

Investing in Early Childhood Education: A Global Perspective
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Introduction

The last several decades have seen growing global interest in the potential for public investments in early childhood care and education (ECCE) to improve the development of young children, especially those from socially disadvantaged groups (Choi 2004; Kirp 2007; Nores, 2010; OECD 2006). This interest is based on evidence of the importance of environmental influences on early cognitive and social development, the human and economic costs of poor developmental trajectories for children in poverty, and the potential for early interventions to alter those developmental trajectories (Barnett 2008a; Cunha et al. 2006; Engle et al. 2007; Engle et al. 2011; Herrod 2007). The body of research establishing the importance of investing in education in the first five years of life has grown substantially in recent years providing a basis for optimism, but also cautions regarding the specific circumstances under which high economic returns can be produced in practice on a large scale (Choi 2004; Engle et al. 2011; Nores & Barnett 2010; OECD 2006).

Research from the United States on the importance of early environment for cognitive development goes back to the 1930s, and research indicating that intensive, high-quality ECCE has direct and persistent effects on cognitive, social, and emotional development dates from the 1960s (Barnett, 2008b; Blau & Currie 2005; Camilli et al. 2010; Heckman & Masterov 2007). Randomized trials find short- and long-term effects on intelligence, subject matter knowledge and skills, pro-social and anti-social behaviors, executive functions, delinquency, crime, and mental health including depression. As discussed below, here are clear economic consequences of these long-term effects including increased earnings in the labor force for the children participating in these programs and, in some cases, their mothers. These randomized trials have studies a wide range of ECCE interventions including part-day preschool at ages 3 and 4, full-day educationally rich child care from the first year of life five, and home visitation with parents beginning prenatally.

Outside of the United States, studies in countries spanning the entire range of economic development have also revealed positive impacts of ECCE on learning and development. Substantial positive effects have been found for cognitive development, school success and achievement, health, and social behavior (Engle, et al 2011, Nores & Barnett 2010). These impacts are long-term as well as short-term and demonstrate remarkable consistency with each other and with the evidence from the United States across very different social and policy contexts. There is some evidence that investments in early childhood development that directly provide ECCE to children are more effective for improving cognition and schooling outcomes than those that solely focus on nutrition or health or that provide cash transfers to families (Nores & Barnett 2010).

While there is increasing agreement about the value of public investments in ECCE in general, there is less agreement about the most effective and efficient programs and policies. Effects are likely to vary to some extent with the children and families served, program practices, and the

broader social and policy context despite the evidence that effects are fairly robust with respect to variations in these circumstances. Sorting out variations in outcomes (and economic returns) with variations in population, program, and context requires cross study comparisons and systematic planned variation studies. However, few studies have been conducted specifically to provide such information, and many of the studies that have been conducted have focused on either highly intensive models or relatively weak, low-cost programs with less attention to high-quality large scale programs (Agüero et al. 2006; Engle et al. 2007; Nores & Barnett 2010). A key limitation of existing research is that little empirical information is available to assess the hypothesis that earlier investments within the first five years of life are more productive than those at ages three to five.

There is more research on the mechanisms through which lasting effects are produced that contributes to knowledge of what works, but policy and practice must still be informed as much by theory as evidence. Suggested pathways to adult economic outcomes include snow-balling effects of early success on motivation and effort, effects on meta-cognitive abilities and executive function, and lasting impacts of family responses to children's early performance (Raizada & Kishiyama 2010). Multiple pathways clearly are implicated, but the best way to influence these pathways is still a matter for research (Barnett et al. 2008; Diamond et al. 2007; Reynolds & Ou 2011). The bottom line is that we must be modest about the extent to which research can inform policy and practice with respect to details and emphasize the need for ongoing monitoring and evaluation to ensure that programs produce the desired benefits.

Research estimating the economic returns to early childhood interventions is rare among studies outside the United States (Nores and Barnett, 2010). Several studies have found positive impacts of ECCE on maternal employment and on children's subsequent adult earnings. For low and middle-income countries, Engle et al. (2011) estimate that increasing pre-K enrolments from 25 to 50 percent would have a benefit-to-cost ratio between 6 and 17 to one based solely on earnings increases due to increased educational success. Benefit-cost analyses in the United States have estimated the economic benefits from a multiplicity of ECCE effects in addition to earnings. These include reduced inefficiencies in the provision of education through lower rates of failure and grade repetition, reduced need for expensive special education services, reduced costs of support for indigents, reduced crime and criminal justice systems costs, and reduced health care costs. Estimated benefit-cost ratios in the U.S. range from 2:1 to 16:1 (Karoly, et al, 2005). The U.S. results together with research on program impacts from elsewhere indicate that estimates of economic returns based solely on earnings benefits could omit the majority of economic benefits.

In addition to studies that explicitly estimate economic returns, a substantial number of studies estimate the magnitudes of the various effects of ECCE that underlie benefit estimates. This much larger body of evidence is critical for understanding the economics of ECCE. It helps to also assess the question of differences in return by types of programs and between high- and middle- or low-income countries. These studies also provide a basis for recommendations regarding how to design programs and policies that will replicate the results of smaller scale efforts and produce substantial economic returns to society on a large scale across a wide range of contexts.

Economics of ECCE

From an economic perspective, the primary rationale for public investments in ECCE (rather than private) is found in the large externalities associated with private investments in ECCE, as evidenced by the literature. Externalities are benefits that accrue to society (social benefits) beyond those captured by the child and family. Private benefits include increased school success and educational attainment, improved health, and increased after-tax earnings. Examples of social benefits related to ECCE are decreased costs of public education, improved classroom climate and learning from peers (because some children are better behaved, and children learn from each other), decreased health care costs, reduced crime and violence, increased tax revenues, increased economic growth due to productivity enhancements, and the value of decreased social and economic inequalities. Some of these social benefits depend on the extent to which government introduces differences between private and social benefits due to taxation and provision of education, health, and social services. Others occur regardless of government policy. Also providing a rationale for public investment are: incomplete altruism when parents act for their children, difficulties parents have discerning quality differences in ECCE, and the greater risk associated with any individual parental investment in children compared to societal investments. All of these lead to less than optimal private investment in ECCE. Much like investments in infrastructure for public health (such as clean water and malaria/tuberculosis eradication), the externalities associated with early childhood programs are large.

One externality that economists sometimes neglect is the value of decreased inequalities. This is one benefit from ECCE as an element of a poverty eradication strategy. ECCE programs tend to produce larger benefits for economically disadvantaged children and families. In addition, to the direct value of decreased inequality to a nation's citizens, decreased inequality can contribute to greater social cohesion and economic stability. In addition, there are financial benefits to the public from a decreased need to provide assistance to families in poverty. Although ECCE alone will not completely eliminate poverty even over several generations, it can be one element of a broader strategy for improving current incomes and the income of future generations for disadvantaged populations.

Benefits of ECCE

As mentioned earlier, an international body of evidence finds that high quality ECCE improves children's cognitive and social development, immediately and long-term (Barnett 2011; Blau & Currie 2005; Boocock 1995; Engle et al. 2007; Heckman & Masterov 2007). Much of the evidence is from U.S. studies, but there is a substantial global research base including rigorous randomized trials, some with long-term follow-up (Kagiticbasi et al. 2009; Nahar et al. 2012; Raine et al. 2003; Walker et al. 2006). The evidence of positive effects from high quality ECCE is remarkably consistent regardless of context, taking into account that quality of ECCE must be judged relative to conditions in the home (Barnett 2008b; Burger 2010). Meta-analyses by Camilli et al. (2010) and by Nores and Barnett (2010) provide quantitative summaries of the evidence.

Studies of the effects of ECCE on maternal employment are mixed. Most studies find positive effects on maternal employment, though the estimated magnitude varies considerably across

studies (Lefebvre et al. 2011; Paes de Barros et al. 2011; Ruhm 2011). A few studies do not find positive effects, and the extent to which increased public investments may lead to a switch from informal or privately paid child care to other forms of child care that are publicly subsidized without increasing maternal employment is debated (Havnes and Mogstad 2009; Ruhm 2011). Certainly this possibility must be considered in designing ECCE policies to have whatever effects on maternal employment are intended. Differences in outcomes across studies seem likely to be influenced by differences in family structure, local labor market conditions, government family policies more generally, and the design of public child care policy.

U.S. Studies

Camilli and colleagues analyze the results from 123 U.S. studies conducted since 1960 in which at least one year of ECCE was provided prior to age 5. The authors find average effect sizes of about .50sd on cognitive development at age five, and long-term effect sizes on cognitive development of about .20sd. When limiting the analyses to better designed ECCE programs, they find initial effect sizes on cognition as high as .90sd with long-term effect sizes approaching .50sd. The study also finds that intentional teaching and individualization are ECCE program features associated with larger gains. The decline in cognitive effects over time is a consistent finding in the U.S. literature (Gorey 2001; McKey et al. 1985; Nelson et al. 2003; White & Casto 1985).

The “fade-out” of initial cognitive gains is sometimes interpreted to mean that ECCE has no meaningful persistent cognitive benefits. If the initial benefits are quite small, as is the case for ECCE of low educational quality, this is likely true. However, as erosion of cognitive effects after children leave ECCE is only partial, ECCE that produces large initial gains can have substantial permanent impacts (Barnett 2011). As a rule of thumb, effects about half the size of initial effects should be expected to continue throughout the school years and into adulthood (Camilli et al. 2010). Some of the “weakening” in cognitive effects found in the literature appears to be the consequence of greater compensatory efforts by public schools for children who did not benefit from high quality ECCE (Barnett, 2011). This partial offset of the initial gains from ECCE by later compensatory efforts for children who did not attend high-quality ECCE is, in fact, what accounts for much of the education cost savings documented by benefit-cost analyses.

In the social and emotional domain, estimated effects have been somewhat smaller, but still average about 0.33 sd (Camilli et al. 2010; White & Casto 1985). One explanation for smaller average effects in this domain may be that many of the studied ECCE programs were not designed to enhance social and emotional development. Randomized trials addressing this question indicate that alternative curricula can have similar effects on cognitive development while having very different effects on social and emotional development (Schweinhart & Weikart 1997; Barnett et al. 2007). It appears that the specific approach to teaching and learning matters for social and emotional development at least as much as for cognitive development. This need not involve any tradeoff across these domains, however, as balanced approaches can succeed in enhancing cognitive and socio-emotional development equally well.

In addition to the cognitive and socio-emotional child development dimensions, studies have sometimes evaluated the effects of ECCE on children's later educational progress, which has implications for the cost of education. Various studies provide evidence of effects on school success into the elementary school years and beyond (Aos et al. 2004; Barnett 2008b; Karoly et al. 2005). Recent meta-analyses show significant lasting effects on classroom behavior, grade repetition, special education placement, and high school graduation (Aos et al., 2004; Camilli et al. 2010). Estimated effects on school success are modest, in the neighborhood of 0.15sd.

Finally, some U.S. studies find small positive effects of large scale ECCE programs on children, including a few that find negative effects for subsidized child care (Barnett 2008b; Herbst & Tekin 2010; U.S. Department of Health and Human Services 2010; Vandell et al. 2010). These findings are consistent with the findings of the meta-analyses and other studies regarding the program characteristics associated with strong positive outcomes. Moderate quality is associated with modest positive short-term effects and small positive long-term effects. Low quality has no positive effects and has been found to have small negative effects.

Broader International Evidence

Overall, international evidence on ECCE is highly consistent with the evidence from the United States (Burger 2010; Engle et al. 2007; Schady 2006; Vargas-Baron 2009; Vegas & Santibañez 2010). Engle et al. (2011) and Baker-Henningham and Lopez-Boo (2010) find positive impacts in a wide range of lower income countries across all aspects of child development including health. In high income countries, positive long-term effects include increased cognitive abilities and educational achievement, and increased adult earnings (Anders et al. 2012; Burger 2010; Dumas & LeFranc 2010; Felfe & Lalive 2010; Havnes & Mogstad 2011; Sylva et al. 2011). Null or negative effects are found in higher-income countries where quality of ECCE is relatively low (Gupta & Simonsen 2011; Sylva et al. 2011). Some studies find larger effects for disadvantaged and migrant children in higher income countries (Burger 2010; Esping-Andersen et al. 2012).

In a meta-analysis of studies in both higher and lower income countries, Nores and Barnett (2010) find average effects of comparable size to those in U.S. studies across multiple domains. ECCE effect sizes were on average 0.35sd for cognition, 0.27 for social development, 0.23 for health and 0.41 for schooling outcomes. Average effect sizes across all types of outcomes were 0.26sd for lower income countries versus 0.32sd for higher income countries. This does not imply that ECCE has smaller effects in lower income countries as this comparison does not equate for quality of ECCE across studies or for outcome domains. Effects of ECCE are larger for schooling and cognition, which are more likely to be the outcomes measured in higher income countries.

Further Details for Key Studies

The strongest demonstration of the economic benefits of ECCE is provided by randomized trials with broad measures of outcomes and very long-term follow-up. These seminal studies have stimulated both public policy changes and additional research. They also provide scaffolding for the interpretation of results from other studies, helping to knit together studies that are limited in

duration (perhaps a single point of follow-up) or measure only one or two benefits. In the United States these include the Perry Preschool Project, the Carolina Abecedarian Program, the Infant Health and Development Program, the Milwaukee Project, and studies of the national Early Head Start and Head Start programs (Barnett, 2008a). Noteworthy studies from other countries include the Jamaican study of psychosocial stimulation, Mauritius Preschool Study and Turkish Early Enrichment Project. Although these studies demonstrate what is possible, a common limitation is that they are small scale and not subject to implementation problems that plague public policy in “real life.” The knowledge base is further enhanced by studies that depend on statistical controls, but provide evidence on the impacts of ECCE when provided a very large scale as a matter of public policy (Barnett 2008b; Burger 2011; Engle et al. 2011; Havnes & Mogstad 2011).

Among the ECCE studies mentioned above, the Perry Preschool study probably is the most widely reported. Participants were economically disadvantaged 3- and 4-year-olds randomly assigned to treatment and control groups in the early 1960s. The intervention group attended a 2 ½ hour per day, intensive educational program with highly qualified teachers in small classes for up to two years. The 123 low-income children in the study have been followed through age 40 (Barnett 2000; Schweinhart et al. 2005). Positive effects on cognitive test scores were observed from ages 3 through 27. Also, the intervention group evidenced better classroom and personal behavior, lower youth misconduct and crime, fewer special education years, and a higher rate of on-time high school graduation. Adult outcomes include increased earnings, decreased welfare dependency, reduced arrests and decreases in risky behavior that could lead to poorer health outcomes (Schweinhart et al. 2005; Belfield et al. 2006).

A second well-known randomized trial is the Abecedarian study which followed 111 children through age 30 (Campbell et al. 2012). In this study children from economically disadvantaged families were randomized at birth. The treatment group attended center-based, educational child care for a full work day, year-round through the age of five. Positive effects were observed on IQ and on reading and math achievement in the short and long-term. Children who attended the program had lower rates of grade retention and special education and increased rates of higher education attainment. Positive effects were also found for health-related behaviors and for symptoms of depression (Barnett & Masse 2007; Campbell et al. 2012).

Also well-known is a longitudinal study of the Chicago Child-Parent Centers, which provided part-day early education through the public schools to disadvantaged children on a large scale (Reynolds 2000; Temple & Reynolds 2007). Effects were estimated by comparisons to children in similar neighborhoods where the program was not available (Reynolds et al. 2011). Although providing less certainty than a randomized trial that no bias has entered into the estimates, it measures the effects of a program under more typical conditions and at a cost consistent with public schooling in the United States generally. The pattern of effects is remarkably similar to those in the Perry and Abecedarian studies, though effects tend to be somewhat smaller. In addition to increased test scores there were reductions in grade repetition and special education as well as increases in high school completion and decreases in arrest rates.

Two other studies that demonstrate what can be accomplished in lower income countries stand out. A small scale randomized trial in Mauritius compared high-quality ECCE at ages 3 to

5 with typical ECCE of minimal quality and found positive early cognitive effects and reductions in later conduct disorders (Raine et al. 2003). The most malnourished children benefited most. In Jamaica, a small scale randomized trial of cognitive stimulation and nutritional supplements from 9 to 24 months found long-term increases in cognitive abilities, higher levels of educational attainment and decreased rates of depression and violence (Walker et al. 2011). These long-term effects in Jamaica were attributable to stimulation only and not to nutritional supplementation. A preliminary report finds large increases in earnings as a result of the Jamaican program in a 20 year follow-up (Gertler et al. 2012).

Other studies of large scale ECCE policy implementation outside the United States provide evidence that similar benefits can be obtained from public ECCE initiatives. In Argentina expansion of preschool education increased school participation, achievement, self-control (e.g., attention and behavior) and maternal labor supply through third grade (Berlinski & Galiani 2007; Berlinski et al. 2008). In Uruguay, preschool education increased educational attainment and decreased dropout rates (Berlinski et al. 2007). Studies in high income countries indicate that quality of the ECCE services provided by government matter. In the U.K. a study of more than 3000 children found that higher quality ECCE was associated with larger gains in achievement and social behavior at least through age 11 (Sylva et al. 2011). In Canada, a study of universal child care of minimal quality in Quebec found strong effects on maternal labor supply, but negative consequences for child development (Baker et al. 2008).

Returns to early childhood interventions

Relatively few studies have calculated the economic value of the benefits from ECCE. As described above, few studies have comprehensively assessed all of the benefits from ECCE, a prerequisite for a full accounting of benefits. The studies that do provide comprehensive estimates of benefits provide a solid core of evidence. Further support derives from additional studies that estimate the monetary value of either increased maternal earnings or increased adult earnings of the children who participated in ECCE. As we have discussed earlier, this economic evidence is then best interpreted in the context of the larger body of evidence regarding the effects on children and parents that underlie by economic benefits.

Three of the U.S. studies discussed in detail above provide cost-benefit analyses through adulthood. The costs of the two model programs are quite high relative to the costs of ECCE programs that have actually been implemented by governments in the United States, reflecting their greater intensity. The cost of the Chicago program is similar to that of the stronger state initiatives and the federal Head Start program (though Head Start is required to provide many additional social services and spends much less in the classroom). Returns for these three programs have been estimated between \$16 dollars and \$2.5 dollars per dollar invested, with the two half-day preschool programs both returning benefits an order of magnitude higher than their costs (Barnett & Masse 2007; Belfield et al. 2006; Temple & Reynolds 2007).

Engle and colleagues (2011) estimated economic returns from earnings increases produced by ECCE in middle and low income countries to be between 6:1 and 18:1. Their estimate leaves out most of the potential economic return, if we extrapolate from the three U.S. studies. Policy makers should recognize that even the more comprehensive benefit-cost analyses do not take

into account all benefits. Some externalities are difficult or impossible to measure from current studies. Benefits that have been observed but not included in the dollar value of benefits include reductions in substance abuse and mental illness and lower child mortality (Karoly 2012). In addition, the intergenerational links between earnings and education are strong (Bowles et al. 2005). Barnett and Belfield (2006) find strong evidence in favor of positive educational and earning effects on subsequent generations, although the size of these effects is elusive. Finally, the value to a nation from decreased inequalities whether from the intangible value to all citizens or from increased political stability has never been estimated.

Also not to be neglected is the potential impact of ECCE on gender equality and the well-being of women. Barnett and Masse found evidence of effects on long-term earnings of mothers in the one U.S. randomized trial where ECCE provided full day care over many years. In addition, Nores (2010) highlights the potential for increased school participation and educational attainment of older female siblings in lower income countries as a result of publicly supported child care. The considerable variation in estimates of maternal labor force response to free or reduced cost child care leads to wide variation in the financial benefits (Ruhm 2011). In some circumstances, the costs of publicly provided child care can exceed the value of increased maternal earnings (Clavet & Duclos 2011; Paes de Barros et al. 2011). However, it should be remembered that ECCE impacts on employment are only one potential benefit, and a well-designed ECCE program will benefit child development, as well (Havnes & Mogstad 2010).

How ECCE Program Design Matters

Differences in ECCE service design affect the types and magnitudes of outcomes, and as a consequence, the economic returns. Camilli and colleagues (2010) found that when ECCE emphasized intentional teaching, individualization and small group instruction effects on cognition were larger. Provision of comprehensive services was associated with smaller effects. In the U.S. context, the negative association with comprehensive services may reflect efforts to do too much with too little. They did not find significant associations between effect sizes and age at start, duration, or whether the intervention targeted economically disadvantaged children. However, most studies focused on disadvantaged children so this was not a strong test of differences in effects by economic background of the children served. Reynolds and Temple (2007) also find that the U.S. evidence does not support claims of higher economic returns from programs that begin before age three. Looking at studies mostly from low and moderate income countries, Nores and Barnett (2010) found that ECCE providing education and nutrition had larger effects on cognition and school success than other types of early interventions, including nutritional supplementation alone.

Three recent reviews conclude that intensity, quality, and support for continuous improvement are critical for the success of ECCE programs (Baker-Henningham & Lopez-Boo 2010; Engle et al. 2011; Pianta et al. 2009). Important aspects of quality include curriculum, training and professional development, and monitoring and supervision. As the quality differential between an ECCE intervention and the environment parents can otherwise provide is likely to be larger for disadvantaged children, it follows that disadvantaged children are likely to obtain the largest benefits (Esping-Anderson et al. 2012; Gupta & Simonsen 2010). This principle also can account for differences in the contribution of nutritional components across studies.

One of the greatest threats to replicating the results of demonstration programs is that large scale ECCE may often be of insufficient quality. Frede (1998) highlights specific ECCE teaching practices and program features found in studies where programs produced large gains for children. These include reflective teaching practices, intensity and continuity, strong emphasis on language development, and a school-like discourse pattern including initiation-reply-evaluation sequences and categorization among other things. These features are consistent with those identified by meta-analysis and broader reviews (Camilli et al. 2010; Pianta et al. 2009). The information provided by research does not provide a complete and detailed guide to how to design and implement a program that produces high returns. The best guidance may be to follow a program that has proven effective as closely as possible, and where departures from proven practice occur to evaluate these carefully.

Unfortunately, there are many reasons that public ECCE programs may fail even if they are designed optimally. There is a great temptation to allocate too little funding to implement the program as designed or to modify the design so that it is less costly without attending to impacts on effectiveness. Even with adequate resources the public sector may fail to adequately implement ECCE programs. Implementation failure can be due to political corruption or other malfeasance as well as a lack of oversight or poor incentives for performance. At a minimum there must be financial controls and other monitoring of program implementation to ensure that ECCE programs actually receive the resources allocated, teachers teach, and children attend. Beyond this it is advisable to add to the monitoring and accountability system a continuous improvement system that provides data on the quality of implementation and key outcomes so that progress can be assessed (Pianta et al. 2009; Frede, 2012). This information can then be fed back into efforts to improve practice over time, both with respect to improving teacher practices, and with respect to program design features that have large effects on cost (e.g., teacher qualifications and group size), but for which optimal specifications for each specific country are unknown.

Conclusions

Public investments in high-quality ECCE can yield high economic rates of return. These returns may be highest when programs provide for both the educational needs of children and child care needs of parents. In contexts where child care needs are already met for most parents through other private or public options, the primary advantage of new public investments will be from improvements in child development. Even where there are substantial benefits from increased parental employment, policy makers should give strong consideration to the potential benefits to children. The economic value of the child development gains from quality ECCE is large relative to care benefits for parents, and poor quality ECCE may even harm children's development. Well-designed policies avoid harm and produce benefits.

From a societal perspective, large scale public investments in ECCE are warranted on purely economic grounds. In addition, ECCE investments can reduce economic inequalities across society and reduce gender inequalities within families. High returns are possible in lower income as well as higher income nations. Judging from the estimated earnings returns, it is possible that returns are highest in low income countries, just as they are higher for disadvantaged children within higher

income countries. Returns will be particularly high where there are low rates of maternal labor force participation due to lack of access to child care and high rates social problems due to inadequate child development that contributes to primary and secondary school repetition and dropout, risky behaviors that adversely affect health, violence and crime, and low productivity in the work force. Public investments in ECCE are not a luxury to be enjoyed only by higher income countries. For lower income countries they can be a key part of an economic investment strategy that boosts a country's income and reduces the costs of government while also helping to attract additional investors, both domestic and international. Public investments in effective, high-quality ECCE contribute to economic growth through improvements in workforce quality, political stability, and public safety.

We recognize that there is still much to be learned about the precise ECCE policy and program designs that yield the greatest returns. Optimal design depends on local context and needs of the population to be served. However, few nations seem to risk overestimating the desirable level of ECCE quality, while many risk erring in the opposite direction. Given the uncertainties, and the many ways in which implementation may fail, evaluation of the impacts of ECCE programs policy on program quality, child development, and maternal employment is essential. Such evaluations should not be thought of as one-time studies, but as on-going systems used to monitor and fine-tune policy and practice from the local level on up to the national.

Obviously, there is much that additional research could help policy makers learn about the design of optimal policies. Among the most important is how early in life public investments in ECCE outside the home should begin. Although such unanswered questions are important, they should not delay policy makers from investing in ECCE policies and programs about which much is already known. Some may find it useful to phase-in increased public investment in ECCE by gradually moving downward from primary school entry. At the same time, very early interventions beginning with improvements in the child's prenatal environment and continuing thereafter are strongly supported by research on brain development, particularly when there is severe malnourishment without intervention. As beginning at either end can have high returns, it is more important to start well than where one chooses to start. Policy makers should avoid the temptation to try to do too much with too little and focus on what can be done well with high returns.

Sound economic policy that supports economic growth is especially in low to moderate income countries. The long time required for child development gains to translate into economic growth can make other policies that appear to produce faster results seem more attractive. However, rapid economic growth often leads to increased inequality. Well-designed ECCE policies present policy makers with an opportunity to increase economic growth and at the same time reduce inequality. This makes investment in ECCE an important component of a larger economic strategy that produces more balanced and, therefore, more sustainable growth. Moreover, public investments in ECCE also can generate short-term economic gains as well, when there is potential for substantial increases in parents' labor force participation. Such gains can offset much of the cost until the longer term gains begin to accrue. And, societies should never forget that benefits to children will be immediately seen by parents as morbidity and mortality decline, and abilities and behaviors improve. As a result, parents will be the earliest and strongest supporters of successful ECCE policies once they have been launched.

References

- Agüero, J., Carter, M. and Woolard, I. 2006. The Impact of Unconditional Cash Transfers on Nutrition: The South African Child Support Grant. Unpublished manuscript, University of California at Riverside.
- Aos, S., Lieb, R., Mayfield, J., Miller, M., and Pennucci, A. 2004. Benefits and costs of prevention and early intervention programs for youth. Olympia, WA: Washington State Institute for Public Policy.
- Anders, Y., Rossbach, H. G., Weinert, S., Ebert, S., Kuger, S., Lehrl, S., and von Maurice, J. 2012. Home and preschool learning environments and their relations to the development of early numeracy skills. *Early Childhood Research Quarterly*, 27, 231-244.
- Baker, M., Gruber, J., and Milligan, K. 2008. Universal child care, maternal labor supply, and family well-being. *Journal of Political Economy*, 116(4), 709-745.
- Baker-Henningham, H. and Lopez-Boo, F. 2010. Early childhood stimulation interventions in developing countries: A comprehensive literature review. Washington, DC: Inter-American Development Bank.
- Barnett, W. S. 2000. Economics of Early Childhood Intervention. *Handbook of Early Childhood Intervention*, 2, 589-610.
- Barnett, W. S. Summer, 2008a. Why governments should invest in early education. *CESifo-DICE report, Journal for Institutional Comparisons, Early Childhood Education and Care*, 6(2), 9-14.
- Barnett, W. S. 2008b. Preschool Education and its Lasting Effects: Research and Policy Implications: Education and Public Interest Center and Education Policy Research Unit.
- Barnett, W. S. 2011. Effectiveness of early educational intervention. *Science*, 333(6045), 975-978.
- Barnett, W. S., and Belfield, C. R. 2006. Early Childhood Development and Social Mobility. *The Future of Children*, 1(2), 73-98.
- Barnett, W. S., and Masse, L. N. 2007. Early childhood program design and economic returns: Comparative benefit-cost analysis of the Abecedarian program and policy implications. *Economics of Education Review*, 26, 113-125.
- Barnett, W. S., Jung, K., Yarosz, D.J., Thomas, J., Hornbeck, A., Stechuk, R., and Burns, S. 2008. Educational effectiveness of the Tools of the Mind curriculum: a randomized trial. *Early Childhood Research Quarterly*, 23, 299-313.
- Belfield, C. R., Nores, M., Barnett, W. S., and Schweinhart, L. J. 2006. The High/Scope Perry Preschool Program: Cost-Benefit Analysis Using Data from the Age-40 Follow-Up. *Journal of Human Resources*, Winter.
- Berlinski, S., and Galiani, S. 2007. The effect of a large expansion of pre-primary school facilities on preschool attendance and maternal employment. *Labour Economics*, 14(3), 665-680.
- Berlinski, S., Galiani, S., and Gertler, P. 2008. The effect of preprimary education on primary school performance. *Journal of Public Economics*. 93, 219-234.
- Berlinski, S., Galiani, S., and Manacorda, M. 2008. Giving children a better start: Preschool attendance and school-age profiles. *Journal of Public Economics*, 92(5), 1416-1440.
- Blau, D. M., and Currie, J. 2005. Preschool, Day Care, and Afterschool Care: Who's Minding the Kids? In F. Welch and E. A. Hanushek (Eds.), *The Handbook of Economics of Education* (pp. 1163-1267). New York: North Holland.

- Bowles, S., Gintis, H. and Osborne Groves, M. (Eds) 2005. *Unequal Chances: Family Background and Economic Success*. Princeton, NJ: Princeton University Press.
- Burger, K. 2010. How does early childhood care and education affect cognitive development? An international review of the effects of early interventions for children from different social backgrounds. *Early Childhood Research Quarterly*, 25, 140-165.
- Campbell, F. A., Pungello, E. P., Burchinal, M., Kainz, K., Pan, Y., Wasik, B. H., Barbarin, O. A., Sparling, J. J., and Ramey, C. T. 2012. Adult outcomes as a function of an early childhood educational program: An Abecedarian Project follow-up. *Developmental Psychology*, 48(4), 1033-1043.
- Camilli, G., Vargas, S., Ryan, S., and Barnett, W. S. 2010. Meta-analysis of the effects of early education interventions on cognitive and social development. *The Teachers College Record*, 112(3).
- Choi, S. 2004. Access, public investment, and equity in ECCE: The nexus in nine high-population countries. UNESCO Policy Brief on Early Childhood, No. 19. Retrieved, June 6, 2009 from <http://unesdoc.unesco.org/images/0013/001374/137408e.pdf>
- Clavet, N. J. and Duclos, J. Y. 2011. Impact of child care support on female labor supply, family income, and public finance. Quebec: Universite Laval, CIRPEE.
- Cunha, F., Heckman, J. J., Lochner, L., and Masterov, D. V. 2006. Interpreting the evidence on life cycle skill formation. *Handbook of the Economics of Education*, 1, 697-812.
- Diamond, A., Barnett, W. S., Thomas, J., and Munro, S. 2007. Preschool program improves cognitive control. *Science*, 318(5855), 1387.
- Dumas C. and Lefranc, A. 2010. Early schooling and later outcomes: Evidence from preschool extension in France. THEMA Working Paper 2010-07. Université de Cergy-Pontoise.
- Engle, P. L., Black, M. M., Behrman, J. R., Cabral de Mello, M., Gertler, P. J., Kapiriri, L., et al. 2007. Strategies to avoid the loss of developmental potential in more than 200 million children in the developing world. *The Lancet*, 369(9557), 229-242.
- Engle, P.L, Fernald, L.C.H., Alderman, H., Behrman, J., O’Gara, C., Yousafzai, A., Cabral de Mello, M., Hidrobo, M., Ulkuer, N., Ertem, I., Iltus, S., and the Global Development Steering group. 2011. Strategies for reducing inequalities and improving developmental outcomes for young children in low-income and middle-income countries. *The Lancet*, 37, 1339-1353.
- Esping-Andersen, G., Garfinkel, I, Wne_jui, H., Magnuson, K., Wagner, S., and Waldfogel, J. 2012. Child care and school performance in Denmark and the United States. *Children and Youth Services Review*, 34, 576-589.
- Felfe, C. and Lalive, R. 2010. How does early child care affect child development? Learning from the children of German unification. St. Gallen: University of St. Gallen.
- Frede, E. C. 1998. Preschool program quality in programs for children in poverty. *Early care and education for children in poverty*, 77-98.
- Frede, E. C. 2008. Quality in early childhood care and education: implementing data-based systems to drive improvement in the real world.
- Gertler, P., Zanolini, A., Pinto, R., Heckman, J., Walker, S., Vermeersch, C., Chang, S., and Grantham-McGregor, S. 2012. Labor market returns to early childhood stimulation: A 20-year follow-up to the Jamaica study.
- Gorey, K. M. 2001. Early childhood education: A meta-analytic affirmation of the short- and long-term benefits of educational opportunity. *School Psychology Quarterly*, 16 (1), 9-30.

- Gupta, N.D. and Simonsen, M. 2010. Non-cognitive child outcomes and universal high quality child care. *Journal of Public Economics*, 94, 30-43.
- Havnes, T. and Mogstad, M. 2009. Money for nothing? Universal child care and maternal employment. IZA Discussion Paper 4504. Bonn: Institute for the Study of Labor.
- Havnes, T. and Mogstad, M. 2011. No Child Left Behind: Subsidized Child Care and Children's Long-Run Outcomes. *American Economic Journal: Economic Policy*, 3(2): 97–129.
- Heckman, J. J., and Masterov, D. V. 2007. The Productivity Argument for Investing in Young Children. Massachusetts: National Bureau of Economic Research Cambridge.
- Herbst, C. M. and Tekin, E., 2010. Child care subsidies and child development, *Economics of Education Review*, 29, 618-638.
- Herrod, H. G. 2007. Do first years really last a lifetime? *Clinical pediatrics*, 46(3), 199.
- Kagitcibasi, C., Sunar, D. Bekman, S., Baydar, N., and Cemalcilar, Z. 2010. Continuing effects of early enrichment in adult life: The Turkish Early Enrichment Project 22 years later, *Journal of Applied Developmental Psychology*, 30, 764-779.
- Karoly, L.A. 2012. Toward Standardization of Benefit-Cost Analysis of Early Childhood Interventions, *Journal of Benefit-Cost Analysis*, 3 (1).
- Karoly, L.A., Kilburn, M.R., and Cannon, J.S. 2005. Early childhood interventions: Proven results, future promise, MG-341. Santa Monica, CA: The RAND Corporation.
- Kirp, D. L. 2007. The sandbox investment: The preschool movement and kids-first politics. Boston, MA: Harvard University Press.
- Lefebvre, P., Merrigan, P. and Roy-Desrosiers, F. 2011. Quebec's Childcare Universal Low Fees Policy 10 Years After: Effects, Costs and Benefits', working paper 11-01, Montréal: Centre Interuniversitaire sur le Risque les Politiques Économiques et l'Emploi. http://www.cirpee.org/fileadmin/documents/Cahiers_2011/CIRPEE11-01.pdf
- McKey, R.H., Condelli, L., Ganson, H., Barrett, B.J., McConkey, C., and Planz, M.C. 1985. The impact of Head Start on children, families, and communities. Washington, DC: Head Start Evaluation Synthesis and Utilization Project.
- Nahar, B., Hossain, M., Hamadani, J., Ahmed, T., Huda, S., Grantham-McGregor, S., and Persson, L. 2012. *European Journal of Clinical Nutrition*, 66, 701-709.
- Nelson, G., Westhues, A., and MacLeod, J. 2003. A meta-analysis of longitudinal research on preschool prevention programs for children. *Prevention and Treatment*, 6, 1-34.
- NICHD Early Child Care Research Network. 2002. Early child care and children's development prior to school entry: results from the NICHD study of early child care. *American Educational Research Journal*, 133-164.
- Nores, M. 2010. The Economics of Early Childhood Education. In D.J. Brewer, and McEwan, P. J., ed. (2010). *Economics of Education*. Amsterdam: Elsevier.
- Nores, M., and Barnett, W. S. 2010. Benefits of early childhood interventions across the world:(Under) Investing in the very young. *Economics of Education Review*, 29(2), 271–282.
- Paes de Barros, R., Olinto, P., Lunde, T., and Carvalho, M. 2011. The impact of accesss to free child care on women's labor market outcomes: Evidence from a randomized trial in low-income neighborhoods of Rio de Janiero. Paper prepared for the 2011 World Bank Economists' Forum.
- Pianta, R. C., Barnett, W. S., Burchinal, M., and Thornburg, K. (2009). The effects of preschool education: What we know, how public policy is or is not aligned with

- the evidence base, and what we need to know. *Psychological Science in the Public Interest*, 10(2), 49-88.
- Raine, A., Mellingen, K., Liu, J., Venables, P., and Mednick, S. A. 2003. Effects of Environmental Enrichment at Ages 3-5 Years on Schizotypal Personality and Antisocial Behavior at Ages 17 and 23 Years. *American journal of psychiatry*, 160(9), 1627-1635.
- Raizada, R. D. S., and Kishiyama, M. M. 2010. Effects of socioeconomic status on brain development, and how cognitive neuroscience may contribute to levelling the playing field. *Frontiers in Human Neuroscience*, 4(3).
- Reynolds, A. J. 2000. Success in early intervention: The Chicago Child-Parent Centers. Lincoln, NE: University of Nebraska Press.
- Reynolds A.J., and Ou, S.R. 2011. Paths of effects from preschool to adult well-being: a confirmatory analysis of the Child-Parent Center program. *Child Devevelopment*, 82(2), 555-582.
- Reynolds, A. J., and Temple, J. A. 2008. Cost-effective early childhood development programs from preschool to third grade. *Annu. Rev. Clin. Psychol.*, 4, 109-139.
- Reynolds, A. J., Temple, J. A., White, B. A. B., Ou, S. R., and Robertson, D. L. 2011. Age 26 Cost-Benefit Analysis of the Child-Parent Center Early Education Program. *Child Development*, 82(1), 379-404.
- Ruhm, C. J. 2011. Policies to assist parents with young children. *Future of Children*, 21, 37-68.
- Schady, N. R. 2006. Early Childhood Development in Latin America and the Caribbean. *Economia*, 6(2), 185-225.
- Schweinhart, L.J. and Weikart, D.P. 1997. The High/Scope preschool curriculum comparison study through age 23. *Early Childhood Research Quarterly*, 12(2), 117-143.
- Schweinhart, L.J., Montie, J., Xiang, Z., Barnett, W.S., Belfield, C.R., and Nores, M. 2005. Lifetime effects: The High/Scope Perry Preschool study through age 40. Ypsilanti, MI: High/Scope Press.
- Sylva, K., Melhuish, E., Sammons, P., Siraj-Blatchford, I., and Taggart, B. (2011). Pre-school quality and educational outcomes at age 11: Low quality has little benefit. *Journal of Early Childhood Research*, 9, 109-124.
- Temple, J.A. and Reynolds, A.J. 2007. Benefits and Costs of Investments in Preschool Education: Evidence from the Child-Parent Centers and Related Programs. *Economics of Education Review*, 126, 130-31.
- UNESCO. 2006. EFA global monitoring report. strong foundations: early childhood care and education. Paris: UNESCO.
- U.S. Department of Health and Human Services, Administration for Children and Families 2006. *Research to Practice: Preliminary Findings from the Early Head Start Prekindergarten Follow-Up, Early Head Start Research and Evaluation Project*. Washington, DC: Author.
- U.S. Department of Health and Human Services, Administration for Children and Families 2010. *Head Start Impact Study. Final report*. Washington, DC: Author.
- Vandell, D., Belsky, J., Burchinal, M., Steinberg, L., Vandergrift, N. and NICHD Early Child Care Network, 2010. *Child Development*, 81, 737-756.
- Vargas-Barón, E. 2009. Going to Scale: Early Childhood Development in Latin America. Designing successful and sustainable ECD programs with national-level coverage. Washington, D.C.: The RISE Institute.

- Vegas, E., and Santibañez, L. 2008. The Promise of Early Childhood Development in Latin America and the Caribbean. Issues and Policy Options to Realize It. Washington, DC: The World Bank.
- Walker, S. P., Chang, S. M., Powell, C. A., and Grantham-McGregor, S. M. 2005. Effects of Early Childhood Psychosocial Stimulation and Nutritional Supplementation on Cognition and Education in Growth-Stunted Jamaican Children: Prospective Cohort Study. *The Lancet*, 366(9499), 1804-1807.
- Walker, S. P., Chang, S. M., Powell, C. A., Simonoff, E., and Grantham-McGregor, S. M. 2006. Effects of Psychosocial Stimulation and Dietary Supplementation in Early Childhood on Psychosocial Functioning in Late Adolescence: Follow-up of Randomised Controlled Trial. *British Medical Journal*, 333(7566), 472.
- Walker S.P., Chang S.M., Vera-Hernandez, M., and Grantham-McGregor S. 2011. Early childhood stimulation benefits adult competence and reduces violent behavior. *Pediatrics*, 127, 849–857.
- White, K., and Casto, G. 1985. An integrative review of early intervention efficacy studies with at-risk children: Implications for the handicapped. *Analysis and Intervention in Developmental Disabilities*, 5, 7-31.