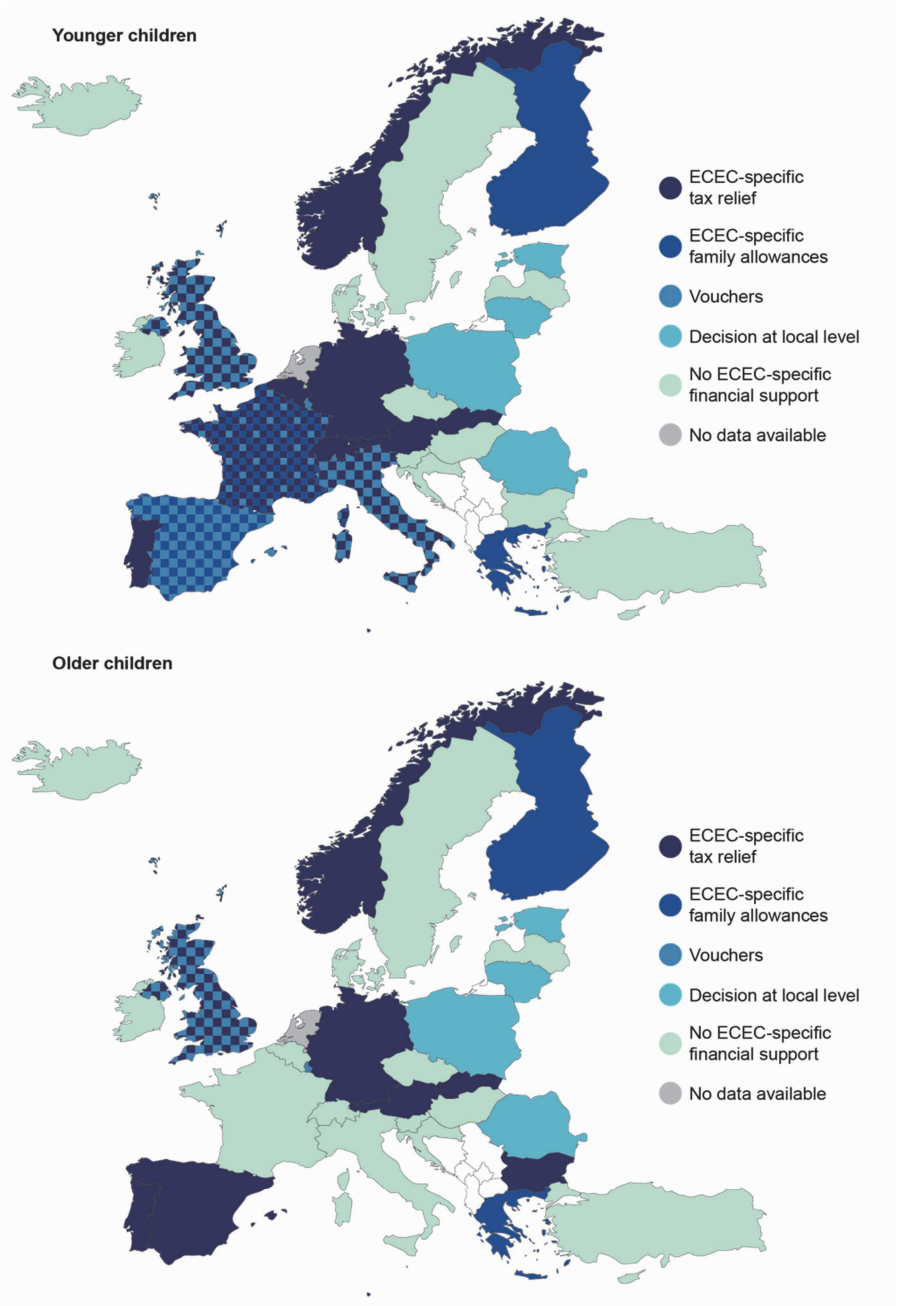


Figure 5: Types of financial support available to parents with children in ECEC (from European Commission/EACEA/Eurydice 2014)

As mentioned, these factors do not stand alone. Increased equality as an outcome of ECEC adaptability is arguably both a mediator and an outcome of policies aimed at improving availability, access and quality. For example, the age at which legal entitlement is available and the associated costs affect the uptake of ECEC differently for children of different socioeconomic backgrounds. With the exception of Denmark, Sweden, Slovenia and Germany, childcare usage is related to household income, with the richest income groups of parents more often using formal childcare arrangements. In other words, children from more wealthy homes are more likely to attend pre-primary education, and those students who might benefit most – the socioeconomically disadvantaged – are less likely to attend and benefit from any quality improvements (Mills et al. 2014).

Box 2. Minority approaches across Europe. The following examples come from the EPIC* website:

- In **Belgium** in 2013, 46 per cent of children under three and 98 per cent of children between three and compulsory school age were enrolled in formal childcare. These figures are above the EU averages of 27 per cent and 82 per cent respectively. The Flanders region provides multiple levels of parenting support, such as local- and regional-level support, the provision of services through parenting 'workshops', the organisation of Flemish parenting support coordinators, provincial parenting support centres and the centre for obtaining expert advice in parenting matters, Expertisecentrum Opvoedingsondersteuning (EXPOO). In the near future, the parenting support programme will be integrated with health and psycho-social prevention in local meeting places as 'Huizen van het kind'.

- In **Germany**, the programme 'Sprach-Kitas: Weil Sprache der Schlüssel zur Welt ist' ('Language day-care: Because language is the key to the world') will promote a range of linguistic educational opportunities nationally in around 4,000 day-care facilities from 2016. The programme is aimed at child day-care facilities with an above-average proportion of children with special needs in terms of language development, including facilities looking after children from refugee families.

* European Platform for Investing in Children (EPIC): http://europa.eu/epic/index_en.htm

3. Outcomes related to ECEC provision

The following section discusses the educational, economic and social outcomes that have been linked to ECEC attendance. These different types of outcomes are not independent, and in many cases describe the same result: for example, higher educational attainment following ECEC attendance will in most cases lead to higher earnings later in life. However, these outcomes differ both in their timing in relation to ECEC attendance, and in the degree to which they are affected by policies that affect ECEC availability, access, acceptability and adaptability, and for this reason are worth discussing separately.

3.1. Outcomes of ECEC: educational and labour outcomes

In 2012, the difference in PISA mathematics scores between students who had attended pre-primary education and those who had not was 51 points – the equivalent of more than a year of formal schooling (PISA 2013).

Although there is overwhelming evidence from both randomised controlled trials, quasi-experimental and longitudinal studies, conducted across many European countries, that ECEC improves educational outcomes (OECD 2011), these effects are mediated by between-country differences in the availability, acceptability and adaptability of, and level of access to, ECEC, as discussed above. In addition, they depend upon family and child factors, such as family deprivation and child temperament. Here we will discuss how policy decisions that have a bearing on the availability, acceptability and adaptability of, and level of access to, ECEC affect educational and labour outcomes later in life, and how these policies might differentially affect children with disadvantaged backgrounds.

ECEC availability & access. As mentioned in Section 2, between-country differences in ECEC availability and access are closely related to the age at which children enter ECEC, and the duration of ECEC attendance in the years preceding school. Child outcomes of ECEC generally reflect a combination of timing (or age of entry) and duration, as these two factors are highly correlated.

A longer duration of centre-based care up to the age of three is associated with better language and cognitive skills at school age (Sylva et al. 2010; Sammons et al. 2002; Anders et al. 2011; Broberg et al. 1997; Broberg et al. 1990; Dearing et al. 2015). Generally, children who have attended ECEC for longer show higher cognitive performance levels and educational attainment (provided that the ECEC is of good quality) (Buechner et al. 2007; Caille 2001; Driessen 2004; Sylva et al. 2004; Votruba-Drzal et al. 2004; Votruba-Drzal et al. 2013; Gorey 2001), and these effects are long lasting. The PIRLS study showed that across the 28 EU member states, reading skills at age ten were correlated with the number of years children had been in preschool: children who had been for three years or more performed better than children who had been for between one and three years, who in turn performed better than children who had been for less than a year (Mullis et al. 2012).

However, the evidence for a positive effect of an early starting age for children up to the age of three on ECEC outcomes is mixed, with results depending on the type of care (Luijk et al. 2015; Bernal & Keane 2011; Gregg et al. 2005; Hansen & Hawkes 2009; Loeb et al. 2014; Love et al. 2003; Sylva et al. 2011) and the quality of the care (Anders et al. 2013; Melhuish 2004), and the family background (Leak et al. 2010; Leseman 2009). These discrepant results reflect that overall, the effects of starting age on ECEC outcomes for children up to three years of age are moderated by family background, with negative, neutral and positive effects occurring depending on the relative balance of quality of care at home and in childcare. The best outcomes occurred for those children for whom the quality of childcare was higher than the quality of care at home.

For children aged three years and older there is consistent evidence for the positive effects of ECEC. This finding holds across European countries, and across different ECEC provisions, as evidenced by an OECD PISA report from 2011, which found that students who had attended some pre-primary school outperformed students who had not, by about a year of achievement, although benefits are greater for high-quality provision.[16] Interestingly, results from the UK in the EPPSE study found that full-time attendance led to no better gains for children compared to part-time provision (Taggart et al. 2015), suggesting that in terms of educational outcomes, having some access to ECEC provision during the preschool years is more important than the amount of provision.

Figure 6 shows the effect of ECEC duration on reading scores across the EU: there is a consistent pattern of higher reading scores in children who attend preschool for longer.

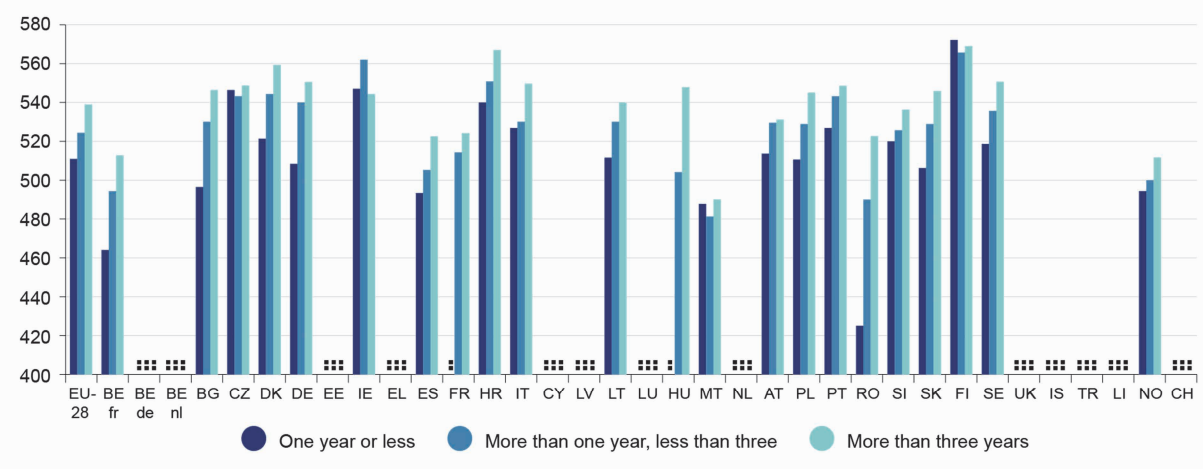


Figure 6: Average reading achievement scores by length of ECEC attendance for fourth graders 2011 (from European Commission/EACEA/Eurydice 2014).

To conclude, evidence on ECEC in the first three years indicates that for children who are not disadvantaged in their home environment, access to ECEC during the early years benefits their cognitive, language and social development in both the short and long term (Akgündüz et al. 2015). For children from a disadvantaged background, the benefits of ECEC depend on the quality of ECEC care, specifically so for young children up to the age of three (see below for a more detailed discussion of ECEC quality). Access to ECEC in the preschool years (three years onwards) has positive effects on educational attainment for all children.

However, higher availability of ECEC provision does not by itself lead to better outcomes. When considering the effect of availability on outcomes, the concepts of 'availability' and 'participation' must be distinguished. Even though policies may ensure universal access by raising the number of day-care places, universal participation is in fact dependent on the actual demand for ECEC. Simply adding day-care places will not necessarily raise the participation rates of children in every country. Aside from cultural differences among EU countries, acceptability and adaptability are some of the main drivers of participation.

ECEC acceptability. Overall, there is consistent evidence that there is a link between the quality (acceptability) of preschool and the persistence of outcomes. Studies have shown both that good quality preschool has long lasting effects (Anders et al. 2011; Melhuish et al. 2008; Sammons et al. 2008; Sammons et al. 2014; Sylva et al. 2014; Melhuish 2004) and that good quality ECEC has more persistent effects compared to poor quality (Anders et al. 2013).

Results from a study by Anders et al. (2013) suggest that specifically good process quality of ECEC provision (i.e. quality of the curriculum, pedagogical practices and a safe socio-emotional environment) is a predictor for the persistence of positive outcomes. These effects of good quality are specifically true for children from disadvantaged backgrounds. Studies have shown an association between good quality ECEC in preschool years and better grades in mathematics and science at age 14, as well as better scores in English and maths at age 16, in children of lower-qualified parents (Sylva et al. 2011).

Quality is additionally tied to the type of ECEC provision, because in many European countries structural indicators of quality such as adult–child ratios, caregiver qualifications and group size differ between types of ECEC provisions. As discussed above, a split system for ECEC, which is how ECEC provision is organised in the majority of EU countries, has both positive and negative effects on overall quality. For children up to the age of three, a split system is generally characterised by higher adult–child ratios and smaller group sizes, but less uniform regulations for caregiver qualifications and educational guidelines, whereas the reverse is true for the preschool age category. Moreover, within Europe the presence of unitary systems is associated with early legal entitlement with low associated costs, whereas a split system in most countries is associated with high costs in the pre-legal entitlement age group because of a split in funding sources between early years, which is predominantly private sector funded, and preschool years, which are publicly funded almost everywhere (European Commission/EACEA/Eurydice 2015). Results from the EPPE study in the UK suggest that, overall, a unitary system, in which ECEC provision for all children of preschool age is organised and delivered in an integrated setting, leads to better intellectual outcomes (Melhuish 2013).

The results discussed in the previous section emphasise that quantity and quality of childcare are intertwined: the effect of availability of ECEC on outcomes is mediated by the quality of ECEC. Good-quality ECEC leads to better and longer-lasting outcomes, and policy decisions on how ECEC provisions are organised (unitary vs split ECEC provisions) directly affect quality.

ECEC adaptability. Most research into outcomes related to ECEC adaptability has focussed on how socioeconomic status mediates the effects of ECEC attendance, or in other words, the extent to which policies aimed at increasing ECEC adaptability improve outcomes of

children in disadvantaged groups.

Figure 7 shows how the long term development of cognitive scores is differentially affected by socioeconomic background. Specifically, it shows that at the age of two, children with high cognitive scores from families with low socioeconomic status already perform worse than children with low cognitive scores who are from high socioeconomic status (Marmot 2010). Although it is difficult to directly attribute this difference to either family or preschool factors, it does illustrate the potential effect of environment on cognitive development, and the relative strength of this effect in the preschool years.

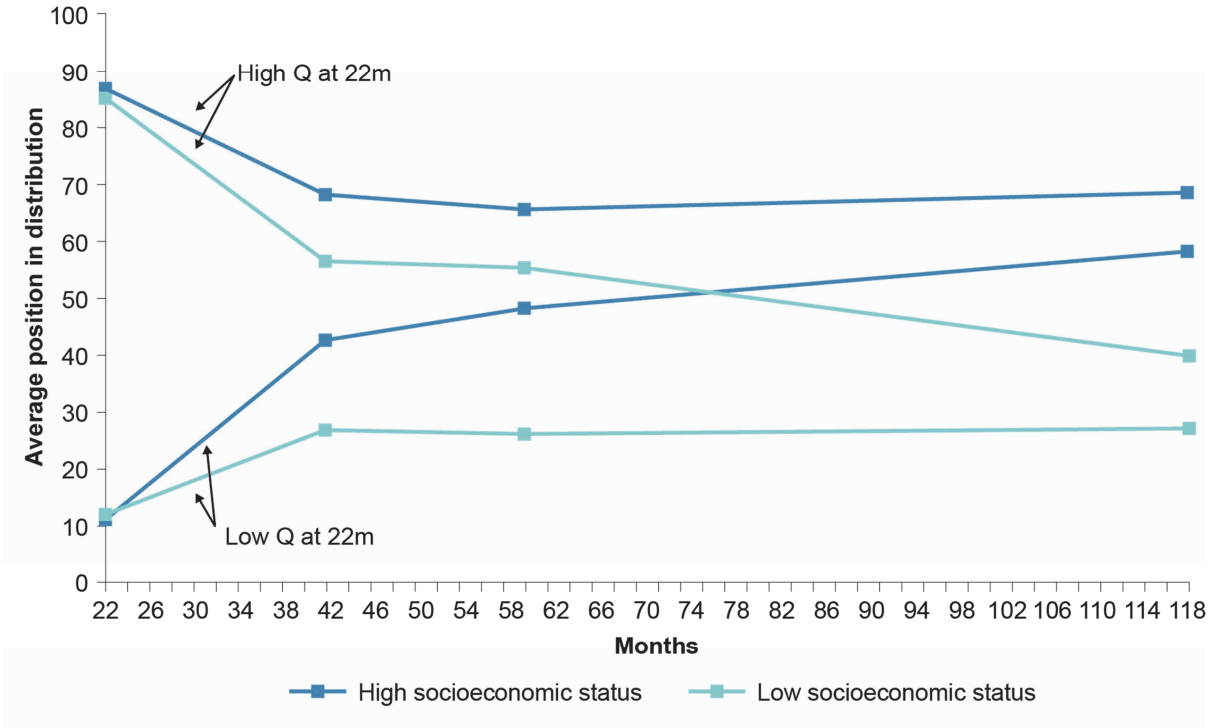


Figure 7: Inequality in early cognitive development of children in the 1970 British Cohort Study, at ages 22 months to ten years. Q = cognitive score (from Marmot 2010).

This idea is consistent with the previous points on the availability and acceptability of ECEC, namely that the benefit of ECEC may be greater for children from disadvantaged backgrounds than for children from more advantaged families. Insofar as policies can improve access to ECEC, a more equal participation in ECEC of children across different backgrounds will improve outcomes at a system or national level.

Improving adaptability, however, only works if it improves access to good quality ECEC. Vincent et al (2010) have shown how in the UK, the use of private for-profit nurseries can increase social stratification (Vincent et al. 2010). England has a stringent monitoring and inspection system for ECEC, but in a privatised system this is still insufficient to ensure quality across a large section of the private sector. An Office for Standards in Education (Ofsted) survey of 90,000 inspection visits to 84,000 providers (daycare, out-of-school clubs and childminders) over a three year period suggested that only two thirds of those inspected were good quality, but only half of those good-quality providers were located in deprived areas (Ofsted 2014). This illustrates that in order to maximise the benefits from ECEC adaptability, i.e. to ensure that increased access benefits those who need it most, it is important to develop policies that

address ECEC access, acceptability and adaptability together.

3.2. 'Skills beget skills': How long do educational outcomes persist?

The majority of studies that have investigated long-term outcomes have focused on outcomes of preschool ECEC for children three years and older. The few studies that have investigated outcomes related to early ECEC found that benefits of ECEC up to the age of three persisted into later childhood (Broberg et al. 1990; Broberg et al. 1997) but not into adolescence or adulthood (Hwang 2006).

For children of preschool age (three years onwards), studies from different EU countries have found significant and lasting effects of preschool on educational attainment and labour wages (Havnes & Mogstad 2011; Bauchmüller et al. 2014; Bauer & Riphahn 2009; Dumas & Arnaud 2010). In both younger (up to the age of three) and older (three years onwards) children, some of these benefits appear related to the effect of ECEC on language. The 2011 OECD report found that literacy at age 15 was strongly associated with preschool participation in countries where a large proportion of the population uses preschool, where preschool is for a longer duration, and where there were measures to maintain the quality of preschool (see Lekhal et al. (2011); Felfe & Lalive (2011)) for the evidence on children up to the age of three years old).

On average across the 28 EU member states, the effects of ECEC attendance on educational outcomes are relatively small compared to the effects of socioeconomic background, gender or student motivation: ECEC attendance explained only about two per cent of variation in 15 year old students' results (European Commission/EACEA/Eurydice 2014). However, from a policy perspective, preschool is one of the largest modifiable environmental predictors of educational outcomes. In a study done in England (Sammons et al. 2008), the effect of attending a high-quality preschool on a child's literacy and numeracy skills at age 11 can equal or surpass that of other factors, including primary school quality and early developmental problems. In addition, despite the fact that the effects of ECEC are relatively small, they are long-lasting: a significant relation between earlier entry into education and mathematic results remains after ten years. Importantly, the benefits of ECEC are not confined to educational and labour outcomes: as we will discuss in the next section, there are considerable economic and social benefits of ECEC.

3.3. Outcomes of ECEC: Economic outcomes

In the last decade there has been a significant increase in spending on ECEC both in the US and Europe. Since Nobel prize-winning economist James Heckman showed in 2006 that the economic return on investment in children's early years is higher than the return on investment at any other time during childhood (Heckman 2006) (see **figure 8**, based on US data), the global EU spending on ECEC has risen by 25 per cent, from 0.6 per cent of GDP in 2005 to 0.8 per cent of GDP in 2012 (OECD 2015; OECD 2007). This has been led in part by a series of policy initiatives, such as the Lisbon strategy and Europe 2020.

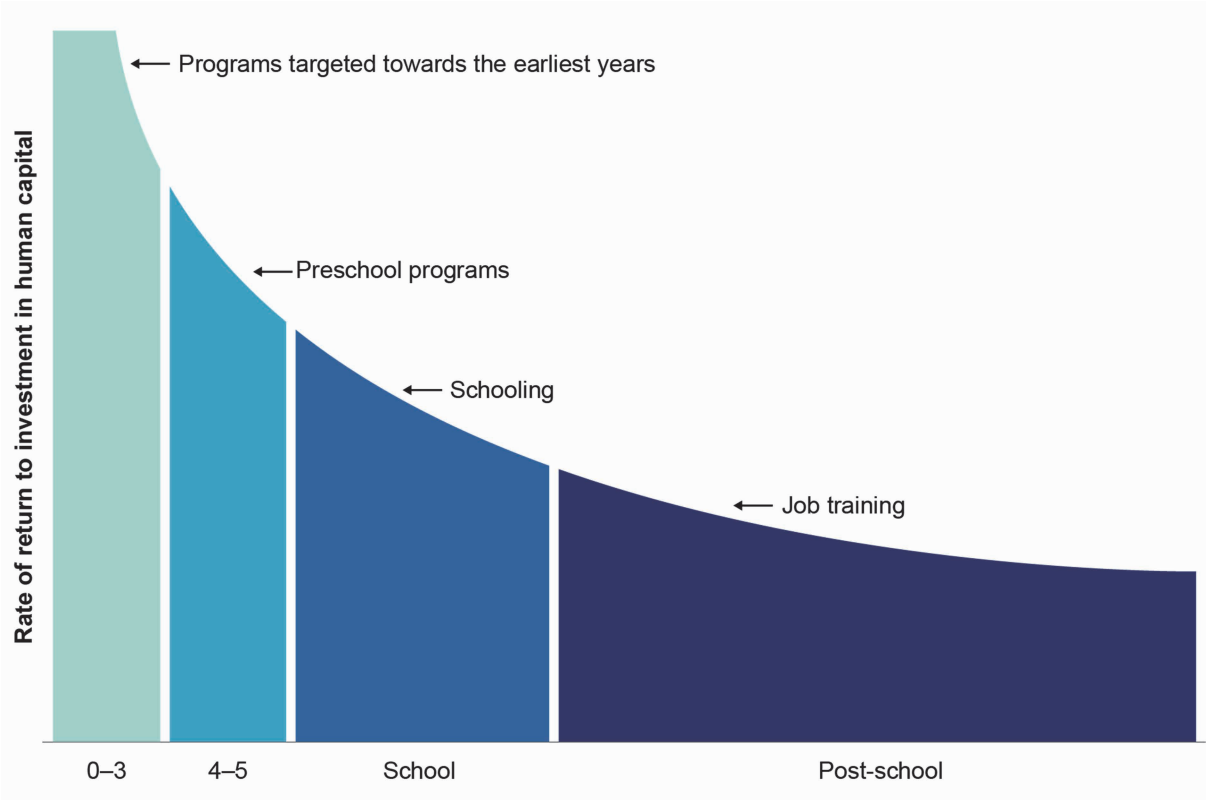


Figure 8: Illustration of the Heckman equation, showing the return on investment (ROI) in children against their age (from Start Strong 2011) .

However, the average expenditure on ECEC across 21 EU member states in 2012 was lower (0.8 per cent of GDP) compared to that on primary, secondary and postsecondary non-tertiary education (7.3 per cent of GDP) (OECD 2015). There are large differences among countries in what they spend on pre-primary (ECEC) compared to primary education. For example, in the UK, Spain and Luxembourg, the annual spending (as percentage of GDP) on ECEC is half or less of the amount spent on primary education, whereas Denmark and Germany spend approximately equal amounts on pre-primary (ECEC) and primary education (OECD 2014). These data suggest that if Heckman's prediction is true, increases in education funding are not always spent in ways to maximise their benefits.

Here we investigate the possible effects of between-country differences in availability, access, acceptability and adaptability on the return on investment (ROI) on ECEC, as compared to primary and/or secondary education.

Not all benefits of ECEC translate into financial returns. The benefits of ECEC programmes that translate into ROIs generally fall under the following categories (Penn et al. 2006; Goodbody Economic Consultants 2011):

- Education – this refers to improved cognitive outcomes, higher school completion and graduation rates and reductions in the need for remedial educational services.
- Improved health and social wellbeing – this refers to a reduction in the occurrences of child maltreatment and neglect, and reduced teen pregnancy rates.
- Increased earnings and labour-force participation – this refers to improved employment abilities and higher earning potential.

- Reduced welfare dependency.
- Increased exchequer returns – this is a spill-over effect of ECEC related to higher tax returns due to higher labour participation and improved earnings.
- Reduced crime rates.

An important limitation in calculating the long-term economic outcomes in Europe is that the vast majority of longitudinal European studies that have investigated outcomes of ECEC have done so in children up to about 16 years of age, and thus mainly consider educational outcomes. Given that the ROI is calculated across the lifespan, and represents accumulated economic benefits related to ECEC, the ROI on ECEC within Europe is unknown. Almost all current data on the long-term economic outcomes of ECEC are results from three large studies in the US: the Perry High/Scope (1960s), the Abecedarian (1970s) and the Chicago Child-Parent study (1960s) (Heckman et al. 2010; Barnett and Masse 2007; Reynolds et al. 2011). Results from these studies show an impressive ROI, with the Perry High/Scope showing an average yield of $17 by age 40 for every dollar spent on ECEC. Although all three are well-designed randomised controlled trials, they were carried out in very disadvantaged communities several decades ago, with a very different social context and different policy frameworks than most European countries. The validity of a direct translation of the results of these US studies to the European context is therefore much debated (Penn et al. 2006). For this reason, there is a scarcity of good data on what works in Europe in terms of long-term economic outcomes. There are, however, a few areas in which the results from European studies are similar to the early results in the US studies, suggesting that perhaps the long-term results will hold in the European context. These cover the following domains:

Availability & access. As was the case for the educational outcomes, there is evidence that the age and duration of ECEC are relevant factors for the long term economic benefits of ECEC.

Evidence from the Chicago Child-Parent Centres research shows that preschool attendance led to reduced crime-related costs at age 20. Similarly, the Abecedarian Project found that participation in preschool led to a reduction in the costs of educational support as it was associated with a reduced need to repeat a year or receive special educational support (both Goodbody Economic Consultants (2011)). From the European perspective, a natural experiment in France, when policy changes in the 1960s led to a rise in the uptake of free preschool by three year olds, from 35 per cent to 90 per cent, showed that one additional year of preschool increased average earnings by three per cent, and reduced the drop-out rate by two per cent (Dumas and Arnaud 2010).

Acceptability. The quality of an ECEC programme is also a key determinant of its long-term effectiveness, and thus its ability to yield long-term returns. In all three US longitudinal studies, there was an emphasis on providing good-quality care, such as providing good staff–child ratios and carefully structured curricula. Despite the importance of quality for educational outcomes at adolescent age, there is a lack of direct evidence on the effects of the quality of ECEC on long-term economic outcomes in a European context (Penn et al. 2006).

Adaptability. As discussed previously, one of the outcomes of increased accessibility is increased equality of participation, and for this reason we will consider the joint effects of access and adaptability on long-term economic outcomes. One of the most consistent and long-lasting effects of ECEC is that of increased socioeconomic equality (Esping-Andersen 2005). Both European studies (Bauer & Riphahn 2009; Dumas & Arnaud 2010) and US studies show that children from disadvantaged backgrounds gain more from ECEC than children from advantaged backgrounds. The economic benefit of reducing socioeconomic inequality is the fact that it acts intergenerationally, by reducing the high correlation between parents' educational attainment and income and that of their children. The improved educational outcomes of children who attend ECEC discussed in Section 2.1, and their relative importance for children from a disadvantaged background, show how ECEC can improve educational mobility in terms of educational outcomes. Improved educational mobility in turn improves income mobility, which means that the typically high correlation between parents' income and their child's future income is reduced (Bauer & Riphahn 2009). A study from Norway underlines this positive effect of access to ECEC on economic outcomes by showing that a large scale expansion of subsidised ECEC resulted in increased educational attainment and labour market participation and a concurrent reduction in welfare dependency – driven by the children whose parents have a lower level of education who benefited most from the reduction in ECEC cost (Havnes & Mogstad 2011).

These studies illustrate one of the key arguments for investing in ECEC over investing in public education later in life, namely that early intervention at the ECEC age is more cost effective than remedying unequal outcomes later in life, as the effects of inequality accumulate over the lifespan (Heckman & Mosso 2014; Currie 2001).

On the whole, there is good evidence that the economic outcomes reported in US studies hold in a European context, despite the difference in population characteristics. The evidence shows that the key determinants of long term ROIs are related to the availability, acceptability and adaptability of ECEC, with high levels of access for all to early, good quality ECEC yielding the best returns. A limitation of using financial-economic returns as an outcome measure of ECEC, and specifically in measuring the ROI of the equalising effect that ECEC can have, is that the benefits are measured as outcomes at the individual level. There is, however, a large range of social returns on investment, which span generations, that follow from the broader effect that accessible ECEC has on society. These are discussed in the next section.

Box 3. In addition to the intergenerational effects and reduced welfare expenditure, a large part of the access related ROI of ECEC consists in the avoidance of negative outcomes, i.e. the high costs of juvenile detention and other crime-related costs that are associated with disadvantaged backgrounds. As a result, a question that is often raised is: '**why not target ECEC at disadvantaged children?**' There are good arguments why non-targeted early universal access to ECEC is preferable as a policy, which are worth mentioning:

- The high costs associated with determining eligibility.
- There are more advantaged children than disadvantaged children: the accumulated gain of small improvements in the outcomes of advantaged children are likely to outstrip the fewer large gains in children from a disadvantaged background (Karoly and Bigelow 2005).
- The proportion of the ROI driven by a reduction of crime-related costs is substantially smaller in Europe than in the US, where the majority of these estimations originate. This is because the costs of holding someone in prison, and indeed all costs associated with crime are large, and these costs are higher in the US than in Europe because of higher victim compensation in the US justice system (Penn et al. 2006). Although the costs of criminal detentions are not negligible they are considerably lower in Europe.

3.4. Outcomes of ECEC: Social returns of ECEC

Aside from the economic, educational and labour market outcomes of ECEC, there are important, albeit less tangible socioeconomic outcomes that are associated with ECEC. These can be categorised as: 1) **non-cognitive benefits to the child**, such as improved health and wellbeing, and increased social engagement, and 2) outcomes of ECEC that do not directly stem from the effects of ECEC on the child, but reflect **indirect effects of ECEC on society** both in economic and social terms. In this section we discuss these socioeconomic outcomes of ECEC, with reference to how availability, access, acceptability and adaptability affect these outcomes.

Non-cognitive child benefits. Although the non-cognitive benefits of ECEC on child wellbeing are hard to quantify, it is a current topic in the evaluation of ECEC. There is work underway to develop a Holistic Child Development Index, as part of the 2010 UNESCO 'Moscow Framework for Action and Cooperation: Harnessing the Wealth of Nations' (UNESCO 2010). This index is developed to monitor global progress towards the equitable provision of quality and holistic ECEC, where the holistic aspect incorporates the wellbeing aspects related to ECEC.

This interest follows from a number of international studies that have indicated that child wellbeing is related to more effective learning, higher productivity, good health and longer life expectancy (Huppert & So 2013). It also aims to broaden the definition of ECEC success by considering the combined effects of ECEC on economic and equality-related outcomes and related child-centred outcomes. Distributional issues, such as social justice and universal access, may be seen as legitimate goals in themselves, regardless

of strict economic efficiency (Cleveland & Krashinsky 2003; Karoly 2010; PricewaterhouseCoopers LLP 2004).

There is an increasing number of studies that aim to capture wellbeing in young children, using subjective wellbeing measures such as positive senses of self, agency and security, and safety (Fattore et al. 2009; Mashford-Scott et al. 2012). Although it is difficult to directly attribute any changes in child wellbeing to ECEC attendance alone, a majority of studies indicate that measures of quality of care, such as quality of carer–child relationship and the ability of staff to create an 'intersubjective space dominated by high sensitivity and responsivity' (Seland et al 2015, p.10) is key to subjective wellbeing (Seland et al. 2015).

Another often quoted non-cognitive benefit of ECEC is the increase in social skills and motivation that follows from ECEC attendance. An important result from the Perry Pre-school programme, and indeed from the entire literature on successful early interventions, is that the social skills and motivation of children are more easily altered than IQ. The increase in social skills has been associated with both the quality and the duration of ECEC attendance (Melhuish 2013) and is long-lasting: the social and emotional skills acquired during ECEC attendance have been argued to affect performance in school and in the workplace (Melhuish et al. 2015; Taggart et al. 2015) (see **Figure 9**).

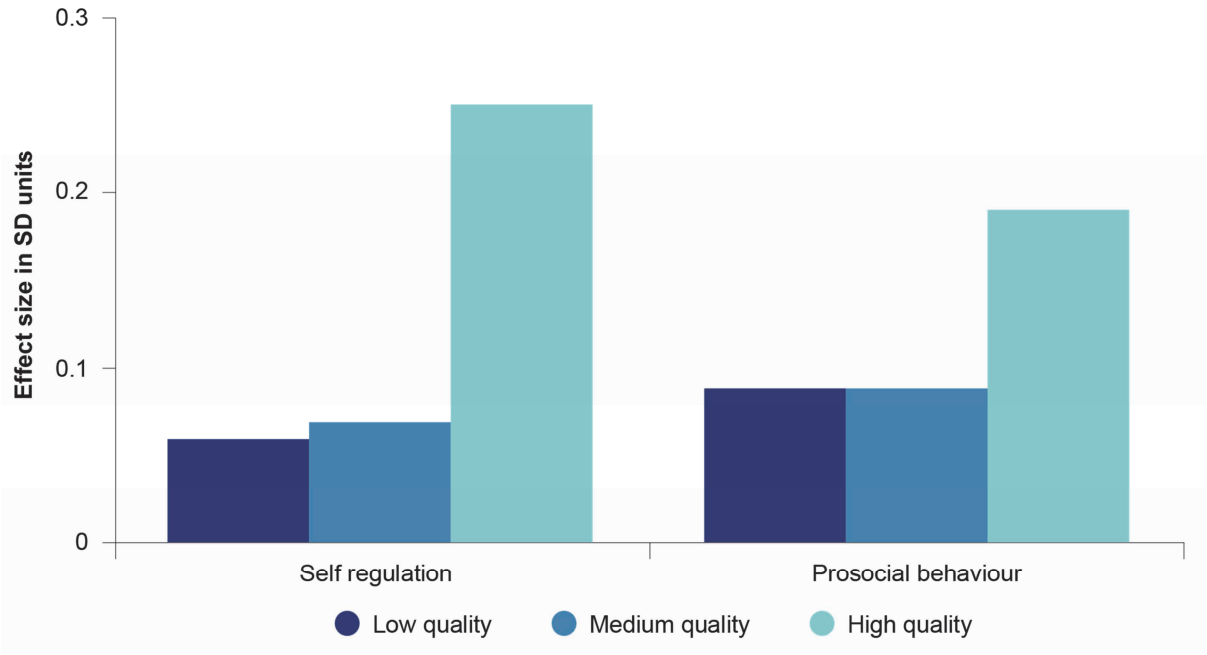


Figure 9: The EPPE study results on the influence of the quality of pre-school on positive social behaviours at age 14 (home as comparison) (from Taggart et al. 2015).

Indirect effects of ECEC on society. One economic outcome of ECEC which does not directly stem from the effects of ECEC on the child, but is instead is a broader socioeconomic outcome, is the influence that ECEC has on *female labour market participation* and *fertility.* Women's work now accounts for 30 per cent of GDP in the United Kingdom (in Denmark and Sweden it is around 40 per cent), not including unpaid work in the home (OECD 2006). Within the EU-26 countries, 65 per cent of women between the ages of 25 and 54 are now in the labour market (Eurostat 2016b). Labour market participation is

directly linked to availability of and accessibility to ECEC, as it is widely recognised that when a certain level of female participation in the formal labour market is reached (generally from 50 per cent upwards), private solutions to meeting childcare needs become insufficient. Parents or other family members are themselves working and informal child-minding solutions are unsatisfactory because of quality concerns, shortages and instability (The Business Roundtable 2003; Dy-Hammer et al. 2001). This link between labour market participation and ECEC access and availability is illustrated by the findings by Mills et al. (2013) that within Europe the main reason for parents not to enter the workforce is the cost of childcare (53 per cent of parents), followed by the lack of childcare availability (25 per cent). Only four per cent mentioned the quality of childcare as a barrier to joining the workforce (Mills et al. 2014). **Figure 10** shows the difference in employment rates between men and women with children under 12 in different EU countries.

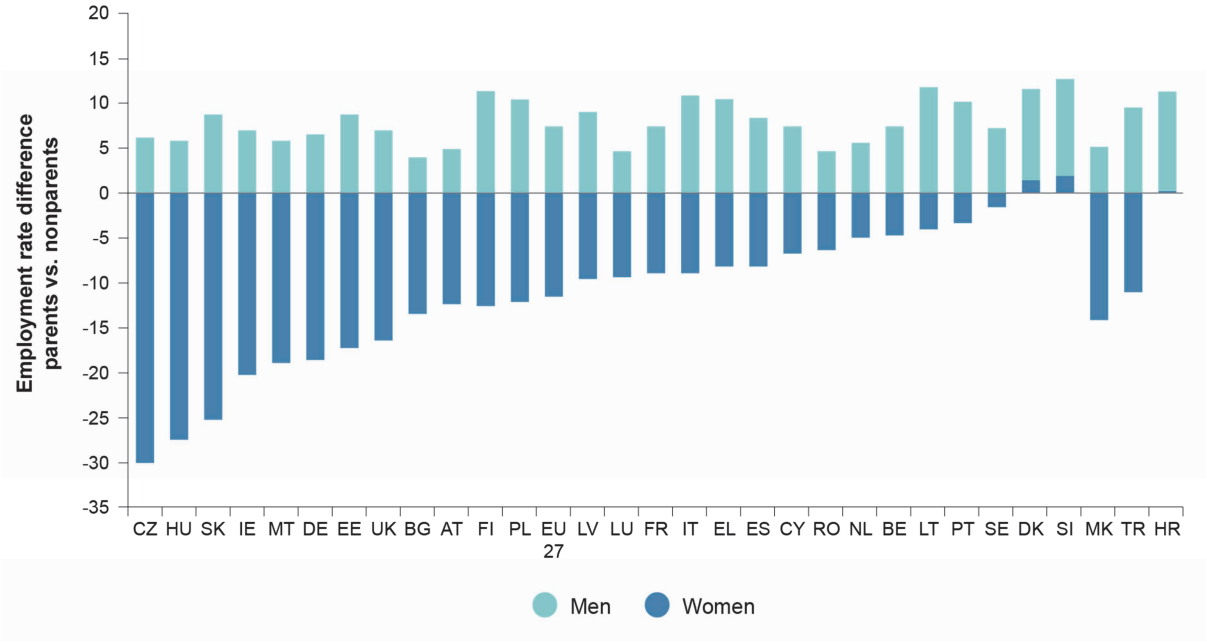


Figure 10: Differences between employment rates of men and women aged 25 to 49 with and without children under 12, 2010 (figure based on Mills et al. 2013)

Wages for primary caregivers need to cover several costs. There are the opportunity costs of working, as working time can also be used to save money on the costs of childcare. For this reason there is a larger proportion of women participating in the labour force in countries with a high level of public (affordable) childcare provision, which drives down this opportunity cost (NESF 2005; Browning 1992). This positive relation between labour market participation and ECEC availability and access is particularly strong in countries with a split ECEC provision system, and a high age of legal entitlement as this leads to high costs for parents. This is reflected in the fact that in all European countries except Denmark, Sweden, Slovenia and Germany, female labour market participation is tied to household income (Mills et al. 2014).

It is important to note that the negative consequences of low availability or high costs of ECEC on female labour supply reach far beyond the direct consequences. High ECEC costs result in reduced re-employment rates because of time out of the labour market, and for the same reason underlie the gender pay gap (the pay gap between equally qualified males and females), and the family wage gap (the pay

differential between women with children and childless women) (Voicu & Buddelmeyer 2003; Harkness & Waldfogel 2003).

In the same way that ECEC availability and access affects female labour supply, the availability of ECEC is also related to fertility. The high female labour supply in economically developed countries is often assumed to be a direct cause of a reduction in fertility; however, this relationship is mediated by the availability of childcare to reduce the conflict between work and family. Increased availability of ECEC leads to a younger age at first birth. This effect of ECEC is related to both quality and accessibility of ECEC: high quality, accessible (affordable), worker-friendly childcare leads to higher levels of childbearing (Harper 2013). Female fertility is relevant not only because fertility numbers below the replacement rate put pressure on economic growth, but also because low fertility results in a change in the Elderly Dependency Ratios (EDR). This ratio represents the number of persons of working age (aged 15 to 64) per person aged 65 or over, and is forecast to double in Europe by 2050 (Harper 2013). Essentially, this means there will be fewer young people to support the ageing population (Buchanan 2014), as illustrated by the OECD estimates in **figure 11** (from SHRM Foundation 2014).

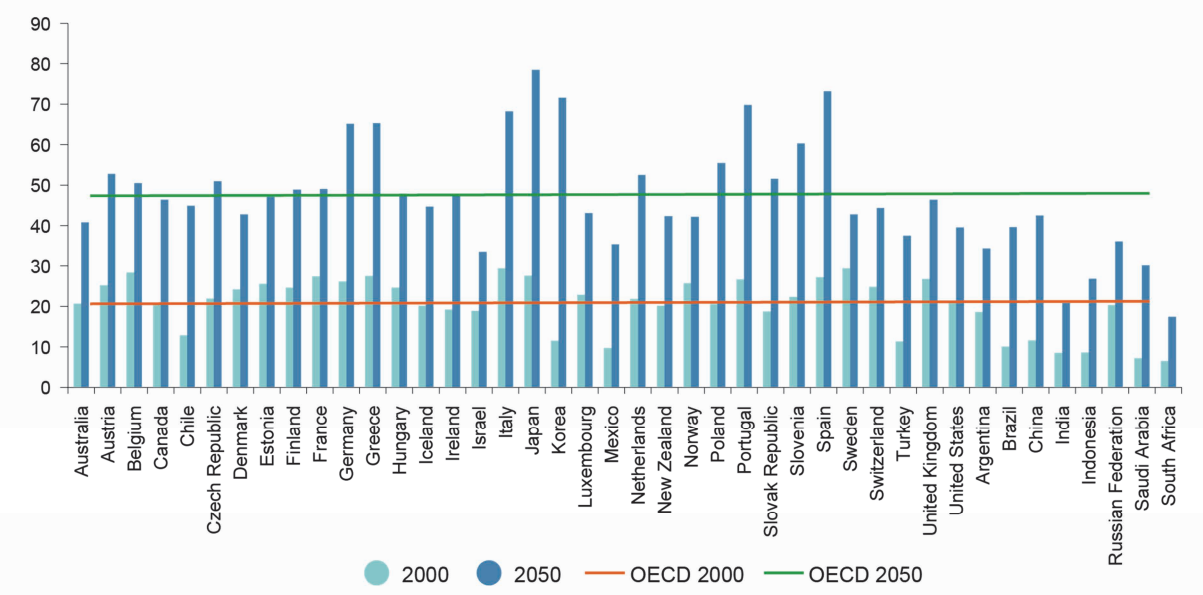


Figure 11: The age dependency ratio is defined here as the share of population aged less than 20 or more than 64, as a percentage of the 20 to 64 population. A higher share means more higher costs associated with care for children and the elderly (from OECD 2013b).

4. Conclusions

The research presented in this brief highlights the complexity of the relation between ECEC attendance and outcomes later in life (and for society). It shows that different aspects of how ECEC is provided act together as predictors of outcomes: there is not one single policy lever that will improve outcomes more than others. Having said that, the research does support a number of 'best practices': interventions that, combined, can be expected to improve outcomes later in life for those who participate in ECEC, or increase the societal benefits of ECEC. These include:

- For children under three who are not disadvantaged in their home environment, any ECEC attendance, even part-time, is beneficial in terms of cognitive and social development – provided the ECEC provision is of high quality.
- For children under three who come from a disadvantaged background, both the duration of attendance and the quality of the provision is important, with longer attendance and good-quality ECEC yielding best results.
- For children between three years old and school age, ECEC attendance is strongly linked to good outcomes at all levels: cognitive, social and economic outcomes improve with attendance – again provided the provision is of good quality.
- ECEC quality benefits from provision through a unified system, where ECEC for under- threes and older children is in one provision centre, as opposed to ECEC provided in a split system. Increasing the number of places where ECEC is provided from an early age up to school age within one integrated setting will contribute to higher quality ECEC.
- Availability and access, in combination with country-specific cultural norms and parental leave policies is strongly related to ECEC participation. Lowering the age of guaranteed access and providing sufficient financial support to bridge the gap between sufficiently paid parental leave and the age of guaranteed access will contribute to higher participation.
- ECEC availability and access have direct effects on social outcomes such as fertility and female labour supply, which by themselves have far ranging economic consequences. Especially in light of an ageing population across Europe, it is worth considering the impact that ECEC availability and access have on economic growth. Improving ECEC availability and access may, in the long term, provide a buffer against the economic consequences of demographic ageing.

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