
The Economics of Early Childhood Care and Education

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1. EXECUTIVE SUMMARY

Economic impacts are clear....

- 1.1 A major lesson from recent research is that the skills acquired in one stage of the life cycle affect both the endowments and the technology of learning at the next stage. Human capital is not only a function of the initial stock the individual is born with (genetic luck) but is produced over the life cycle by families, schools, and firms, although most discussions of skill formation focus on schools as the major producer of abilities and skills. Moreover, these four components of the human capital acquisition interact with each others. The relative roles and complementarities of the sources are still widely debated and no conclusion has yet been reached. The differences in human capital between individuals observed later on in life can stem from variations in any of these factors. For example important differences in ability across family types appear at early ages and persist. These are found in the UK (Vignoles and Galindo-Rueda, 2003; Feinstein, 2003), the US (Carneiro, Heckman and Masterov, 2003). Feinstein (2003) finds that there is a 13 percentile difference in an index of cognitive development at 22 months between British children from high and low SES families. By 118 months, this difference widens to 28 percentile points.
- 1.2 The argument in favour of large scale public provision of early education experiences is centred on the fact that education is not a repeatable process. So whilst consumers of other goods upon realising that they are not provided with adequate quality may simply change producers, for education the change does not compensate for the previous loss of opportunities. This inability to catch-up puts an enormous strong a penalty on getting it wrong in the first place. A central conclusion of a vast body of research summarized and extended in, for example, Carneiro and Heckman (2003), is that in most countries efficiency in public spending would be enhanced if human capital investment were directed more toward the young and away from older and less-skilled for whom human capital is a poor investment. Remedial policies are usually targeted towards individuals whose low level of human capital prevent them from participating to the labour force and integrate the society more generally. Whilst these policies may be politically desirable there is a case that they may not be the most efficient nor cost effective.
- 1.3 It is possible to argue that a private sector could concomitantly exist, in order to provide parents with more choice and create competition between providers of ECCE which could lead to quality and efficiency improvements. However the existence of the two competing sectors is a hotly debated issue (see for example the UK debates about private schools) with the argument against being that the private sector will cream off the best pupils/staff out of the public sector, leading to a lower quality in the public sector.
- 1.4 Other economic arguments for educational investment propose societal impacts from education. This is broadly true but acutely so for early/primary education where the greatest social gains are made relative to private returns. The balance of returns shifts to favour private outcomes for higher levels of education suggesting that the universality of provision argument is strongest in early stage education and that the economic argument favour early investments given fixed budgetary positions.
- 1.5 The evidence on programmes aimed at increasing the skills and earnings of disadvantaged youth suggests that sustained interventions targeted at adolescents still enrolled in school can positively affect learning and subsequent employment and earnings. Interventions for dropouts are much less successful.

...and Preschool Programmes seem to have the strongest impact...

- 1.6 The strongest evidence for impact on the child and on society comes from high-quality preschool education. The best evidence is from studies of programmes that targeted disadvantaged children. While the features used to target participants have varied, programmes such as the US based Perry scheme served children at significant risk of school failure. Benefit-cost analyses of preschool programmes are typically based on such targeted programmes. The high returns often cited are based on programmes that served disadvantaged children and generated large impacts that translate into substantial economic returns for every dollar invested – something close to a return of eight dollars per dollar spent.

- 1.7 Cognitive ability is an important factor in determining outcomes but noncognitive abilities, although harder to measure, also play an important role. Noncognitive abilities matter for success both in the labor market and in schooling. Early childhood interventions primarily improve noncognitive skills, with substantial effects on schooling and labor market outcomes, but only weak effects on cognitive ability.

...the tradeoff between targeted and universal is important....

- 1.8 A universal programme could be expected to have smaller impacts than those measured in targeted programme. A universal programme would be available to more-advantaged children, as well as children already attending private preschool programmes. Thus, the marginal benefit of providing a publicly funded preschool programme is likely to be smaller than what would be expected from providing the same programme to more-disadvantaged children not in preschool.
- 1.9 However a quality ECCE programme would come under significant demand from parents. The pressures to provide and widen the scope of a targeted programme could evolve into distortions in the provision. Allied reasons which push towards universal provision are associated with stigma, political and administrative efficiency and the reality that targeted programmes could also be developed within universally provided programmes. . *A universal ECCE programme is a preferable policy aim*
- 1.10 Despite the known impact the provision of ECCE services could produce perverse results – increasing educational inequality (as higher income families recognize quality effects and send their children to the ECCE provision which widens potentially the group of well educated middle class kids) and introducing regressive outcomes (as poorer individuals would, as a group, pay relatively more for ECCE services than the middle class). The economic logic here stems from an assumption of (a) voluntary participation and (b) skewed take up towards middle class parents. *This strongly motivates the provision of an ECCE service on both a universal and where possible compulsory basis – effectively extending compulsory education at the beginning rather than at the end through the raising of the minimum school leaving age.*

....other ECCE Interventions have drawbacks – good for child, economically bad for parent so potential for downside....

- 1.11 Other type of policies to foster child development which are linked to labour force participation, such as promoting family friendly employment could also lead to perverse outcomes but this does not mean that all these policies should be banned. For example, WFTC by providing childcare for the poorer working families could be considered to increase inequality between poor children whose parents work and those whose parents do not work. However, it may be argued that lifting children out of poverty is also a desirable objective for society, which compensate for the increase in inequality. Moreover, if the dominant focus is child development and not economic development then these policies are more sharply effective.
- 1.12 For example parental leave and policies such as extending maternity leave are far less clear in their impact. They are only relevant for those that work and as such carry significant dead-weight costs. The child development impacts are far more clear and significantly positive up to age one for the child. Longer term child development benefits may have general impacts on the economy through more skilled workers. The caveat here, in what economists refer to as general equilibrium effects, is that this positive child outcome could be offset through the loss of income through non-return or through deskilling and subsequent earnings loss.
- 1.13 The economics of the childcare market literature focuses on the supply and demand in that market. Quality adjustments – which parents effectively factor into prices they are willing to pay – are rarely empirically accounted for. The summary position would seem to be that most of the externality arguments in favour of childcare subsidies are, in fact, limited in scope. It is not the case that parents or society have no interest in pre-school childcare, nor education in general. Instead it is an issue of access to, and affordability of, early childhood care and education. This is less an issue of market failure as a impetus for government subsidy and instead an argument that appeals to distributional concerns.

2. ECONOMIC ARGUMENTS UNDERPINNING ECCE INVESTMENT

2.1 Motivating Government Investment

Human capital is acquired through the innate ability of the individual, other characteristics associated with the acquisition of cognitive and non-cognitive skills, but also family characteristics, including income and education institutions. The differences in human capital between individuals observed later on in life can stem from variations in any of these factors.

Policies can impact on all of these sources of the variation in human capital acquisition but most have focused on releasing financial constraints by, for example, providing schooling for free or creating educational institutions and structures and insuring their quality. Remedial policies are usually targeted towards individuals whose low level of human capital prevent them from participating to the labour force and integrate the society more generally. Whilst these policies may be politically desirable there is a case that they may not be the most efficient nor cost effective and economists have increasingly put the case forward for early intervention. A central conclusion of a vast body of research summarized and extended in, for example, Carneiro and Heckman (2003), is that in most countries efficiency in public spending would be enhanced if human capital investment were directed more toward the young and away from older and less-skilled for whom human capital is a poor investment.

Against this context the objectives of ECCE are multidimensional in nature and include improving the cognitive ability of pupils, but also equip them to fit in society along the social, political, economical or cultural dimensions. Moreover, these outcomes will be observed in a distant future, for example reduced mortality or externalities on the second generation, and may be difficult to measure. There is obviously not a single policy that can be successful on all these outcomes but in most societies ECCE policies are designed in order to provide some form of equality of opportunity.

The logic or motivation for state intervention is as usual due to market imperfections.

- First, the 'consumers' of ECCE, the children, are not able to process the available information and have to rely on agents their parents to take decision. The parents may fail to take the best decision for the child if they have imperfect information about the quality and returns of ECCE, the need of the child or if they do not maximise the utility of the child but instead some utility of the household (or their own, in case of non-altruistic parents). Imperfect information is likely to lead to under-consumption of ECCE.
- Secondly, parents may be financially constrained which prevents them to take the appropriate decision even in the case of perfect information. Moreover, an equity reason may be advocated. Even if information is available, there will be a cost (at the minimum, time to acquire and process it) and this cost is likely to be greater for parents from lower socioeconomic groups. In addition, if information is not freely available or is difficult to obtain, parents from lower socioeconomic groups may acquire less of it. These differences in the information set of parents would lead to a gap in the use of ECCE even if it was provided free of charge. Thus for equity reason, there may be an argument for making ECCE compulsory and publicly provided (or publicly regulated) in order to reduce the costs of obtaining information on quality.
- Education is not a repeatable process. So whilst consumers of other goods upon realising that they are not provided with adequate quality may simply change producers, for education the change does not compensate for the previous loss of opportunities. Also, if parents are not altruistic they may not make the decisions that are in the best interest of the child.
- There is evidence that returns to skills have increased over time (skill biased technological change) leading to greater inequalities and even a polarisation of the labour market between skilled and unskilled labour (Groot and Manning, 2004). Moreover, increasing technology means that the half-life of knowledge (the period by which half of the knowledge becomes redundant) has shortened, thus individuals are expected to keep on

retraining regularly, which as described below is more efficient if substantial human capital has already been gained.

One may conclude that it is increasingly important to invest in early intervention to give the children all of the opportunities to increase their human capital in the future. On top of the positive effects on the child development, ECCE interventions, in the form of early preschool provisions for example, can also have a direct impact on mothers which in turn impacts on the child. However there are reasons that this indirect effect can have negative consequences on equality of chances or opportunity:

- Provision of childcare releases one of the parents, typically the mother, from childcare duty, and thus increases her chances of participating to the labour market. Whilst such provision of universal childcare may be desirable outcome on its own, in particular to increase female participation to the labour force, it may have ambiguous effects on inequality of opportunities between children. Since female labour force participation is not homogenous and is correlated with education, more educated mothers would make greater use of the provision.
- This self-selection of mothers using childcare means that children of more educated mothers, who already have greater advantage in their development, would as a consequence of the universal provision of childcare, live in a household with higher disposable income and have benefited of the positive effect of childcare on their own development.
- These two outcomes means that by providing universal childcare, the differences in child development between children born in high SES and those born in low SES would be increased. This policy would also be regressive as poorer individuals would, as a group, pay relatively more for childcare usage than the middle class.

Other type of policies to foster child development which are linked to labour force participation, such as promoting family friendly employment also have the potential to lead to increased inequality. For example, the UK Working Families Tax Credit by providing childcare for the poorer working families could be considered to increase inequality between poor children whose parents work and those whose parents do not work.

To avoid these negative effects of increased inequality and regressivity, it may be important to make ECCE compulsory, so that parents do not have the choice to opt out, and all children benefit from the direct effect of childcare.

2.2 Parental Influence and Life Cycle Perspectives on ECCE Investment

The economics of early intervention relies, to a significant extent, on the complementarities of formal and informal education. Children convert educational inputs into outcomes more effectively if parents reinforce the input by encouraging and motivating children (Feinstein and Symons, 2005). By contrast job training programmes, whether public or private, work with what families and schools supply them and cannot remedy twenty years of neglect. The uncompromising evidence in the dialogue between James Heckman and Alan Krueger (*Inequality in America*, MIT Press, 2004) is that policy remedies later in life seem, at least in the US, to be taking on an almost palliative air – coping with the problem rather than moving the problem towards lasting solutions. A major lesson from recent research is that the skills acquired in one stage of the life cycle affect both the endowments and the technology of learning at the next stage. Human capital is not only a function of the initial stock the individual is born with (genetic luck) but is produced over the life cycle by families, schools, and firms, although most discussions of skill formation focus on schools as the major producer of abilities and skills. Moreover, these four components of the human capital acquisition interact with each others. The relative roles and complementarities of the sources are still widely debated and no conclusion has yet been reached.

First, in the line of Galton (1877) it can be thought that parental effects are mostly due to the transmission of genetic material, defining ability, motivation, or other traits associated with educational attainment. One identifying strategy to account for genetic effects is to rely on comparing siblings. Two set of siblings are especially informative: monozygotic twins, as they

have exactly the same genetic material and (in most cases) family background, and adopted children, as they share the same family background but completely different genetic background. First, the correlation in IQ between monozygotic twins brought up together (0.86) or apart (0.72) are extremely high suggesting a large impact of genetic factor on educational attainment (Feldman et al., 2000). Supporting this view, Behrman and Rosenzweig (2002) compare children of twins (cousins), who thus share half the same genetic background, and conclude that the education of their parents does not explain differences in the educational attainment of cousins. However, Antonovics and Goldberger reanalysing this same dataset found a positive effect of parental education even after accounting for the common genetic background. Similarly, Bjorklund et al. (2004) comparing natural children with adopted children report that genetic account for about 50% of the observed correlation in education between generations.

This controversy suggests that whilst genetic is clearly an important component of the intergenerational correlation in education there is still room for other factors. As noted by Heckman and Masterov (2004), a major determinant of successful schools is successful families. Herrnstein and Murray (1994) controversially stated that more educated parents provide a "better" environment and a role model for their children. There is a wealth of evidence on the positive relationship between parental education, especially the mother's, and offspring's education. The elasticity for intergenerational mobility in education ranges from 0.14 to 0.45 in the US (Mulligan, 1999) and 0.25 to 0.40 in the UK (Dearden et al., 1997). To separate between a nature and nurture effect, researchers have relied on strategies accounting for the transmission of genetic materials, as seen above, alternatively, a series of recent papers have used institutional characteristics, as natural experiments. Using changes in minimum school leaving age in Norway, Black et al (2004) find that parental education is mostly insignificant at determining child's education, whilst Oreopoulos et al. (2003) and Chevalier (2004) using respectively US and GB school leaving age reforms, report positive causal effects. Moreover, parental education affects other factors that may be crucial to the child development and educational attainment. For example, Currie and Moretti (2004) estimate that more educated mothers have healthier babies, as proxied by birthweight, which has long term effect on the development of the child.

Parenting is not in a vacuum and interacts with the schooling activity of the child. The pathbreaking work of Coleman (1966) first established this and an entire literature summarized in Heckman (2000a), Carneiro and Heckman (2003), or Heckman and Masterov (2004) which emphasise the compelling evidence that schools can only work with what parents bring them. Moreover, educated parents put a higher value on education (Feinstein and Symons, xx), are more active partners in the education of their children, (Lareau, 1987) or are in a better position to assist their children with schoolwork, or securing access to better quality education. Sabates and Feinstein (2005) estimate that education does not cause a change in parental style and that the differences observed in parental behaviour by education level are related to selection effects rather than an effect of education. In these circumstances, education from one generation does not change its parenting style and may thus have limited impact on the educational attainment of the second generation. Furthermore, more educated parents can provide a more favourable environment to help their children's education. This is especially apparent during the summer recess when lower class children suffer from a greater drop in their score than more well off peers (Entwistle and Alexander, 1994). Finally, the most lasting influence of parents on the development of their children may be due to income effects where wealthier parents can afford goods and services which have a positive effect on the development of the child, whilst parents from lower SES are financially constrained (Becker and Tomes, 1986). Despite similar returns to their educational investment, children brought up in less favorable conditions invest less in their own education (see Heckman and Masterov, 2004 for an extensive review).

The mechanism by which such intergenerational correlations are transmitted is not clear. Becker and Tomes (1986) modeled that children from poorer background may be financially constrained due to their lack of collateral. Krueger (2004) reviews various contributions supporting this view but Carneiro and Heckman (2003) suggests that current parental income is unimportant at explaining educational decision and that its effect is dwarfed by permanent income effect or, more generally, family fixed effects. This conclusion is also supported by empirical evidence for the US, Cameron and Heckman (1998) and the UK, Chevalier and Lanot (2002). However, experimental evidence on policy relieving financial constraints, such as Moving to Opportunity (in the US) or Education Maintenance Allowance (in the UK) are associated with improvement in educational attainment¹. In the absence of experimental evidence, Meyer (1997) and Shea (2000) have relied on instrumental variable to identify income effects, both find that unanticipated changes in parental long-run income have modest and sometimes negligible effects on the human capital of the children.

2.2.1 Ability, Family Background and Adaptability

Important differences in ability across family types appear at early ages and persist. These are found in the UK (Vignoles and Galindo-Rueda, 2003; Feinstein, 2003), the US (Carneiro, Heckman and Masterov, 2003). Feinstein (2003) finds that there is a 13 percentile difference in an index of cognitive development at 22 months between British children from high and low SES families. By 118 months, this difference widens to 28 percentile points. Using data from the British Cohort Study, Feinstein (2003) finds that the percentile rank on the cognitive development index at 22 months predicts educational attainment at age 26 though scores at 46 months yield better predictions. High SES children with low scores are much more likely to improve their scores than low SES children with poor scores. Lindhal (xx) also reports that low SES children loss more knowledge during the summer recess than their peer from higher SES.

Ability gaps open up early and persist. This is true for many other measures of verbal and mathematical ability. The ability that drives schooling participation is shaped early in life. The available evidence indicates that cognitive ability is relatively more adaptable early in the life cycle (see Heckman, 1995). Having access to more and higher-quality resources that contribute to improving cognitive ability early in life affects skill acquisition later in life.

Other analysts have also focused their attention on these gaps in cognitive ability and have attempted to eliminate them by controlling for more factors. Using data on the Children of the National Longitudinal Survey of Youth, Phillips et al. (1998) study the black-white test score gap. They analyze only math and vocabulary tests at ages 3 to 4. Like Carneiro et al. (2003), they cannot fully eliminate the test score gap using family background, mother's AFQT, and rich measures of family environment, although controlling for these factors substantially reduces the gap.

2.3 Cognitive and Non-Cognitive Development

The recent literature in the economics of human development challenges a convention that equates skill with intelligence in a number of key dimensions. It demonstrates the importance of both cognitive and noncognitive skills in determining socioeconomic success. Both types of skills are affected by families and schools, but they differ in their adaptability over the life cycle with noncognitive skills being more adaptable than cognitive skills at later ages. Differences in levels of cognitive and noncognitive skills by family income and family background emerge very early and persist. However, as noted in Heckman and Masterov (2004), current educational policy discussions focus on tested academic achievement as the major output of schools and systems for evaluating school performance are based on this.

¹ For an extensive review of evidence of financial effects on educational attainment see Blanden and Gregg (2004).

2.3.1 Impacts of Cognitive and Non-Cognitive Skills

Cognitive ability is an important factor in determining outcomes but noncognitive abilities, although harder to measure, also play an important role. Noncognitive abilities matter for success both in the labor market and in schooling. Early childhood interventions primarily improve noncognitive skills, with substantial effects on schooling and labor market outcomes, but only weak effects on cognitive ability. Mentoring programmes in the early teenage years can also affect these skills. Current evaluations of skill formation policy focus too much on cognitive ability and too little on noncognitive ability mostly because of measurement difficulties.

2.3.2 Changing Outcomes

The evidence summarized in Carneiro and Heckman (2003) shows that noncognitive skills matter greatly in labor markets and for success in school. Hence, understanding the gaps in these behavioral skills across different income groups (and how to eliminate them) is also important for understanding the determinants of economic success. Adjusting for early family background factors substantially reduces gaps in non-cognitive skills across income groups. Comparing adjusted cognitive and non-cognitive test scores reveals the importance of long-term factors in reducing the gaps in behavioral scores across these groups. Although non-cognitive ability gaps across income quartiles cannot be eliminated at later ages, controlling for mother's ability, educational attainment of the parents, family structure, and location significantly reduces the gaps in ranks in non-cognitive abilities across these groups at both early and later ages. Vignoles and Galindo-Rueda (2003) present similar evidence for the UK.

The core idea is that good families promote cognitive, social, and behavioral skills while bad families do not. Children from broken homes or single parent families suffer both cognitive and non-cognitive deficits. The relevant policy issue is to determine what interventions in bad families are successful. Yet the policy interventions supported by this evidence is far from obvious because the exact causal mechanisms through which good families produce good children are not yet well understood.

Perhaps for this reason, most societies have been reluctant to intervene in family life, especially in the early years. This creates a profound asymmetry in popular views about family life and schooling. On the one hand, there is a widespread belief that parents cannot make wise choices about their children's schooling. The logical extension of the paternalistic argument that denies the wisdom of parental sovereignty in choosing schools would suggest that the state should play a far more active role in the preschool life of the child. That is a position that few would accept. In his recent lecture at the UCD Geary Institute Heckman noted how paternalistic interventions in the early life of children in dysfunctional families may be appropriate and if one is to do so anywhere in the life cycle process of learning the case for doing so is strongest at the preschool stage and not at later stages of formal schooling where the argument for paternalism is most often made.

2.4 Interventions in the Adolescent Years

A key question in the economics of ECCE literature is how effective are interventions in the alternative policy options – indeed the focus of much policy attention. Is it possible to remedy the consequences of neglect in the early years? Carneiro and Heckman (2003) focus on this because cognitive abilities are fairly well determined and stable by age 8 in the sense that IQ at later ages is highly correlated with IQ at those ages. Just as early intervention programmes have a high payoff primarily because of the social skills and motivation they impart to the child and the improved home environment they produce, so do interventions that operate during the adolescent years, and for the same reasons. Carneiro and Heckman (2003) summarizes evidence on the effects of adolescent interventions on education, earnings, and crime rates. The available schooling literature demonstrates that providing disadvantaged students with financial incentives to stay in school and participate in learning activities can increase schooling and improve employment outcomes. It should be noted that although programmes providing such incentives have proven to influence employment and earnings positively, and often to

reduce crime, they do not perform miracles. The impacts they achieve are modest, but positive. The evidence on programmes aimed at increasing the skills and earnings of disadvantaged youth suggests that sustained interventions targeted at adolescents still enrolled in school can positively affect learning and subsequent employment and earnings. Interventions for dropouts are much less successful. It is important to remember, that the interventions conducted by such programmes only partially alleviate and do not reverse early damage caused by poor family environments.

2.5 Wider Concepts of the Economic Value of Children

2.5.1 Growth

The increased education levels that roll forward from the programmes discussed above lead to higher lifetime earnings for those who participated in the programmes. The social returns, often called “externalities” by economists, capture benefits to society beyond those benefits to private individuals. We will later discuss a benefit-cost analysis for a programme that does attempt to capture some of the social benefits that result from investing in preschool education. In summary however the argument is that a more educated workforce could have broader benefits to society beyond those already captured in the analysis above. This appeals to an extensive economics literature on the link between human capital—typically measured by education levels for a given country as a whole—and overall economic growth (for a recent review, see Krueger and Lindahl, 2001). DeLong, Goldin, and Katz (2003) estimate the impact of education on growth as an addition 0.3% per year (on growth rates of 3% to 4%) for the 85-year time span between 1915 and 2000, although they note that the contribution has been smaller in the past two decades as the growth in educational attainment slowed.

Economists theorize that education could have two effects on economic growth (Aghion and Howitt, 1998). One hypothesis is, as above, that the accumulation of human capital, treated as another factor of production, can lead to higher rates of economic growth. A second hypothesis is that the current stock of human capital leads to higher growth by improving the ability of a country to develop, implement, and adopt new technologies. The resulting technological progress leads to sustained growth. In the first hypothesis, it is the change in human capital over time that affects growth, while under the second hypothesis, it is the stock of human capital that drives economic growth. To date the empirical literature finds evidence in support of both hypotheses. While no clear consensus has emerged regarding these competing hypotheses, education is viewed as having a large effect on economic growth (DeLong, Goldin, and Katz, 2003).

2.5.2 Consequences for Economic and Social Equality

In the last several decades, economic disparities have widened in the United States and Europe including Ireland with family incomes and worker earnings rising faster at the upper tail of the distribution compared with the growth in incomes and earnings at the lower tail (Burtless and Jencks, 2003). The rise in inequality has wider implications in terms of disparities that affect family functioning, neighborhood quality, education, health, crime, and political participation (see, for example, the collection of studies edited by Neckerman, 2004).

Much of the increase in income inequality is driven by rising inequality in earned income—reflected, in part, in the widening wage gap by education level. Those with more education are able to earn increasingly more than their less educated counterparts, pulling the distribution of earnings and family income further apart. The relationship between education and socio-economic status which means that as the returns to education increase, so do social gaps. The widening gap in earnings, in turn, is driven by technological change and, to a lesser extent, globalization, which are increasing the demand for more-skilled workers faster than the supply has risen, thereby raising the premium paid to more-skilled workers.

The current period may be contrasted with the first half of the 20th century, when the high school movement provided secondary education for the masses and the rise in average education levels was sufficient to meet the technological changes of that era and resulted in the

last period of sustained decline in inequality. Improving educational attainment for future cohorts will help reduce income disparities, lower poverty, and, increasing in a economy such as Ireland with growing diversity, will narrow the gaps in economic and social outcomes across racial/ethnic groups. For example, US evidence in Reed and Cheng (2003) estimate that if full-time Hispanic workers had the same education distribution as white full-time workers, they would earn 93 percent as much as their white counterparts compared with 80 percent today. Equalizing education outcomes would also close the wage gap for blacks as well, though by a smaller amount.

A potential impact of a preschool program that raises educational attainment overall and improves educational outcomes for more-disadvantaged children could be felt through contributing toward such benefits.



3. Evidence of the Impact of ECCE

3.1 Early Intervention Programmes

3.1.1 A Note on Programme Design

In this section we revisit, in some more detail, the benefits of ECCE. It is important to note, however, that our review of this evidence has focused on research based on experimental evaluation methods. For example, as noted in the Karely and Bigelow (2005) work, and in the work of James Heckman, there is an extensive literature on the effects of early childhood programmes that serve children in the year or two prior to kindergarten entry. However simply observing differences in outcomes among children who attend preschools versus those that do not does not necessarily identify the causal effect of preschool. Children in US Head Start, for example, are selected from more-disadvantaged backgrounds (as is the case with many Irish interventions). Their school performance and other outcomes after attending Head Start may be worse than some children who never attended preschool simply because they are a more disadvantaged group, not because Head Start led to unfavorable outcomes. Likewise, those who attend private preschool programs tend to be children with fewer risk factors. If their outcomes after preschool are better than those with no preschool, it may be because they have other advantages that promote their success, rather than being attributable to preschool attendance itself. As described in Karely and Bigelow (2005): "What we need to know is what is the effect of preschool attendance on children's outcomes compared with what would be observed for the same children had they not attended preschool, holding everything else constant? Of course, we do not have the opportunity to observe outcomes for the same children attending and not attending preschool. Compensating for this inability to observe the counterfactual is the primary challenge facing evaluation research that seeks to identify the causal effects of participating in preschool."

However most studies are not providing evidence of outcomes that could be considered definitive given their initial design and roll-out process. We focus on research and evaluations based on experimental or strong quasi-experimental methodologies. In the first of these, children are randomly assigned to either the programme being evaluated or to no programme. The progress of both sets of children is tracked over the course of time and compared. While experiments are the "gold standard" for evaluation, they are not always practical. Quasi-experimental studies involve comparing educational and other outcomes between children who happen to take a preschool programme and children who happen not to. Here, the children are not assigned randomly, so the two groups of children may differ in important ways. However, efforts to control or account for these differences using the best nonexperimental methods can increase the confidence that the impacts of the programme, and not some other confounding factor, have been measured. In both cases, the more helpful evaluations measure not only short-term educational benefits but also those accruing over the long term into adulthood and also consider nonacademic benefits.

3.1.2 Experimental Evidence from Intervention Studies

Although there are several early interventions in the Ireland, the UK and wider afield there is little evidence of any extensive evaluations of their long term effects. If US evidence is any indication of their potential, they should prove to be fairly successful. Recent small-scale studies of early childhood investments in children from dysfunctional families and disadvantaged environments have shown remarkable success and indicate that interventions in the early years can effectively promote learning. They demonstrate the value of good families by showing that interventions that good families routinely provide can remedy the failings of bad families. Early childhood interventions of high quality have lasting effects on learning and motivation. They raise achievement and noncognitive skills, but they do not raise IQ.

Disadvantaged subnormal IQ children (average IQ=80) in Ypsilanti, Michigan, were randomly assigned to the Perry Preschool programme, and intensive treatment was administered to them at ages 4 to 5. The treatment consisted of a daily 2(1/2) hour classroom session on weekday

mornings and a weekly ninety minute home visit by the teacher on weekday afternoons to involve the mother in the educational process. The length of each preschool year was 30 weeks, beginning in mid-October and ending in May. The average child-teacher ratio for the duration of the programme was 5.7. Treatment was then discontinued, and the children were followed over their life cycle. Evidence on the treatment group, which is now about thirty-five years old, indicates that those enrolled in the programme have higher earnings and lower levels of criminal behavior in their late twenties than did comparable children randomized out of the programme. Reported benefit-cost ratios for the programme are substantial. Measured through age 27, the programme returns \$5.70 for every dollar spent. When returns are projected for the remainder of the lives of programme participants, the return on the dollar rises to \$8.70 (see table 2). A substantial fraction (65 percent) of the return to the programme has been attributed to reductions in crime (Schweinhart, Barnes, and Weikart, 1993).

The Syracuse Preschool programme provided family development support for disadvantaged children, from prenatal care for their mothers through age 5 of the children's lives. Reductions in problems with probation and criminal offenses ten years later were as large as 70 percent among children randomly assigned to the programme. Girls who participated in the programme also showed greater school achievement (Lally, Mangione, and Honig, 1988). Studies have found short-term increases in test scores, less in-grade retention, and higher high school graduation rates among children enrolled in early intervention programmes. Of those studies that examine delinquent or criminal behavior, most have found lower rates of such behavior among programme participants.

Recent estimates of the rate of return to the Perry preschool programme are 13 percent (Barnett, personal communication, 2002). This number looks low relative to the 15 to 20 percent return for schooling reported by Carneiro and Heckman (2003). However, it should be compared to the return for low-ability students, because the Perry programme only recruited low-ability children.

Evidence on the more universal Head Start programme is less clear, but the programme is quite heterogeneous and is much less well funded than the Perry Preschool programme. Currie and Thomas (1995) find short-term gains in test scores for all children participating in Head Start; most of those gains decayed quickly, however, for African American children after they left the programme. Currie and Thomas conclude that either differences in local-programme administration or in quality of schooling subsequent to the Head Start programme are at the root of the differences between the outcomes for black and white children. Ramey et al. (1988) note that the schools attended by the Perry Preschool children were of substantially higher quality than those attended by the typical Head Start child. In addition, the Perry programme also taught parenting skills and arguably put better long-term environments in place for the children. The failure in subsequent years to support the initial positive stimulus of Head Start may account for the decline in the impact of Head Start over time, and may account for its apparent ineffectiveness compared to the Perry Preschool programme. In a more recent paper, Garcés et al. (2002) find substantial long term effects of Head Start on high school graduation, college attendance, earnings and crime. The largest effects are for individuals whose mothers have less than a high school education. Among whites in this group, attending Head Start leads to a 28 percent increase in the probability of high school graduation, a 27 percent increase in the probability of college attendance and a 100 percent increase in earnings measured in the early twenties. For blacks, the likelihood of being booked or charged with crime is 12 percent lower for those who attended Head Start than for those who did not. There is also new evidence that suggests that Head Start may not have any effect. Imai (2004) uses a difference-in-differences approach rather than the family fixed effects method. He finds no effect whatsoever on cognitive outcomes or problem behavior.

It appears, however, that early childhood programmes are most effective in changing noncognitive skills, although they also raise achievement test scores (as opposed to IQ). We also note that eventual decay of initial gains in test scores, like those found in regard to the Head Start programme, were found for programmes like Perry Preschool as well, but the long-term evaluations of these programmes are quite favorable in terms of participants' success in school and society at large. The fade-out effects in test scores found for the Head Start programme do not imply that participation in the programme has no long-term beneficial effects. Head Start may improve the lifetime prospects of its participants, despite yielding only short-

term gains in test scores, which may not measure many relevant dimensions of social and emotional skills.

The Perry intervention affected both children and parents. Parents in the programme improved their education and labor force activity and reduced their participation in welfare. Successful enrichment programmes like Perry Preschool foster long-term improvements in the home environment that carry over to the child long after the programme has terminated. Head Start offers a much lower quality staff who are also paid accordingly, part-time classes for children, and limited parental involvement. The programme terminates without any substantial intervention into or improvement in the home environments of the disadvantaged children. Improvements in Head Start, proponents argue, are likely to produce effects closer to those observed in more-successful small-scale programmes. Given the potential for success of such programmes (as exhibited by the Perry Preschool experiment), more studies of the long-term impacts of various types of small-scale and broad-based early intervention programmes are warranted. Calculations by Donohue and Siegelman (1998) indicate that if enriched early intervention programmes were targeted toward high-risk, disadvantaged minority male youth in the US, the expected savings in incarceration costs alone would more than repay the substantial costs of these enriched programmes.

An important lesson to draw from the Perry Preschool programme, and indeed from the entire literature on successful early interventions, is that the social skills and motivation of the child are more easily altered than IQ. There also tends to be a substantial improvement in the children's social attachment. The social and emotional skills acquired in these types of programmes affect performance in school and in the workplace. Academics have a bias toward believing that cognitive skills are of fundamental importance to success in life. Because of this, the relatively low malleability of IQs after early ages has led many to proclaim a variety of interventions to be ineffective. Yet the evidence from the Perry Preschool programme and the evidence summarized in Carneiro and Heckman (2003) reveals that early intervention programmes are highly effective in reducing criminal activity, promoting social skills, and integrating disadvantaged children into mainstream society. The greatest benefits of these programmes are their effects on socialization and not those on IQ. Social skills and motivation have large payoffs in the labor market, so these programmes have the potential for a large payoff. These programmes may be very effective as antidotes to the adverse family environments arising from the growth of dysfunctional families. Enriching the educational and nurturing content of the recently expanded early child care system will pay off in producing a more skilled and emotionally competent workforce.

3.2 Parental Policies

Parental policies typically relate to parental leave and more specifically to maternal leave as women use most parental leave in most nations (OECD, 2003). Evidence suggests that while there are good grounds for extending maternal leave from a child development perspective, this policy can have negative repercussions on labour force participation and other economic costs. As noted by Ruhm (1998), proponents of parental leave believe this policy results in healthier children and improves the position of women in the workplace. Opponents stress the negative effects of restricted voluntary exchange between workers and employers, reduced economic efficiency and, in particular, adverse effects on women. In the following, more detailed, examination of these benefits and costs, we examine the impact of parental policies on child development, the economy and labour force participation.

Research on early childhood development supports extended maternal leave as a beneficial policy for children and indeed for mothers. Numerous commentators examine the effects of parental leave policies with respect to child health and development outcomes. Evidence from the US in Berger et al (2005) finds considerable associations between early return to work and reductions in both breastfeeding and immunisations, in addition to increases in externalising behaviour problems. These results are found to be stronger for mothers who return to work full-time within twelve weeks of giving birth. Children whose mothers return to fulltime work in their first year are at risk of reduced "well-baby" care. This suggests a causal link between maternal

employment and child outcomes, and indeed a concomitant enhancement of children's health and development with longer periods of maternity leave.

Gregg et al (2005), commenting on the effect of mothers' return to work on child development in the UK, suggest that while their findings mirror that of the US - adverse effects on fulltime working in the first year -, overall, the size and scale of these effects are smaller. They suggest this is due to the greater use of part-time working and the lower incidence of return to work in the first 3 months as result of better maternity leave rights. They conclude that on average it is only fulltime work up to when the child is 18 months that have adverse effects of child cognitive development, with both part-time work and work after 18 months having no effect. Interestingly their analysis examines the effect across subgroups of the population and finds that children of least educated mothers seem not to be disadvantaged by maternal employment. The negative effects then are concentrated among the children of more educated mothers. Theoretically this is explained by the possibility that earnings from mothers are particularly beneficial in low income families or that the quality of maternal care in disadvantaged families is less than or equal to the quality of alternative care used. In short, the interdependence of the relationship between quality of maternal care and quality of alternate care is stressed. In essence whether a child is disadvantaged by maternal employment depends on the quality the childcare receives relative to that which would have been provided by the mother (Gregg et al, 2005), perhaps explaining the negative effects for more educated mothers. Finally, they stress that paid childcare, not unpaid care (friend, relative or neighbour), may protect against the adverse effects.

Tanaka (2005) examining the impact of extended parental leave on child health across OECD countries finds that the extension of weeks of job-protected paid leave has significant effects on decreasing infant mortality rates. It is suggested that a 10 week extension in paid leave may decrease infant mortality rates by between 2 and 2.5% (However it should be noted that as infant mortality rates are already small in absolute numbers a large percentage change results in a small absolute effect). Worth mentioning here also are findings which differentiate between the effects of paid and unpaid leave, a significant decrease in infant mortality with paid leave is shown but no significant effect for other leave. It is concluded that parental leave-taking behaviour may not be very responsive without adequate payment and job protection, and may result in mothers' early return to work.

Maternal employment is also shown to have an effect on child education outcomes. Ruhm (2002) in a paper examining the effects of maternal employment on child cognitive development stresses the importance of parental investments at the beginning of the child life and its significant role in fostering cognitive development. Early job holding, particularly in the first year, is estimated to have negative effects on reading and mathematics performance of five and six year olds. Noting the rise of female labour force participation for mothers of children 6 years and under in the US, coupled with no evident offset through a reduction in male work hours and a rise in one-parent families, Ruhm (2002) suggests that adults have less time and energy to invest in their children (Parental time for children fell 22 hours per week or 14 percent between 1969 and 1999 in the US). Examining the effects of maternal employment during the first 3 years of a child life shows that there is a small deleterious effect on estimated verbal ability of three and four year olds and a larger negative impact on reading and mathematic achievement of five and six year olds. The consequences are worst when mothers either work long hours or also held a job in the first year. However, favourable child development outcomes from part-time work, as opposed to full time work, are indicated. The author points to the possible benefits of promoting a gradual return to the labour market. Nonetheless, if extended leave results in adverse effects on maternal employment and career advancement, documented benefit of early parental investment might be partially or fully offset by a reduction in future income (Ruhm, 2002).

Parental leave policies are associated with both economic and social benefits and costs. Extended parental leave that results in positive effects for child health, education and development may have significant longer term benefits for the economy as a whole. Positive educational outcomes for children are associated with extended maternity leave, this finding coupled with that indicating (Ruhm, 2002) a strong relationship between early test performance and future educational and labour market outcomes, suggest effects translating into lasting economic benefits. As strongly supported in the US literature, better educational outcomes lead to reduced costs for government and society in the form of grade repetitions, special education,

juvenile crime, child welfare to mention but a few (all examined later in our cost-benefit analysis). In addition this increase in skilled labour is vital for economic competitiveness and productivity. While parental leave results in costs for business, non-wage costs such as the hiring and training of temporary staff, the longer-run benefits are increased rates of returns for women to the workplace and increased labour force participation, particularly important in a tight labour market. From a social perspective, maternity leave policies, by facilitating women to strike a balance between childbearing and work commitments, help promote gender equity in labour force participation. This is true however only if discrimination in hiring can be avoided.

As it is generally women who take parental leave, there may also be particular consequences for female labour force participation and outcomes. While the impact of extended parental leave on childhood outcomes is consensually a positive one, both positive and negative effects of maternity leave on female labour force outcomes are reported. Research indicates that maternal leave may have negative impacts on female labour market participation and skills, long term career advancement and earnings. Research by the OECD analysing the effects of certain policies on female labour force participation suggest that very long parental leave may make it more difficult to return to the labour market. Skill depreciation is also associated with employment leave and is particularly relevant where the period of interruption is great. Edin and Gustavsson (2004) estimate that a full year of non-employment is associated with skill losses that are equivalent to moving 5 percentiles down the skill distribution. Although while Gupta and Smith (2001) find that human capital theories of the depreciation of women's labour market potential during career interruptions are supported, the negative effects are small over the entire career perspective. They state the main effect seems to be loss of human capital accumulation during the leave period which may have knock on effects for both career advancement and earnings. On the other hand, it is also argued that maternity leaves in helping women reconcile working and family lives actually boosts female participation. Empirical evidence from the US indicates that maternity leave coverage strongly influences women's return to work (Berger et al, 2005). Although maternity leave is associated with longer leave-taking (which may have certain economic costs) and may increase leave lengths up to a certain threshold, after a certain point evidence suggests it in fact decreases leave lengths and facilitates increased returns - that is, return of mothers to work (Berger et al, 2005). It also argues that job security strengthens attachment to the work force. Ruhm (1998) in a study on the effect of paid parental leave on employment rates across nine OECD countries found an increased employment rate. While extended leave is shown to have a negative impact on salaries of returning mothers by some commentators, a recent study from Denmark report a (progressive) catch up of mothers' salaries to that of childless women (OECD, 2003). Ruhm (1998) finds that parental leave is associated with increases in women's employment, but with reductions in their relative wages at extended durations.

Specific policy options adopted by governments have been varied. From the evidence above it is clear that maternity leave has significant benefits for strengthening female attachment to the labour force and increasing the rate of participation. Where leave is extended, particularly over one year, negative effects on hiring, skills, returns and career advancement may arise. The potential for harmful effects from maternal employment in early childhood is demonstrated (Ruhm, 2004; Berger et al, 2005; Gregg et al, 2005). However it is recognised that policy interventions can manipulate the factors that lead to adverse effects for children. Early, fulltime working in the UK is shown to be most problematic and as suggested by Gregg et al (2005) policies encouraging adoption of flexible and part-time working practices, enabling mothers to remain at home for longer, will minimise the negative effects of maternal employment. In emphasising the difference between paid and unpaid care they also note the importance of access to affordable childcare and in particular for very young children. Policy interventions such as flexible work-time scheduling, part-time work, home-based work or work-sharing are also possible solutions to combating the loss of human capital accumulation as highlighted by Gupta and Smith (2002). Finally the role of fathers requires further consideration. Increased time investment by fathers might offset some of the negative effects of working mothers in a two-parent household and indeed policy prescriptions such as an extension of paternal leave schemes, with respect to earnings for example, could help narrow the gender gap (Gupta and Smith, 2002)

Studies examining the impact of financial support find a positive effect on the employment probabilities for both single (Berger and Black, 1992) and married mothers (Powell, 2002). Subsidies targeted at formal care and unconditional childcare subsidies were found to have the greatest potential in terms of increasing employment. Furthermore, Leibowitz et al. (1992) find that greater monetary support for childcare increases early return to work after childbirth in the US. For the UK, Forth et al. (1997) find that family friendly working arrangements (for example, increased flexibility in childcare arrangements or a workplace crèche) have a positive influence on the rate of women's return to work after childbearing.

Childcare subsidies in general can be designed to encourage employment or to enhance the quality of childcare. These goals are generally in conflict: policies that encourage employment would allow parents flexibility in the choice of the quality of childcare and policies that are most likely to encourage the use of high-quality childcare would not impose employment requirements. Blau (2001) believes that the main problem with the childcare market in the US is low quality. Hence childcare subsidies with an employment prerequisite are likely to worsen the childcare problem by increasing the use of low quality care.

The sharpest evidence on the impact of childcare provision policies is contained in Duncan and Giles (1996) which simulate the impact of a number of popular policy options on UK data, namely:

- childcare 'disregards' in the family credit system (deducting childcare from income before being means tested for key benefits)
- childcare vouchers (either an allowance per week for each child under 5 in the family irrespective of use for childcare OR the same benefit which can only be paid when being used for childcare, or finally a variant of the benefit which only pays when other potential carers are working outside the home to focus the benefit on those in work)
- full subsidy of all childcare costs effectively reducing costs to zero (variants include restriction of the subsidy to three and four year olds, or restriction to low net income families)
- tax relief for childcare against income tax.

The focus of Duncan and Giles (1996) is a labour supply effect to generate the cost/benefit effect. Across the range of options simulated there are modest benefits making it extremely unlikely that the policy can pay for itself due to dead weight costs - the subsidy almost invariably gets spent on mothers who would have returned to work anyway, and those that would not return to work also receive the subsidy. Childcare disregards have the most benign outcome but only because the policy is so restrictive that only a fraction of mothers benefit. The more broad the subsidy – such as unconditional allowances – then the greater the expense with little additional benefit (measured, it must be reiterated, by tax and welfare benefit redistributions from changes in female labour supply). This to economists is unsurprising – a broad and universal benefit such as a full childcare subsidy will provide income irrespective of childcare need for employment choices and therefore provide a direct – and negative – income effect. Governments can limit schemes in some way and trade off some of the cost-benefit imbalances but this is not without costs. Schemes which focus on restricting the subsidy to those that work – such as the earnings disregard or tax relief – do maximize the benefit of labour supply (since anyone who remains outside of employment does not receive any subsidy) but in distributional terms this is less attractive as those that are in employment already are in general better off than those out of employment.

Rather than just focusing on simulations of impact Duncan and Giles (1996) also examine policy shifts in the UK towards vouchers provided to parents of four year olds for spending on a place in the private or state sector. Parents using the private sector will receive up to the full subsidy but the provider must be validated by the government and this voucher covers costs of 5 sessions (or 12.5 hours per week). State or local authority provided places are costless but capacity constrained thus the voucher increases the choice set to parents by bringing the private sector into the choice set - where state places exist the voucher can be used but the state withdraws the capitation grant from the provider. The parent in effect exchanges the voucher for a place that would have been free of charge, but the choice is empowered and the quality controlled. Short term effects of such a policy are almost fully dead-weight. Those in the state sector are unaffected while those in the private sector have a windfall gain and for some

the transfer of funds could provide an income effect and an incentive to reduce hours. Similarly the private provider could incorporate the voucher value into pricing reducing some of its impact. In the longer term the private market may adjust to the increased resources and increase choice but fundamentally it seems unlikely that such a policy would ever escape from the dead weight problems and therefore the distributional impact is limited. In other words a childcare voucher is likely to channel funds towards those for which the case or need is weakest.

The summary position would seem to be that most of the externality arguments in favour of childcare subsidies are, in fact, limited in scope. It is not the case that parents or society have no interest in ECCE. Instead it is an issue of access to, and affordability of, early childhood care and education. This is less an issue of market failure as a impetus for government subsidy and instead an argument that appeals to distributional concerns as outlined. Given limited resources and distributional concerns, and given the educational impact of early investment outlined earlier, a prioritisation of early investment, particularly amongst 'at risk' families, to give an equal start to educational and life development, would appear appropriate.

3.3 Economics of the Childcare Market

3.3.1 Key Issues - Quality, Accessibility and Price

Instead of heavy public investment in childcare witnessed in many of our European neighbours, Ireland has relied on the markets to provide childcare in general. The main focus in the economics of childcare is that the childcare process is justified either as it helps parents gain or return to employment while their children are young or it enhances the educational and psychological development of children².

Given the focus of childcare need, the parents as consumers of childcare are facing conflicting sets of needs: those of their offspring regarding the quality of care and their own needs for convenience, affordability and reliability. In this process the providers of childcare are better informed about the quality of the care they provide than the consumers of formal childcare. The information is therefore asymmetric and the resulting unfair exchange is often an inefficient allocation of resources or market failure (Akerlof, 1970).

Mocan (2001), in a unique paper in the childcare literature, demonstrates the existence of both information asymmetry and adverse selection in the childcare market. Market competition does not seem to create childcare services of acceptable quality suitable to every family budget. This is the main motivation behind government intervention – it may be desirable in order to increase total social welfare. Different aspects of the childcare market that may be associated with market failure include the quality of childcare, accessibility to childcare and its price.

- A 2001 MORI survey commissioned by the UK Daycare Trust found that 70% of all surveyed parents said that the availability of well-trained experienced staff is the most important factor in high quality childcare provision (Childcare Trust, 2001a). Less than a quarter of UK parents use formal childcare on a regular basis, of whom 90% were happy with the quality of childcare (La Valle et al., 2000). Hence for the remaining non-users of childcare the perceived quality of the childcare available may be a deterrent to using formal models of childcare.
- Discussions on the accessibility to childcare focus on the parents' ability to find appropriate childcare for their offspring. Holloway and Tamplin (2001) report that the total number of UK childcare places has increased by approximately 13% between 1995 and 1999 despite

² In a large survey by La Valle et al. (2000), two-thirds of non-working mothers in the UK would prefer to work or study if they had access to good quality, convenient, reliable and affordable childcare. Thirty-one per cent of parents who used some form of childcare in the previous year admitted that there were times when they would have needed more childcare hours but were unable to obtain them. This proportion is larger for lone parents and those in the lowest income groups (La Valle et al., 2000). Nearly 75% of working parents said their childcare arrangements are not ideal, with most common reason being lack of local provision and inability to afford more adequate care (La Valle et al., 2000). The Daycare Trust reports that 43% of parents want, as top priority, more affordable provision of childcare, 38% want increased availability of care; furthermore, ¾ of parents say that working mothers cannot find enough affordable childcare.

of a fall in the under 5 population. However, the number of childminder places, which may be the preferred choice of care for many parents because of the flexibility in hours and often a more convenient location, has actually declined in the more recent years. Ideally the childcare available to parents is conveniently located: 49% of surveyed parents expressed the location being their top priority when choosing a childcare provider. The MORI survey commissioned by the Daycare Trust finds that 75% of parents of young children say that there is not enough childcare provision (Daycare Trust, 2001b). Advocates of this position also point to long waiting lists for formal childcare - the UK government estimates that there are 830,000 registered childcare places for the 5.1 million under 8-year-old children in England, which gives a ratio of approximately one place to every six children. This potential shortage of childcare providers is likely to worsen with time as the participation of women to the labour market is due to increase by 1.5 million individuals between 1999 and 2010 (Wilson and Green, 2001).

- Similar confusion surrounds the issue of costs. A substantial part of the household disposable income is devoted to childcare expenses. According to the Daycare Trust “the typical cost of a nursery place [is] more than the average household spends a year on either housing or food”. For a family with a pre-school age child living in London and where mother works and purchases childcare, up to a fifth of family income is devoted to childcare. As a result, concerns about the affordability of childcare are often focused on families in the lower end of the income distribution. Hence the UK government has introduced policies, such as the childcare element of the Working Tax Credit, to reduce the costs of childcare to parents of young children and hence enable employment.

3.3.2 Labour Markets and Childcare

Economists usually emphasise that young children impose high time costs increasing the opportunity cost of working for the main caretaker of the children, usually the mother. This in turn raises the reservation wage of the mother – the wage that needs to be offered to encourage a return to work by the mother. The increase in the reservation wages is at least partly due to the childcare costs that would be incurred if the women had participated in the labour force, hence lowering the participation probability.

The labour force participation of women varies considerably between countries. It can be noticed that often countries with large public provision of childcare have a high proportion of women in the labour force (for other determinants of female labour force participation see, for example, Jaumotte, 2003). A good example of this pattern is provided by the Nordic countries. On the other hand, countries that rely less on public subsidies for childcare have in general lower female labour force participation rates. There are a variety of factors that are responsible for the increases in female labour force participation over the past 30 years.

- Rising wage rates, due to increased investment in human capital as well as technological advances, have facilitated female entry into the labour force.
- Other reasons include the widespread use of the contraceptive pill (and hence reduced fertility), the rising divorce rates, and the tremendous growth in the service sector jobs relative to the goods sector as well as a lower degree of product market regulation.

Evidence from the UK suggests that a substantial proportion of mothers are constrained in their employment decisions because of the need to care for their pre-school age children: 25% of non-working mothers would like a regular paid employment but are prevented from working by having to look after their children; 18% of mothers of pre-school age children who work part-time say they would like to work longer hours but are prevented from doing it due to child rearing responsibilities; 11% of mothers of pre-school age children who work part-time say they would work more hours if suitable childcare were available. Mothers of younger pre-school age children are less likely than mothers of older pre-school age children to report that they feel constrained in their labour force participation decision or increased working hours (Paull and Taylor, 2002). However it is unclear whether the mothers' reported preferences regarding their working behaviour and complaints about the lack of appropriate childcare provision are a sign of a market failure in the childcare sector. A market failure occurs when the supply of a commodity or a service is not at a level that would be optimal from the society's point of view.

The difficulty of saying what is the socially optimal amount of childcare provision prevents us from concluding whether the childcare market fails in any fundamental aspect.

Understanding the direct and indirect effects of children on labour supply is critical to a number of policy debates. Browning (1992) provides a comprehensive literature review on the effects of children on household economic behaviour. His conclusions include the finding that younger children are associated with lower labour supply by the mother. Furthermore, Voicu and Buddelmeyer (2003) find that the indirect effect or the time spent out of the labour force far outweighs the direct effect (i.e. reduced employment probability when children are present) of children on women's labour force participation dynamics when looking at the probability of a mother of a young child working full-time. Indeed the time spent out of the labour force may provide one explanation for the commonly found family wage gap or the pay differential between women with children and childless women. Research on the family wage gap has been conducted by, for example, Harkness and Waldfogel (1999) and Viitanen (2004) for the UK. Harkness and Waldfogel (1999) find that among a sample of seven countries, UK displays the largest wage penalties to children, which is partly due to the higher propensity for UK mothers to be employed in low-paid part-time jobs. Career interruptions and the greater incidence of part-time employment due to childcare responsibilities may be reduced by a policy that makes childcare cheaper and more widely available to parents hence leading to a reduction in the wage gap between women with children and childless women (for discussion, see also Jaumotte, 2003). The effectiveness of such a policy depends on how responsive the labour force participation of mothers is to the price of childcare.

3.3.3 Empirical Models

The economic model underlying much of the empirical work in this literature is a basic labour supply model adapted to account for the presence of children. This model is set within the wider framework of "new household economics" with its gendered divisions of labour (Becker, 1981, 1996). Becker theorises that the gendered division of labour results in within households specialisation in order to maximise the returns to human capital. This joint production function usually leads men to work on the labour market and women to specialise in household production and childcare. As the services for childcare can be bought outside the household, the household makes cost-benefit decisions regarding the gendered division of labour taking into account the availability and cost of childcare, which is compared to mother's potential income from paid work. The basic model is augmented with the childcare dimension to examine the joint decision regarding the mother's labour force participation and their use of formal childcare. Theory suggests two alternative approaches to understanding the impact of childcare on women's employment, first, it affects the value women place on their time at home (Blau and Ferber, 1992) and, second, the cost of childcare can be viewed as a tax levied on mother's wages so that higher-priced care would have the same effect as lower net wages (Connelly, 1992 and Michalopoulos et al, 1992). Both approaches predict that a lower price of childcare is associated with increases in the labour force participation probabilities of mothers of young children.

There are two different approaches to modelling childcare. The first one involves childcare costs in the budget constraint. The underlying assumptions in this approach include that maternal care and formal childcare are perfect substitutes and that there is a fixed link between the hours of work and the hours of childcare utilised. The second approach assumes that childcare arrangements have an effect on the mother's utility. Formal childcare forms part of the production function for childcare quality, which in turn enters the utility function. The analysis rests on the assumption of imperfect substitutability of maternal care and formal childcare in the production of childcare quality, as well as the omission of a direct link between working hours of the mother and the hours of formal childcare used. Entering the childcare arrangements in the utility function affects the budget constraint and hence the reservation wage of the mother.

The empirical models predict that women participating in the labour market equate the market wage to their reservation wage. A further prediction of the model is that the mother will substitute between formal and maternal childcare until her wage rate equals the net benefit of maternal childcare. Hence an increase in the wage rate of the mother is expected to increase

the probability of labour force participation, while an increase in the price of childcare is expected to lower the probability of labour force participation. This approach relies on the assumption of a functioning market system where the parents' willingness to pay determines the amount of childcare they purchase.

The predictions of the theoretical model outlined above provide a basis for an empirical choice model. The value of the time spent outside of the labour force (the reservation wage) depends on non-working income and domestic commitments - for example, the presence of children in the household and hence the participation probability is lowered due to the increased level of the mother's reservation wage. However, an increase in price has an ambiguous effect on hours worked and childcare used if the mother stays employed. On the one hand, work is financially less rewarding and higher prices induces a 'substitution' of work hours with leisure hours. On the other hand, higher childcare prices reduces net income and she may want to work more hours to make up the loss. Although the theoretical model leaves open whether the income or the substitution effect is dominant, it is generally believed that higher childcare costs reduce female labour force participation (note that in most parental choices the price is a function of childcare quality but however most empirical models ignore the childcare quality aspects and assumes they are unobservable, but uniform (see Blau, 2001 for extensive discussion on the impacts of childcare quality when the quality is observable). This simple model also assumes that the supply of childcare is fixed in the short-run. This allows the use of basic supply and demand analysis.

The labour supply of mothers is dependent upon her gaining greater utility from working in the labour market than outside the labour market. Utility derived from working is a function of personal, market, and policy factors (see, for example, Killingsworth and Heckman, 1986 for a review). Variables such as the number and ages of children in the household and the presence of alternative, informal caregivers in the household affect the cost of childcare by providing an informal, low-cost alternative to formal childcare (see Heckman, 1974 for further details) and hence the probability of labour force participation. Furthermore, any government policy that affects the cost of childcare is expected to affect the labour force participation of mothers of pre-school age children.

The model suggests the following explanatory variables: wage rate, non-wage income, the price of childcare, and the availability of informal care. The model also draws attention to the fact that the price of childcare is a choice variable since it depends on the quality of purchased childcare chosen by the family. The importance of allowing for non-linearities in the price of childcare with respect to the quantity of childcare purchased is highlighted in previous research by, for example, Ribar (1995) and Duncan et al. (2001a). Ribar (1995) finds that childcare expenditures increase with hours of work but at a decreasing rate.

A higher wage rate (which depends on individual characteristics such as the level of education) is generally considered to encourage employment as it raises the hourly return to working, while higher partner's income or non-labour income reduce the likelihood of working by reducing the family's need for additional income. The standard labour supply model has to be augmented with other variables when incorporating the childcare dimension into the model. These include, for example, factors influencing the amount of formal childcare needed, the availability of formal and informal childcare, the ability to afford the formal care, and the parents' and the children's preferences and tastes. Both the higher cost of childcare and the increase in the number of children requiring childcare decreases the probability of using formal childcare by increasing the reservation wage of the mother. Mothers can capture economies of scale if they stay at home but not if they rely on childcare (unless it is cheaper for additional siblings to be in the same formal childcare setting).

The availability of informal (zero-cost) childcare, such as other adults in the household or the neighbourhood (which is proxied by the amount of time lived in the current accommodation), or older children in the households, is expected to have a negative effect on the use of formal childcare. Higher potential earnings of the mother can be expected to have a positive effect on the use of formal childcare, while the impact of the partner's earnings on the decision to use formal childcare may be ambiguous due to the joint nature of the decisions to become employed and to use formal childcare and the relative strengths of the income and substitution effects. Important non-observed components of the decision to become employed or to use formal childcare include tastes and preferences, which can be proxied by age, ethnicity, and the level of education of the mother. Also, partner's years of education, hours of work, or earnings

may affect these decisions due to, respectively, assortative mating, gendered division of labour within the household, or an income effect.

The estimation of the market equilibrium allows the calculation of elasticities. The main focus of research on childcare by economists has been to estimate the effects of the cost of childcare on the demand for childcare and the supply of labour by mothers of young children. This is an important issue because despite the rapid growth in labour force participation of mothers in recent years it is possible that some mothers remain out of the labour force partly as a result of high childcare costs. Increases in government subsidies to childcare might be expected to induce many women to enter labour force, however, this depends on the supply side of the childcare market as well as the demand side. If the supply of childcare is relatively inelastic, as found by Chevalier and Viitanen (2002), then increased subsidies may simply drive up costs rather than expand supply.

3.3.4 Supply of Childcare - Informal Care Providers

Informal childcare is most often provided by relatives such as partners, parents, and parents-in-laws. In 1994 half of British working mothers with children less than four years old used informal care for their offspring (Finlayson et al., 1996). Holloway and Tamplin (2001) estimate that the valuation of informal, daytime care for British children under 8 years old as a percentage of GDP ranges from 4 to 6 per cent between 1995 and 1999. However, in countries such as Finland with a large public childcare sector, the concept of informal childcare use for working mothers is virtually unknown.

The majority of previous literature on informal childcare providers has been conducted for the US. Brandon (1995) examines kin-provided childcare in the US and concludes that kin-provided childcare is an in-kind transfer, however, the choice to use kin-provided childcare is also affected by economic factors. He argues that policies aimed at reducing the cost of childcare may have unintended effects on the private provision of childcare within the families. For example, the kin who provided childcare in return for goods and services may suffer losses if childcare subsidies lead mothers to substitute market-provided childcare for their care. Thus in-kind transfer behaviour within families can weaken or reinforce the effectiveness of childcare policies.

3.3.5 Supply of Childcare - Formal Childcare Providers

Since the last 30 years have witnessed such a tremendous growth in demand for childcare, it is surprising that the wages of childcare workers have grown barely above the rate of inflation (see, Mocan and Viola, 1997 for further details). Since a large increase in the demand for childcare has not driven up the wages of childcare workers, this suggests that the supply of childcare labour is highly elastic. In other words, as demand grows, the quantity of labour supplied expands along with it dampening the tendency for the demand increase to drive up wages.

Estimates for the elasticity of supply of labour to childcare for the US range from 1.2 to 1.9 (Blau, 1993) or 1.15 (Blau, 2001) i.e. a 10% increase in the wage rate of childcare workers, holding constant the wage rate in alternative occupations, would increase the total number of childcare hours worked by 11.5% accounting for both new entrants to the sector and increased hours by workers already in the childcare sector. These parameter estimates could explain why childcare workers' wages tend to remain unchanged in real terms despite rapid growth in the demand for childcare.

Another possible reason for the childcare workers wages not to have risen faster is that the providers have hired less-qualified staff. Walker (1992) finds that childminders in the US receive no returns to experience or to education. Hence, well-educated individuals have no monetary incentive to enter the profession and low-educated providers have no incentive to upgrade their skills. The increased educational requirements for the childcare profession, which are desirable to increase some aspects of the quality of care (see, for example, Currie and Hotz, 2001), may therefore have serious effects on the supply of formal childcare.

Government subsidies for formal childcare and its regulation in the form of, for example, child-staff ratios may have an impact on the supply of childcare labour. However, Blau (1992) finds that in the US the childcare workers wages are generally unaffected by government subsidies and regulations, which suggests that the supply of childcare labour is relatively elastic. Blau (2001) concludes that, for the US, the quantity and quality of childcare are quite responsive to the price of childcare. Also as the childcare price rises, childcare providers increase the quality of care they provide with the price elasticity of quality supply of 0.66 in the for-profit sector and 0.48 in the non-profit sector.

One potential explanation for the highly elastic supply of childcare labour may be the intrinsic value of work. Mocan and Tekin (2000) find evidence of labour donation hypothesis in the childcare sector. In other words, childcare workers often express that their work is important from the society's point of view and that someone has to do it, even for a lower pay. However, the childcare sector suffers from a high rate of employee turnover, which may provide at least a partial explanation for the previously found elasticity figures (see Kimmel and Connelly, 2003 for US evidence). In the UK, similar issues are prevalent. In the survey of childcare students and workers, over 90% of the students and workers are committed to working in the childcare industry and report a high satisfaction with childcare work (Cameron et al., 2001)³. However, the industry suffers from a high turnover: 1/3 of nursery schools had at least one vacancy and 3/4 of nurseries had at least one member of staff leaving in last 12 months prior to the survey. Fourteen percent of the surveyed workers were considering leaving their work shortly because of the poor pay, however, most commonly quoted reason for staying on the childcare occupation is the satisfaction the work brings and commitment to it. However, only 48% of the surveyed childcare staff pictured themselves working in the childcare industry in five years time (Cameron et al., 2001).

All the findings on the labour supply of childcare workers indicate that there exists a potentially large and committed labour force. However, for many potential childcare workers the low wage rate acts as a disincentive to continue to work in the childcare sector, particularly after becoming mothers themselves.

3.3.6 Demand for Childcare and the Labour Supply of Mothers

We earlier discussed that the labour force participation of mothers is closely related to the demand for childcare; therefore these two issues are analysed together in this section. The price of childcare and the wages are the key variables through which government policy attempts to influence consumer behaviour in the form of, for example, childcare subsidies or tax credits. Hence the predictions of these models are of direct policy interest.

The simple economic model makes predictions of the effects of the price of childcare and income on the use of formal childcare and mother's labour force participation. To recap, we would expect the price of childcare to reduce the likelihood of using formal childcare but to have an ambiguous effect on labour force participation. Research summarized by Viitanen (2004) shows that out of the 27 previous studies only Del Boca et al. (2003) for Italy find no significant effect of the price of childcare on the use of childcare; the rest of the studies find the expected negative impact of the price of childcare on the probability of its use. The majority of the previous studies also find that the higher price of childcare reduces the labour supply of the mothers of young children. Only four separate studies (Blau and Robins, 1991 and Hotz and Kilburn, 1991 for the US; Choné et al., 2003 for France; Del Boca et al., 2003 for Italy) find no significant effect of the price of childcare on the labour force participation probability of the mother. Furthermore, Connelly (1989) finds a significant impact for single mothers only.

Hence the majority of studies find that a higher cost of childcare both reduces the likelihood of employment as well as the probability of using formal, paid childcare. Some of the insignificant results that are found especially for Europe could reflect the cultural differences with respect to

³ The survey examines the characteristics of UK childcare workers and finds that the average age of a UK childcare worker is 32 with 1/3 being less than 26, 1/2 have their own child and just over a half have a teaching, nursing or vocational qualification. Two-thirds of the childcare workers work full-time and the mean annual salary before tax was £13,400 for heads of childcare centres and £7,700 for others.

the attitudes toward female employment and the care of young children in a formal setting. Furthermore, European countries, in general, experience much more government intervention in the childcare market than the US for example.

Although most of the studies find consensus on the sign of the effect, the magnitude of the impact of the price of childcare varies widely among the existing childcare literature. The wide range in the empirical results is not surprising given the vast differences that exist with respect to modelling and estimation issues. First, many papers focus solely on either the employment decision or the use for childcare decision. Second, large differences exist in the approach to the sample selection correction and especially the choice of identifying variables in the supporting childcare price equations. Furthermore, small but a growing number of studies utilise a more structural approach to estimate these issues (see, for example, Choné et al., 2003 for France or Wrohlich, 2004 for Germany). A range of studies concentrates on the effect of the price of formal childcare on the labour supply decisions of mothers of young children. Most studies estimate a labour supply equation with expected childcare costs as an explanatory variable.

Heckman's (1974) pioneering article reminds us that many working mothers use informal modes of childcare such as care by relatives for low or zero cost. Hence the decision to enter the labour market is not automatically a decision to use formal childcare but instead it depends on the relative weight of the cost and quality of formal childcare versus the cost and quality of informal care. Heckman concludes that the quality-adjusted price of childcare has a significant positive effect on the marginal rate of substitution hence decreasing mothers' labour supply. Studies by, for example, Connelly (1990, 1992), Hotz and Kilburn (1991), Kimmel (1995, 1998), Powell (1997, 1998) and Averett et al. (1997) have confirmed the significant negative relationship between female labour force participation and the price of childcare. In general, the empirical method within this group of studies involves an estimation of an employment equation, which includes selectivity-corrected, predicted childcare prices and wages. The price elasticity of demand for childcare with respect to employment ranges from -0.20 to -0.78 in studies by, respectively, Connelly (1992) and Averett et al. (1997) or -0.92 by Kimmel (1998). In other words, decreasing the market price by 10% would lead to an increased likelihood of employment for mothers of pre-school age children varying between 2% and 9.2%. Higher childcare costs hence seem to have a significant negative employment effect for mothers of pre-school age children.

Another group of studies estimates the joint decision of mothers of pre-school age children to engage in paid employment and to purchase formal childcare. The research by Blau and Robins (1988, 1991), Michalopoulos et al (1992), Ribar (1992, 1995), Powell (2002), and Cleveland et al. (1996) highlight the interrelated nature of the employment decision and the decision to use formal childcare. The childcare price elasticity for married women found by these studies ranges from -0.02 by Ribar (1995) to -0.39 by Cleveland et al (1996) and -0.74 by Ribar (1992). In other words, decreasing the market price by 10% would lead up to a 7.4 percent increase in the probability of mothers of pre-school age children engaging in paid employment. These papers also find that higher childcare costs significantly reduce the likelihood of using formal, paid childcare. Based on all the previous studies it appears that accounting for the joint labour force participation-use of childcare decision the elasticities are reduced.

Duncan et al. (2001), for the UK, find that the price of childcare has a negative impact on the decision of a sample of working mothers to use formal paid childcare and on the hours of formal care used. The elasticities for the former range from -0.26 to -0.45 for pre-school age children using different measures of the price of childcare. The elasticity with respect to the hours of formal care used is over -0.20 without the controls for hours and quality, however, once the unit values are corrected for the choice of hours and quality, the elasticity estimates become insignificant. Duncan et al. (2001) stresses the importance of controlling for quality effects and non-linearities in the price of childcare since the failure to do this may generate significant overestimates of the price elasticities. Their evidence suggests that the price of childcare is negatively related to quality. Therefore, subsidies aimed at lowering the price of formal childcare may increase childcare expenditures by increasing the quantity demanded and raising the level of quality purchased.

On average, the price elasticity of demand for childcare with respect to employment is estimated to be higher in absolute terms in the North American studies compared to the rest of

the world. Furthermore, the US studies overall estimate American mothers' employment to be slightly more responsive to the price of childcare compared to the Canadian mothers. Similar differences are found between the North American studies and those of the rest of the world regarding the childcare price responsiveness with respect to the use of formal childcare. These results may reflect both institutional and cultural differences in female labour supply behaviour and, in particular, the differences in childcare provision. In general, the American childcare system is based more on the ideals of a free market economy with few subsidies or public provision, whereas especially in Europe government intervenes in the childcare market more systematically (for further discussion, see for example Blau, 2003). The lack of evidence for the Nordic countries, where low-cost, public childcare is prevalent, prevents one from further examining this hypothesis.

In general, single mothers are found to exhibit less responsiveness than married mothers in their labour force participation due to childcare prices (Berger and Black, 1992 and Kimmel, 1998). An exception to this common finding is that of Connelly and Kimmel (2000) who conclude that employment elasticities are larger for single than married women. Keeping in mind the findings quoted above for the differences between single and married women's results, the childcare price elasticity of employment can be expected to surpass that found by Jenkins and Symons (2001) for the UK. They find a much lower price of childcare-employment elasticity for the British lone mothers (-0.09) than most other similar studies that are conducted for both married and single mothers (-0.2 to -0.92 for married women and -0.22 for single women). Furthermore, Kimmel and Powell (2001) find that the decision to become employed in a non-standard job (for example, shift work, night shifts etc.) is less responsive to the price of formal childcare. This implies that childcare subsidies are likely to help mothers working in "standard" working arrangements. Being a non-standard worker significantly reduces the likelihood of using formal modes of childcare, which in general are less likely to offer flexible childcare arrangements.

The papers reviewed here and summarized in more detail in Viitanen (2004) find that higher childcare costs significantly reduce the likelihood of using formal, paid care by posing a significant barrier to employment for single and married mothers. Furthermore, higher childcare costs may also lead to an increased rate of leaving employment (Blau and Robins, 1989). The reported estimates for childcare price elasticities for employment range from -0.09 to -0.92. The findings of these econometric studies are in accordance with both quantitative and qualitative survey results (Bloom and Steen, 1990; Cattan, 1991; Mason and Kuhlthau, 1992; Paull and Taylor, 2002; and the Daycare Trust) indicating that a substantial number of women would like to work if there were suitable, reasonably priced childcare available.

Finally, it must be noted that the majority of the studies examining childcare markets are based on US experiences, characterised by limited availability of publicly provided childcare. The question of the affordability of childcare may lose some of its importance in the context of a day care system that is characterised by a high share of public provision and a rather unimportant private childcare market. Instead the availability of childcare slots may be relevant to policy discussion in countries such as Germany (Kreyenfeld and Hank, 2000). It would be desirable to more systematically examine the childcare question in the European context to examine to what extent the institutional settings affect the magnitude of the childcare price elasticities. However, at this point, no conclusion can be reached regarding this issue due to the small number of studies conducted for countries other than the US or Canada.

3.3.7 The Quality of Childcare

Blau (2001) provides an extensive overview of the childcare market in the US with a large concentration on the issue of childcare quality. The quality of care has also formed part of the analysis in several pieces of economic research. The quality of childcare could have profound long-term implications for the society at large if it has an impact on the child's emotional and cognitive development. Quality of childcare can be measured in two main ways: 1) process quality i.e. what actually occurs in childcare settings, for example, language stimulation, health and safety measures and 2) structural characteristics, for example, child-adult ratio, training of caregivers and the group size. Important issues to consider include, first, the effect of childcare quality on children and, second, the determinants of childcare quality.

Ideally investment in childcare yields net benefits to society by enhancing the human capital of upcoming generations and reducing inequalities due to family background. Vandell and Wolfe (2000) and Waldfogel (2002) provide comprehensive literature reviews examining the effects of childcare on child development. None of the reviewed studies provide any definite answers. The main body of research has moved focus from examining whether childcare and early maternal employment are detrimental to child development to assessing which type of childcare can provide most benefits to children's cognitive and socio-emotional development.

Blau and Mocan (1999) find that, on average, the parents of young children are unwilling to spend significantly more on formal childcare in order to obtain higher quality care. They find that the supply of quality is inelastic for both profit-making and non-profit firms. Blau (2001) reasons that parents may not value childcare quality in the terms defined by developmental psychologists or that they may simply not have enough information to assess the quality of a childcare provider.

The traditional measures of quality, such as the child-staff ratio or the group size have in the recent years come under attack in the academic circles. Blau (1998, 2000, 2001) finds that the easily observed inputs, such as the group size, child-staff ratio and teacher qualifications, are correlated with childcare quality, however, there seems to remain a lot of unmeasured centre-specific heterogeneity in the quality of formal childcare. Hence Blau's results raise questions about the chances of public policy to influence the quality of childcare through regulation and childcare subsidies.

Furthermore, Mocan (2001) compares consumer evaluations of quality to actual quality and finds that parents do not utilise all the available information in forming their assessment of quality. The parents of young children may suffer from information asymmetry, which is exhibited mostly by the parents interpreting the signals of quality incorrectly, for example, equating clean reception areas with high quality of childcare. However, Mocan (2001) finds some evidence of moral hazard whereas the centres with clean reception areas tend to produce lower level of quality for unobservable items. These results provide a partial explanation for the low average quality in the childcare market.

Mulligan and Hoffman (1998) argue that in the absence of significant increases in government support, the only feasible method for accommodating more children in formal childcare rests with higher child-staff ratios. Policy makers are given the advice that regulation of child-staff ratios, group sizes and qualification levels is too blunt an instrument for improving the overall quality of childcare. By focusing on outcomes rather than inputs, childcare providers should be free to choose among different combinations of these inputs.

The child-staff ratio is not significant for the employment decision of the British mothers and larger provider size is associated with higher proportion of mothers working full-time rather than part-time or not working at all for all forms of childcare except for childminders, which may reflect quality issues (Paull and Taylor, 2002). Furthermore, it is possible that in the UK parents do not have a choice regarding the quality of childcare due to its low availability. Hence, the issue of quality may become more relevant only when the childcare market reaches the equilibrium.

Overall, the previous research on the quality of childcare has not reached any agreement. Blau and Mocan (2002) for the US find that parents are unwilling to pay more for higher quality childcare, a result which reinforces the finding of Blau (2001) that the relationship between family income and quality of care is almost non-existent. None of the childcare literature has examined the overall costs and benefits to the society in terms of whether additional government expenditure on childcare is justified given the magnitude and the nature of the social benefits they yield. The next section examines the arguments that have been put forward for the governments to intervene in the childcare market.

3.3.8 Government Intervention in the Childcare Market

Government intervention in the childcare market varies considerably between countries. The US and the UK follow mainly the non-interventionist approach by allowing the market to operate freely and privately with only a few subsidies, which are mainly targeted at the low-income households. The role of the state is limited to ensuring minimum quality standards among the

childcare providers. An example of the other extreme of the level of government intervention in the childcare is provided by the Nordic countries. In the Nordic countries the large public provision of childcare in general guarantees every pre-school age child a place in a high-quality, low-cost childcare setting regardless of the family income.

The laissez-faire approach that is prevalent in the US and the UK relies on the notion that having children is a private decision. The possible career break effects and the resulting lower income, according to this view, should be factored into the decision to have children. On the other hand, both private and social economic gains can be expected from governmental intervention in the childcare market. Bergstrom and Blomquist (1996) state that the differences in the public policy configurations regarding childcare are due to the political climate of the country. In other words, the Nordic countries, according to their argument, are more willing to accept a system of high taxes and redistribution than the US and the UK.

There are two main justifications for the government to intervene in the childcare market according to the basic principles of welfare economics. The first concerns inefficient resource allocation and argues that the government should intervene to correct any imperfections that prevent the childcare market from working efficiently and maximizing consumer welfare. Market failures in the demand for childcare services include information failures or imperfections in capital markets. In the former case, families fail to gauge the financial losses of career breaks and/or perceive the benefits of formal childcare. In the latter case, the cost of childcare might, in the short run, be greater than the immediate returns from employment. Hence, the laissez-faire approach to the childcare markets might be improved by correcting some of the imperfections by intervention as long as the benefits to society exceed the private benefits to parents.

The second justification for government intervention in the childcare market concerns inequality. The distributional issues in childcare use, for example, the equality of opportunity in society provides a strong argument for government intervention in the childcare market. This argument regarding inequality has two parts. First, there may exist inequality in the mothers' ability to participate in the labour force compared to women with no children or school age children. Second, intervention in the childcare market may be required to aid children to get an equal starting point in life regardless of the household financial status (see, for example, Duncan and Giles, 1996 or Carneiro and Heckman, 2003 for further details). In general the Nordic countries have less child poverty, a smaller gender wage gap and more similarity in the educational outcomes between different socio-economic groups (see, for example, the PISA 2000 study by OECD) than, for example, the US or the UK.

Previous research indicates that there are large differences in the private returns on remaining employed between the interventionist and the laissez-faire approach. Gornick et al. (1998) find results that demonstrate a strong association between policy configurations regarding parental leave and childcare and the employment patterns of mothers. Out of the 14 industrialised countries analysed, wage penalties for mothers are the greatest in countries with the least-developed public policies for supporting the employment of mothers with young children, namely, the US, Australia, and the UK. These arguments point to the possibility that the outcomes of the free childcare market may have distributional implications that the society would prefer to avoid. Duncan and Giles (1996) further note that through examining the reasons why the government would want to subsidise childcare helps in understanding which type of public policy might be desirable. Universal subsidies may result in high private and social returns, however, they are in general costly to the government and hence the tax-payers and, additionally, result in large dead-weight losses. In the end, the ideal balance in terms of economic efficiency is found by weighing both the private returns and the social returns and finding the balance between the extremes of the public intervention approach and laissez-faire approach to the childcare markets.

The Nordic countries are characterised by low level of monetary support for families compared to the other European countries as found by Kurjenoja (2001), who compares the level of monetary support for children in 10 European countries. However, this low level of direct monetary support for pre-school age children is compensated by publicly provided childcare. Since the universal public provision of childcare prevalent in the Nordic countries is designed to provide every pre-school age child a low-cost care place regardless of the family's ability or willingness to pay for the care, there is potential for large deadweight losses for the economy as a whole. Publicly provided private goods such as childcare are closely related to labour supply

and hence government tax revenue. It is possible that public subsidies for childcare “pay for themselves” by inducing higher labour force participation of mothers who then pay taxes that are more than sufficient to pay for the cost of the subsidies.

The direction of the labour supply response to childcare subsidies is not clear. The subsidies increase the returns to every hour of paid employment thereby improving the incentives for individuals to increase paid employment (the substitution effect) but they also reduce the number of hours of paid employment necessary to achieve a given material standard of living or the number of hours of childcare (the income effect). On the producer side, the supply side effects of childcare subsidies include the promotion of additional supply of childcare places depending on market conditions, for example, the consumers’ willingness to pay for care and existing competition from other providers and the barriers to entry. The impact of childcare subsidies on the demand and the supply side regarding the quality of childcare is unclear as outlined earlier. The difficulty in measuring the quality of childcare may speak in favour of the interventionist approach to childcare provision rather than the free market approach due to problems of moral hazard and adverse selection (for discussion see Akerlof, 1970).

Studies examining the impact of monetary support find a positive effect on the employment probabilities for both single (Berger and Black, 1992) and married mothers (Powell, 2002). Subsidies targeted at formal care and unconditional childcare subsidies were found to have the greatest potential in terms of increasing employment. Furthermore, Leibowitz et al. (1992) find that greater monetary support for childcare increases early return to work after childbirth in the US. For the UK, Forth et al. (1997) find that family friendly working arrangements (for example, increased flexibility in childcare arrangements or a workplace crèche) have a positive influence on the rate of women’s return to work after childbearing.

Lehrer (1983, 1989), for the US, finds that unless subsidies to formal care are means-tested they may result in benefits that mostly accrue to high-income families. However, in Sweden the large public childcare provision is found to encourage the labour market activity of mothers of young children regardless of the spouse’s income (Bloom and Steen, 1990 and Gustafsson and Stafford, 1992). The difference between the Swedish and the US experience also reflects the issues of availability and affordability of childcare but also, to a certain extent, the differences in the quality of childcare (real or perceived) available in the interventionist versus the laissez-faire childcare markets.

Childcare subsidies in general can be designed to encourage employment or to enhance the quality of childcare. These goals are generally in conflict: policies that encourage employment would allow parents flexibility in the choice of the quality of childcare and policies that are most likely to encourage the use of high-quality childcare would not impose employment requirements. Blau (2001) believes that the main problem with the childcare market in the US is low quality. Hence childcare subsidies with an employment prerequisite are likely to worsen the childcare problem by increasing the use of low quality care.

The summary position would seem to be that most of the externality arguments in favour of childcare subsidies are, in fact, limited in scope. It is not the case that parents or society have no interest in pre-school childcare, nor education in general. Instead it is an issue of access to, and affordability of, early childhood care and education. This is less an issue of market failure as an impetus for government subsidy and instead an argument that appeals to distributional concerns as outlined. Given limited resources distributional concerns, and given the educational impact of early investment outlined in Section 2 of this report, a prioritisation of early investment, particularly amongst ‘at risk’ families, to give an equal start to educational and life development, would appear appropriate.

3.3.9 Recouping Costs Through Labour Market Behaviour

Given the material above the case for a subsidy in early childcare provision appears strong but less for the more popular arguments in relation to this issue (affordability, access) and more for distributional grounds. The detailed examination of that issue is beyond the scope of this paper and indeed beyond the scope of data available for Ireland. Duncan and Giles (1996) simulated the impact of a number of policy options in the UK, namely:

- childcare disregards in the family credit system (deducting childcare costs up to £40 per week from income before being means tested for key benefits);
- childcare vouchers (either an allowance of £10 per week for each child under 5 in the family irrespective of use for childcare, OR the same benefit which can only be paid when being used for childcare, or finally a variant of the benefit which only pays when other potential carers are working outside the home to focus the benefit on those in work)
- full subsidy of all childcare costs effectively reducing costs to zero (variants include restriction of the subsidy to three and four year olds, or restriction to low net income families)
- tax relief for childcare against income tax, with the relief capped at £50 per week and at standard rates and only when both partners in a couple were taxpayers (with the relief paid only to the woman).

The focus of Duncan and Giles (1996) is a labour supply effect which generates the cost/benefit effect. The results show that for these modest benefits it is extremely unlikely that the policy can pay for itself directly. The reasons for this relate to dead weight costs - the subsidy almost invariably gets spent on mothers who would have returned to work anyway, and those that would not return to work also receive the subsidy. Childcare disregards had the most benign outcome but only because the policy is so restrictive that only a fraction of mothers benefit. The more broad the subsidy – such as unconditional allowances – then the greater the expense with little additional benefit (measured, it must be reiterated, by tax and welfare benefit redistributions from changes in female labour supply). This to economists is unsurprising – a broad and universal benefit such as a full childcare subsidy will provide income irrespective of childcare need for employment choices and therefore provide a direct – and negative – income effect.

Governments can limit schemes in some way and trade off some of the cost-benefit imbalances but this is not without costs. Schemes which focus on restricting the subsidy to those that work – such as the earnings disregard or tax relief – do maximize the benefit of labour supply (since anyone who remains outside of employment does not receive any subsidy) but in distributional terms this is less attractive as those that are in employment already are in general better off than those out of employment.

The schemes simulated by Duncan and Giles (1996) can be compared with specific government policy in the UK. Interestingly the approach takes two directions – a specific policy to increase in-work benefits to encourage labour supply specifically but also a childcare voucher system. As noted by Duncan and Giles (1996) this is a ‘very different animal’. Vouchers of close to €2000 per annum are provided to parents of four year olds for spending on a place in the private or state sector. Parents using the private sector will receive up to the full subsidy but the provider must be validated by the government and this voucher covers costs of 5 sessions or 12.5 hours per week. State or local authority provided places are costless but capacity constrained thus the voucher increases the choice set to parents (bringing the private sector into this domain) and where state places exist the voucher can be used but the state withdraws the capitation grant from the provider. The parent in effect exchanges the voucher for a place that would have been free of charge, but the choice is empowered and the quality controlled.

Short term effects of such a policy are almost fully dead-weight. Those in the state sector are unaffected. Those in the private sector have a windfall gain and for some the transfer of funds could provide an income effect and an incentive to reduce hours. Similarly the private provider could incorporate the voucher value into pricing reducing some of its impact. In the longer term the private market may adjust to the increased resources and increase choice but fundamentally it seems unlikely that such a policy would ever escape from the dead weight problems and therefore the distributional impact is limited. In other words a childcare voucher is likely to channel funds towards those for which, as Duncan and Giles (1996) note, the case is weakest.

4. COST BENEFIT MODELLING OF ECCE PROVISION

4.1 Introduction

Effectively extending free public education seems a laudable aim for the policymaker justified by the recognition that, without such a public-sector investment, educational costs would be prohibitive for many families and the investment in pre-school would be less than optimal (DeLong, Goldin, and Katz, 2003). The private returns to additional schooling (e.g., in the form of higher earnings) may be a sufficient motivator to obtain further schooling. However, when the social returns exceed the private returns, individuals may stop short of investing in the socially optimal level of education if they bear the full costs. In the absence of public subsidies, many families would not have sufficient resources to invest in their children's education, and capital markets do not support families in borrowing against higher future earnings to finance education costs today, creating a market failure.

Some families may not make investments in their own children's education consistent with their long-term interests, and children themselves, especially as they mature, may not comply with their parents' wishes for more schooling. For all these reasons, public-sector investments in primary education and even higher education, are justified as a critical investment in human capital with long-term benefits at the individual and societal levels. Notably, the investment made at the primary level is a universal benefit available to all children, regardless of the ability of their families to finance the educational investment privately. Investing in a universal preschool programme can be considered in the context of this public-sector commitment to investing in education.

4.2 School Provision Models

Preschool education is increasingly the normative experience of 4-year olds in the United States, and to a lesser extent, of 3-year-olds as well. As of 2001, 43 percent of U.S. 3-year-olds and 66 percent of 4-year-olds were enrolled in some form of preschool programme. These percentages are three times as high for 3-year-olds and twice as high for 4-year-olds as they were in 1970. Enrollment rates are subject to large variations across groups of children, depending on race/ethnicity, family income, parental education, and other factors. For example, enrollment rates are lowest for Hispanic children, and lower for families with incomes below poverty compared with families at the top of the income scale. One of the sharpest contrasts is by mothers' education, with just 38 percent of 3- to 5-year-olds whose mothers have less than a high school education enrolled in early education programmes compared with 70 percent of those whose mothers have at least a college degree.

Preschool education is funded through the federal government, state and local governments, and private sources. The federal government supports preschool education targeted to disadvantaged children primarily through the Head Start programme, which serves about 900,000 3- and 4-year-olds annually. Thirty-eight states provide further funding for another 700,000 children, primarily 4-year-olds. All but two of those target their funding to disadvantaged children. Only Georgia and Oklahoma have preschool programmes available to all 4-year-olds whose families choose to enroll them, but other states and localities are aiming for universal programmes in the future.

The state preschool programmes vary considerably in quality and per-child spending. Twelve of the thirty-eight states with programmes met fewer than five of the ten research-based quality standards identified by the National Institute on Early Education Research (NIEER). For example, only about half of the state programmes (20 out of 38) require the lead classroom teacher to have a bachelor's degree, a requirement in every state kindergarten programme. California does not meet this standard, nor does it meet five of the other ten standards.

4.3 School Provision Models – Key Choices

4.3.1 Universal Versus Targeted

The strongest evidence for the benefits of high-quality preschool education comes from studies of programmes that targeted disadvantaged children. While the features used to target participants have varied, programmes such as Perry both served children at significant risk of school failure. Likewise, benefit-cost analyses of preschool programmes are typically based on such targeted programmes. The high returns often cited are based on programmes that served disadvantaged children and generated large impacts that translate into substantial economic returns for every dollar invested.

A universal programme could be expected to have smaller impacts than those measured in targeted programme. A universal programme would be available to more-advantaged children, as well as children already attending private preschool programmes. Thus, the marginal benefit of providing a publicly funded preschool programme is likely to be smaller than what would be expected from providing the same programme to more-disadvantaged children not in preschool.

The higher expected returns from implementing a targeted programme does imply investing public funds in a targeted preschool programme (Heckman and Masterov, 2004) such as Head Start. There are administrative costs associated with targeting that must be accounted for when making this comparison. Programmes designed to serve children based on their family's characteristics require eligibility rules. Since family circumstances often change (e.g., fluctuations in income, employment status, family size, headship status), children may fall in and out of eligibility over time. Second, a targeted program may discourage participation among the targeted population because of a negative stigma attached to such programs or confusion over eligibility rules. Third, any targeting rules are likely to be inefficient in that some children who may benefit from a high-quality preschool experience will be excluded from eligibility. This targeting inefficiency occurs when it cannot be determined with precision, based on observed characteristics at a given point in time, who is likely to benefit most from a preschool program.

In contrast, a universal program does not require a bureaucratic infrastructure to determine who is and who is not eligible. There is no stigma attached since all children and families are eligible and since children are more likely to be served in economically integrated programs. There is no concern about targeting inefficiency since all children who could potentially benefit the most will be eligible to participate. Proponents also argue that a program that serves all children is more likely to receive strong political support from families across the spectrum of socioeconomic status and such a program may be more likely to be funded at the level required for high quality (Barnett, Brown, and Shore, 2004).

4.3.2 Preschool Quality

Would less emphasis on features associated with high-quality result in less benefit reduction than the money it saves? As noted by Bigelow et al (2005) the research base does not allow us to determine the likely changes in the benefits of preschool education from altering these program features. There are no experimental evaluations that compare the long-term outcomes for preschool programs that use varying staff-child ratios or different levels of teacher qualifications. Instead, the features of a high-quality programme have been inferred from those features shared by programmes that have demonstrated long term impacts.

Implementing a preschool programme with these features associated with high quality will be more costly than one that deviates by such changes as lowering teacher qualifications or increasing the group size and the number of children per staff member.

5. A Cost Benefit Model of an ECCE Programme in Ireland

5.1 Overview

The aim of this section is to infer a set of potential benefits from a one year high quality preschool programme in Ireland converted into monetary terms. Methodology as set out by Karoly and Bigelow (2005), for a similar exercise with respect to California, is closely followed. Programme benefits for a targeted Chicago-based programme are adjusted for a universal programme, whereby a lower level of benefit is expected to accrue to lower-risk children.

Children are categorised as high, medium or low risk based on income, with 25% 20% and 55% respectively in each category. The level of benefit assumed to accrue to each risk category is a 100% for the high risk, 50% for the medium risk and 25% for the low risk. From these figures a percentage level of benefit to Ireland is deemed to equate to 49% of the comparison (Chicago based) programme. Applying these assumptions facilitates the calculation of estimated impacts for an Irish single-year cohort of 4 year old participating in universal preschool.

A possible limitation with this method is that a high risk child in the US may not equate to a high risk child in Ireland where it is expected that other welfare benefits to disadvantaged families in Ireland might ameliorate some of the disadvantage for high risk children in particular, and thereby result in a reduction of the potential benefit of a preschool programme. To incorporate this limitation into the cost-benefit analysis is difficult, however utilising data on welfare spending from the OECD we make some attempt to adjust for this. Irelands spending with respect to two welfare spending indicators, income support for those of a working age as a percentage of GDP and percentage of government transfers to the lowest three income deciles of those of a working age, are shown to be twice that of the US (OECD Data). This suggests an appropriate reduction in level of benefit might be in the region of 50%. Admittedly this method is somewhat crude; however it does go somewhat towards accounting for the reduced level of benefit expected in Ireland due to better welfare supports. The estimates incorporating this 'welfare adjustment' are a more conservative version of the original, as described earlier. The benefit-cost ratio for government to now falls, below 1, to 0.63. However overall, for government, society and participants, the benefits still substantially exceed costs with a benefit cost ratio of 4.61. (Please see Table 5.3 for a comparison of more and less conservative models)

Outline of Assumptions*

1. Baseline Model

1.1	Baseline of no preschool			
1.2	Universal Provision-noncompulsory			
1.3	Years of preschool per child	1 year		
1.4	Participation Rate	70%		
1.5	Proportion of population categorised as high, medium or low risk (respectively)	25%	20%	55%
1.6	Distribution of Benefits of Preschool between high, medium and low risk	100%	50%	25%
1.7	Irish Benefit as a percentage of Comparison Study benefit	49%		

Explanatory Notes:

- 1.1 It is assumed that there is no existing preschool. This is deemed valid where existing provision for preschool is services low or non-existent. Reliable statistics on this issue are limited, however is suggested by the OECD that approximately 10% to 15% of children between 0-3 are in half or fullday publicly subsidised services. (OECD Thematic Review of Early Childhood Education and Care Policy in Ireland, 2004)
- 1.2 While a program targeted at disadvantaged children would expect higher returns per euro invested as benefits are greater for 'at-risk' children, the disadvantages of a targeted program are as follows:
 - a) Administrative costs of determining eligibility and addressing changes in eligibility over time
 - b) Stigma associated with participation
 - c) Unavoidability of missing children who could benefit but either do not meet criteria or are confused about eligibility rules
 - d) Political support may be stronger for programmes available to all children and therefore funding for high quality provision is more likely(The Economics of Investing in Universal Preschool Education in California, Karoly & Bigelow, 2005)
- 1.3 Evidence suggests a smaller benefits in the second year than that gained in the first or a higher per euro return for a 1 year program. This suggests where resources are limited that is best to serve a greater number of children for 1 year than a lesser number of children for two. (The Economics of Investing in Universal Preschool Education in California, Karoly & Bigelow, 2005)
- 1.4 As participation is non-compulsory a participation rate of 70% is assumed
- 1.5 The population is divided into high, medium and low risk based on income. This is because evidence shows that preschool benefits are highest for those with lower income and lowest for those with highest incomes.
- 1.6 Given assumption 1.5, it assumed that depending on your level of risk you will receive a certain percentage of 'benefit' from the preschool program. Those in high risk category will receive the most 'benefit' (100%) those in low risk category will receive less 'benefit' (25%). See now assumption 1.7.
- 1.7 So what do we mean by 'benefit'? This analysis uses an existing 'comparison' study that examines and quantifies the 'benefits' of quality preschool on specific indicators/variables with respect to an existing targeted preschool program. Adjusting these 'benefits' for the fact that the proposed Irish program is universal and not targeted, the Irish 'benefit' represents 49% of the 'benefit' as quantified by the existing comparison program.

Notes:

*Less conservative: adjusted for universal provision only.

5.2 Key Choices

Universal versus targeted: Investment returns from targeted preschool programme are expected to be greater than that for a universal programme. This is because the impact is higher for higher risk children. However universal programs have certain advantages. Administrative costs determining eligibility are avoided, as is the potential for stigma associated with participation in a targeted programme. No child who might benefit is excluded either because they do not quite meet the criteria or because there is confusion regarding eligibility. Indeed political support is often stronger for programs available to all children, this may be instrumental in guaranteeing the required level of funding for a high quality programme (Karoly & Bigelow, 2005)

One year or two: Also, evidence for US literature suggests that there are smaller benefits for second year of preschool than benefits gained in the first. In short, there is a higher return on investment for one year than for two. If resources are limited therefore it is better to serve a higher number of children for one year than a lower number for two (Karoly & Bigelow, 2005)

Quality: Finally the difference in long-term benefits between high and lower quality preschool programs is unclear. The latter for example refers to cuts back on features such as teacher qualifications etc. It is expected that benefits would be less for a lower quality Programme, by how much though is unknown (Karoly & Bigelow, 2005).

5.3 Cost Benefit Model for an Irish Pre-School Programme

To evaluate the costs and benefits of a universal preschool programme we must make assumptions about the key features of such a programme. Ideally, these features would be associated with a high quality preschool programme that is universally available to all age-eligible children. Relevant features would include eligibility criteria and the age(s) of children

served, the programme intensity in terms of the hours of services delivered, and characteristics associated with high-quality programmes (e.g., the class size, child-staff ratio, and teacher qualifications). The benefit-cost analysis expresses benefits and costs in common units (euro) inflated (or deflated) to a common base year and discounted to the year 2003 - this is the present value of benefits (costs). The benefit-cost ratio is the ratio of total benefit to total cost.

While the usefulness of benefit-cost analysis cannot be denied, some limitations are worthy of note. Some benefits either may not be measured in the comparison study evaluation or are difficult to cost. In addition this type of analysis only considers benefits and costs in the aggregate. From an equity perspective this is not always desirable, for example, some decision makers may place more weight on benefits to more disadvantaged children. Benefit-cost analysis weights benefits equally for children, regardless of their levels of advantage (Karoly and Bigelow, 2005).

	Source of Costs or Benefits	Government	Society	Participants	Total Ireland
Measured	Program Costs	-2831	0	0	-2831
	Program Benefits				
	Educational Outcomes				
	Grade retention	204	0	0	204
	Special education	1574	0	0	1574
	Educational attainment	-437	0	0	-437
Projected	Juvenile Crime				
	Reduced prosecutions (minimum savings)	391	0	0	391
	Reduced victim costs		benefit		
	Value of childcare				
	Value of childcare for families	0	0	6057	6057
	Labour force earnings				
	Net earnings	0	0	10481	10481
	Tax revenues	2096	0	0	2096
	College Education				
	Increased college attendance	-281	0	-31	-312
Adult crime	Reduced prosecutions		benefit		
	Reduced victim costs		benefit		
	Total Benefits	3546 benefits		16507	20053
Net Benefits		716 benefits		16507	17222
Benefit-Cost Ratio (€/€1) total benefits/total costs		1.25			7.08
Notes:					
* Less conservative model adjusted for universal provision only					
a) All amounts are per child in 2003 euro and are the present value amounts over time where future values are discounted to age 3 of participating child					
b) Program costs refer to current expenditure in a 'steady state'.					
c) Value of childcare for families is the number of hours of childcare per year multiplied by the minimum wage. The aim is to yield a benefit to participating families for the time they now have to work or other activities					

Table 5.2: Present Value Costs and Benefits for Universal Preschool in Ireland in the Baseline Model (in euro per child and euro per cohort of 4 year olds*)**

Source of Costs or Benefits	Euro per child	Euro per cohort (millions)
Program Costs	-2831	-136
Program Benefits		
Education outcomes (measured)	1341	64
*Juvenile crime outcomes (measured)	391	19
Value of childcare (measured)	6057	290
Total Measured Benefits	7789	373
College Attendance (projected)	-312	-15
Labour market earnings (projected)	12577	603
**Adult crime (projected)	0	
Total Projected Benefits	12265	588
Total Benefits	20053	962
Total Net Benefits	17222	826
Benefit-Cost Ratio (€/€1)	7.1	7.1
Notes:		
*Not included- benefits from reduced victim costs		
**Not included-benefit from reduced adult crime and reduced victim costs		
***Less conservative: adjusted for universal provision only		
Euro per cohort assume a cohort of 68500 with a participation rate of 70%		

Table 5.3: Alternate assumptions: The benefit-cost analysis under alternate assumptions

Benefits/costs accrue-	Program costs- current expenditure only			
	Less conservative		More conservative	
	In Total (Euro per child)	To Government	In Total (Euro per child)	To Government
Program Costs	-2831	-2831	-2831	-2831
Program Benefits				
Education outcomes (measured)	1341	1341	670	670
*Juvenile crime outcomes (measured)	391	391	195	195
Value of childcare (measured)	6057	0	6057	0
Total Measured Benefits	7789	1731	6923	866
College Attendance (projected)	-312	-281	-156	-141
Labour market earnings (projected)	12577	2096	6288	1048
**Adult crime (projected)	0		0	
Total Projected Benefits	12265	1815	6132	908
Total Benefits	20053	3546	13055	1773
Total Net Benefits	17222	716	10224	-1057
Benefit-Cost Ratio (€/€1)	7.1	1.25	4.6	0.63
Notes:				
*Not included- benefits from reduced victim costs				
**Not included-benefit from reduced adult crime and reduced victim costs				
Euro per cohort assume a cohort of 68500 with a participation rate of 70%				
Less conservative: adjusted for universal provision				
More conservative: adjusted for universal provision and other welfare supports				

5.4 Estimating Benefits

Benefits and costs are expressed in 2003 euro terms. A brief summary and explanation of benefits (costs) are as follows:

- **Educational Outcomes:** Savings are identified for savings due to a reduction in grade repetition and decrease in years of special education (see Table 5.4 with estimates and sources for unit cost of a years primary school, for example). Increased costs due to increased years of education attainment are accounted for. Also, an increase in leaving certificate completion rates facilitates the projection of increased third level costs.
- **Justice system:** The savings to government from a reduction in juvenile crime is estimated. A concomitant reduction victim crime costs are acknowledged as a 'benefits' but are difficult to estimate in monetary terms. The same is true of both expected adult crime reduction & adult crime victim costs. This is a conservative estimate and is in fact the minimum expected benefit.
- **Labour Force Earnings & Taxes:** The lifetime earnings differential between those with and without leaving certificate completion is calculated using Living in Ireland survey data on mean annual earnings by education and age. This also allows the calculation of difference in tax revenue accruing to government.
- **Value of childcare for families:** The time children spend in school is valued at the minimum wage, this benefit amounts to time participating families now have available for work or other activities.
- The total benefits are understated to some extent, this is due both to the difficulties associated with including some recognised benefits and to the use of conservative estimates of benefits for more difficult calculations (such as that for the justice system). Other intangible benefits worth noting include potential health benefits as higher levels of education result in health improvements over their life course; the relationship between health and years of schooling is well-established. Potential benefits in the form of indirect benefits such as labour force and macro-economic benefits (increased productivity and competitiveness) are also worth noting.

Table 5.4: Estimates & Sources for Valuing Preschool Benefits (Costs)

	Impact	Unit cost (2003-euros)	Age Applied	Unit Cost Source
Source of Benefits (Costs)				
Measured				
Grade Repetition- Reduction (%)	0.08	4361		19 Average annual cost of primary education per child Statistics, Dept. of Education
Special Education- Reduction (%)	0.34	6018		12 1.38 of average annual cost of primary education per child (Kardoy & Biglow, 2005)
Educational Attainment-Increase (years)	0.16	4361		19 Average annual cost of primary education per child Statistics, Dept. of Education
Juvenile Crime- Reduction (%)	0.20	2,972		18 Minimum estimated savings (Irish Prison Service Annual Report 2003, Dept. of Education Statistics on Juvenile Detention Centres, An Garda Síochána Annual Report 2003, Irish Times 12/03/05 Scottish Executive: Working with persistent juvenile offenders)
Value of Child Care (annual hours)	840.00	7.65		4 Minimum wage by annual hours of preschool care
Projected				
College Attendance-Increase	0.05	9456		Impact & Unit Source Impact source Secondary School Completions with an average of 1.5 years post secondary education. (Kardoy & Biglow, 2005) Unit source Average annual cost of thirdlevel education per child Statistics, Dept. of Education Plus 10% for participant costs (Kardoy & Biglow, 2005)
Labour Force Earnings & Taxes on earnings				Lifetime earnings differential for those with and without leaving certificate (Living in Ireland Survey) Expressed as benefits per participating child
Taxes on Earnings				20% of Lifetime earnings differential Expressed as benefits per participating child
Explanatory notes:				
IMPACT: refers to the estimated impact in years or percentage of an Irish preschool program				
UNIT COST: refers to the cost per unit costs and benefits, for example, one year of primary education or one referral/prosecution to the juvenile justice system.				
UNIT COST SOURCE: refers to source of data used for the unit cost.				
AGE APPLIED: refers to the age at which a benefit or cost accrues, this accounts for the fact that the further in the future a euro accrues the less valuable it is. This is referred to as discounting and the rate is 3%.				

5.5 Estimating Costs in Euro Terms

The calculation of costs closely follows the methodology incorporated by Karoly and Bigelow (2005) in their Cost-Benefit Analysis of a Universal Preschool Programme. Assumptions are made regarding day length, weeks per year, classroom space required, instructional and administrative staff required and salaries (see Table 5.5). Based on these assumptions, estimated steady state current expenditure per participating child in euro per year is estimated to be €2831.⁴ Expenditure including capital costs is calculated as percentage of salary cost and is derived from occupancy costs over a 30 years period, it is estimated as €4119 euro per child per year.

In substituting this for current expenditure, the benefit-ratio for government falls below one. However overall, the benefit-cost ratio, for government, society and participants remains above

⁴ The cost of primary school education per child per year is €4361. Multiplying the cost of preschool per child per year by 2 (two children receive half-day schooling in preschool) equals €5662, this facilitates a comparison of the costs of full-day equivalents for preschool and primary. It is expected that the cost of preschool per two children (full-day equivalent) would be roughly similar to the cost of primary school per child, but due to economies scale it is also expected that the cost of preschool per two children (full-day equivalent) will be somewhat greater than the cost of primary per child. This is the case.

three for both more and less conservative baselines. In short, the overall economic returns (under more and less conservative assumptions) are such that gains outweigh costs. This leads to the conclusion that investment in early childhood education can result in long-term payoffs for government, society and participants.

Table 5.5: Outline of Assumptions

2.Preschool Costs	
2.1 Hours per day per child participating	3.5
2.2 Two sessions/classes of 3.5 hours per day	
2.3 Class size	20
2.4 Teachers per class of 20	1
2.5 Teaching Assistants per class of 20	1.3333
2.6 Director per 120 students	0.15
2.7 Accountant/Bookkeeper per 120 Students	0.15
2.8 Education Specialist per 120 Students	0.15
2.9 Enrollment Specialist per 120 Students	0.15
2.10 Other non-personnel & capital costs as a percentage of salary costs	31%

Explanatory Notes:

This cost analysis follows closely the cost analysis carried out by Karoly & Bigelow, 2005

2.1 The number of high quality preschool hours per child per day is 3.5 hours. A 'wrap around' service providing extended-day care, financed from other sources, could also be made available

2.2 Two sessions per day per teacher and classroom are provided

2.5 One teacher and one teaching assistant per classroom, one 'roaming' teaching assistant for every three teacher/teaching assistant combination.

2.6, 2.7, 2.8, 2.9 Administrative staff for each 120 students consists of 0.15 full-time equivalent cost.

2.10 Non-personnel cost are assumed to equal 31% of total costs.
 29% relate to capital costs spread out over 30 years
 2% relate costs for equipment and supplies
 Some adjustments are also made to account for distribution of other expenses with respect to Irish system, i.e departmental expenses, grants and subsidies.

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