

Ready for Life.

A Socio-Economic Analysis of Early Childhood Education and Care



Ready for Life: A Socio-Economic Analysis of Early Childhood Education and Care Craig Alexander, Kip Beckman, Alicia Macdonald, Cory Renner, and Matthew Stewart

Preface

This report examines the role early childhood education (ECE) can have in reducing income inequality and boosting economic growth. Canada's current provision of ECE is compared with peer countries to highlight the strengths and weaknesses in Canada's approach. The cost and benefits of ECE investments are evaluated over a long time horizon. The impact of higher ECE on income inequality is also quantified.

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Ready for Life: A Socio-Economic Analysis of Early Childhood Education and Care

At a Glance

- This report explores the impact of early childhood education (ECE) on Canada's economy and highlights its potential to improve socio-economic outcomes.
- Expanding ECE in Canada would increase female labour market participation, improve child outcomes (especially for disadvantaged children), and reduce Canada's income inequality.
- By allowing more women to enter the labour force, the introduction of an expanded ECE program would result in about 23,000 families—many of them single-parent families—being lifted out of poverty.
- Given the substantial positive benefits to society and the economy, there is a strong case for expanding ECE services.

This report explores the impact of early childhood education (ECE) on the Canadian economy and highlights its potential to improve socio-economic outcomes, including the reduction of poverty and income inequality.

While Canada performs well on a host of social programs compared with other countries in the Organisation for Economic Co-operation and Development (OECD), especially the United States, the nation's performance in providing ECE programs is lacking in certain areas. There is compelling evidence that access to quality education should begin before most compulsory education programs are currently offered. An expansion in ECE would increase female labour market participation, improve child outcomes (particularly for disadvantaged children), and reduce inequality in Canada.

Past research suggests that widespread use of high-quality ECE programs not only benefits children and their parents but also has a sizable positive impact on the overall economy. Provision of ECE increases the participation rate of mothers in the workforce and results in long-term benefits for children. Children who attend effective ECE classes develop better human capital skills that potentially enable them to find better jobs and earn higher incomes than children who don't attend similar programs. These are important considerations given that the aging of the population is already leading to a shortage of skilled workers. Stronger skills are also needed to build the flexible and resilient workers of the future capable of coping with today's fast pace of technological change.

Given the evidence on the economic benefits of ECE—delivered either through kindergarten, pre-kindergarten, or licensed child care programs—Canada could benefit from greater investment and learn from global best practices. Canada does well in class sizes for young children, per student funding, an elevated level of education for preprimary instructors, and strong student outcomes as observed in science and math scores. Where Canada needs to improve is the child-tostaff ratios in kindergarten, the wages and training of early childhood Executive Summary | The Conference Board of Canada

We estimate that moving Canada to the OECD average for ECE provision would result in an additional 58,000 women entering the workforce. educators, and, most importantly, given ECE's strong correlation with future academic outcomes, the length of time that children have access to ECE.

We found that if Canada were to increase the enrolment rate for children aged 2 to 4 to the OECD average rate, an additional 134,000 children would have access to ECE programs. Moving to the average of the three countries with the highest enrolment rates would result in almost 400,000 more children attending ECE programming. By increasing the number of ECE spaces for children under the age of 5, Canada would increase the average duration that children attend ECE, resulting in numerous benefits. In addition to improvements in soft skills, such as self-regulation, social skills, and communication skills, a longer duration of ECE is linked to better future math scores, which have in turn been shown to result in higher future wages. As well, we estimate that moving Canada to the OECD average for ECE provision would result in an additional 58,000 women entering the workforce—a development that would bring significant benefits for the economy.

Evaluating the gains of higher maternal labour force participation and higher future wage earnings for children who receive ECE against the costs of funding the new spaces shows that the gains from an expansion of ECE outweigh the costs. Our cost-benefit analysis included four scenarios, with two different time frames and two different improvements in enrolment studied. While the results from the cost-benefit analyses differed, all showed that the benefits from expanding ECE outweighed the cost of the ECE expansion.

The economic benefits that accrue from ECE investments are not the only factor to consider when looking at expanding the provision of ECE. Other studies have shown that ECE can help reduce income and social inequalities because many of the benefits of ECE are realized by disadvantaged children and their families. Similar results were found in our analysis, since maternal employment makes a significant difference in the income distribution of families with young children. In 2015, 43 per cent of Canadian families with young children where the mother didn't work had family incomes below \$36,000—the low-income cut-off for a

family with two children—compared with just 12 per cent of families with young children where the mother worked.

Our analysis also showed that investments in ECE that bring mothers into the workforce would result in a more equitable distribution of family incomes. Income inequality for families with young children (as measured by the Gini coefficient) would drop 2.3 per cent—an impressive result given that the benefit affects only 0.5 per cent of census families (family units of more than one person). The numerical change may seem small, but it would have a meaningful impact on reducing income inequality for those affected positively. More importantly, about 23,000 families—many of them single-parent families—would be lifted out of poverty after the introduction of an expanded ECE program.

Given the substantial positive benefits to society and the economy, there is a strong case for expanding ECE services. In terms of longterm outcomes for children, the most important dimensions for policymakers to tackle are enrolment and the duration that children receive the programming. This is one of the areas where Canada falls well below OECD standards, and it is the key factor tied to a boost in future academic scores. However, beyond the impact on children, increased ECE provision will also have a significant impact on the economy through increased labour participation of women.

Some provinces are already offering full-day ECE programming through junior and senior kindergarten for children aged 4 and 5. The next step for these provinces should be to expand service provision to children age 3. However, other provinces and territories still require additional investments to make access to at least two years of ECE universal across the country. Ultimately, the goal for these regions would be to provide universal ECE coverage for children aged 3 once they have provided full-day programming to kindergarten students.

Ensuring all children aged 4 to 5 have universal access would therefore necessitate creating full-day kindergarten spots for 316,500 children—some who are currently in half-day programming and others who do not have access through the public school system. This expansion would cost an estimated \$2 billion in annual operating costs and \$1.8 billion in construction costs.

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Another 87,600 3-year-olds would need to be enrolled in programming to reach the OECD average of 69.9 per cent for this age group. If Canada were to expand ECE to reach the OECD average ECE enrolment rate of 69.9 per cent for 3-year-olds, an additional 87,600 children would need to be enrolled in programming at an additional cost of \$715 million in operating costs. If the government were to create a publicly funded program to increase enrolment to the OECD average, the total operating cost would be \$2.2 billion. The costs of this program would rise to \$3.2 billion if the program were to become universal.

While the costs of a government-funded ECE program are not insignificant, expanding early childhood education and care in Canada would provide sizable benefits. These include boosting the participation of women in the workforce, improving the educational outcomes for children (especially disadvantaged children), and reducing income inequality. Based on our analysis, the economic benefit derived from this investment would exceed the cost, and therefore further investments in ECE are recommended.

CHAPTER 1 Introduction

Chapter Summary

- Evidence continues to mount that access to quality education should begin before most compulsory education programs now begin.
- This report explores the impact of early childhood education (ECE) and how Canada's ECE compares with that of other countries.
- This report also quantifies the economic impact of improving Canada's performance on ECE and examines the impact of expanding ECE on income inequality.

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Canadians are often drawn to comparing themselves to their neighbours in the United States. On a host of social programs, Canada compares well, which can lead to a sense of complacency. For example, comparing the quality of public elementary and secondary school education available in the two countries gives Canada reason to be proud.

However, evidence is continuing to mount that access to quality education should begin before most compulsory education programs currently begin. And if we broaden the comparison of Canada's performance to peer countries other than the U.S., the country's performance in some areas is lacking.

In this research, we explore the impact of ECE, how Canada performs in ECE, and what improvements might mean for Canada's economy and the equality of its society. While some benefits, such as to the labour force participation of women, will accrue regardless of the type of programing—ECE or child care without an educational focus—when we refer to ECE, we are discussing curriculum-based programs that are attended on a regular basis and taught by trained educators, targeted at children before they enter Grade 1. This means all pre-primary school education programs, whether they are delivered through kindergarten, preschool, or licensed child care facilities that adopt a curriculum-based approach in their programming.

Chapter 2 of this report summarizes the findings of the literature on the impacts that ECE can have on an economy and society, including its impact on maternal labour force participation, benefits to children, and inequality. In Chapter 3, we take a snapshot of what ECE looks like in Canada, how Canada compares with other countries, and what type of potential gains are possible based on the literature review and the comparisons. Chapter 4 quantifies the economic impact of improving Canada's performance on ECE, while Chapter 5 examines the impact that expanding ECE would have on income inequality. Chapter 6 provides policy recommendations.

CHAPTER 2 The Impact of Early Childhood Education on Society and the Economy

Chapter Summary

- Evidence from the literature suggests that access to affordable, high-quality child care through programs such as ECE can boost maternal labour force participation rates, raising income and reducing income inequality.
- More widespread use of ECE programs could help address the issue of income inequality by improving educational opportunities for disadvantaged children.
- Some evidence suggests that children who attend ECE retain their academic advantage throughout life, leading to higher wages when they later enter the workforce.
- The cost-benefit analyses reviewed in this report show an overwhelmingly positive return on ECE investments.
- While the magnitude and type of benefits from ECE differ across studies, the bulk of the evidence suggests there are notable economic and societal gains from investing in ECE.

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There is an extensive body of literature discussing the benefits of ECE. Our research focuses on summarizing the observed impact of ECE programming in three areas: the impact on female labour force participation rates, the impact on children's future labour market success, and the impact on economic inequality and social conditions.

Additionally, this report reviews previous studies that have undertaken a cost-benefit analysis of ECE program investments. The detailed results of the review are in Appendix A, while this chapter highlights our main findings and conclusions from the literature.

The Impact on Female Labour Force Participation Rates

For many mothers, the absence of reliable and affordable daycare can be a barrier to entering the labour force. Some remain out of the labour force entirely, while others work part time. Many studies have attempted to discern the impact that affordable, high-quality child care can have on maternal labour force participation, as summarized on Table 1. The table reveals that the results are mixed concerning the effect of child care on participation rates; our literature review will examine in detail some of the differences in the research findings.

Table 1 Impact of Subsidized Daycare on Maternal Labour Supply

Author(s)	Date	Findings	
Fortin	2017	Introduction of subsidized daycare in Quebec increased female participation rate from 76 to 85 per cent between 1998 and 2014.	
Thévenon	2013	Higher enrolment in child care leads to more female employment on a full- and part-time basis.	
Havnes and Mogstad	2009	Subsidized daycare had no net effect on maternal labour supply in Norway.	
Cascio	2009	Subsidized daycare had no net effect on maternal labour supply of married mothers in the United States.	
Baker, Gruber, and Milligan	2008	Both the participation rate and the employment rate increased for women in Quebec.	
Lundin, Mörk, and Öckert	2008	Subsidized daycare had net effect on the maternal labour supply in Sweden.	
Lefebvre and Merrigan	2005	The participation rate for women with children aged 0 to 5 increased in Quebec.	

Source: The Conference Board of Canada.

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There seems to be a strong causal relationship between the creation of daycare spots and an increase in maternal labour force participation in Quebec. The introduction of a subsidized child care program in Quebec in 1997 provides a unique opportunity to assess the impact of better access to child care on maternal labour force participation. Researchers have been able to see how the labour force participation rate has changed in Quebec and how it has compared with other provinces where subsidized daycare hasn't been available. Economists have taken advantage of this opportunity and examined this case study in considerable detail.

Pierre Fortin, Michael Baker, and other economists have found that the availability of subsidized child care has provided an incentive for females in Quebec to join the workforce. Specifically, Fortin observed that between 1998 and 2016, the participation rate for females in the 20 to 44 age cohort increased from 76 to 85 per cent. In the rest of Canada, the participation rate only increased from 78 to 80 per cent.

Fortin and other economists took the analysis a step further by examining the impact of a higher female participation rate on the Quebec economy. The higher income in the province attributable to more women in the workforce generated greater spending and higher GDP than would have been the case without the rise in labour force participation. Both the provincial and federal governments collected more tax revenues as well.

While Fortin's work is used widely to illustrate the impact of child care on maternal labour force participation, there have been criticisms of his work. The Fraser Institute has criticized Fortin's analysis, specifically the claim that the subsidized daycare program in Quebec has helped boost the female participation rate and income. The Institute contends that the increase in Quebec mothers' labour force participation rate since 1997 hasn't been a result of the child care program because the participation rate also increased in Atlantic Canada, even though there wasn't a similar child care program available in this region. Fortin counters that argument by suggesting stronger economic growth in the Atlantic region was behind its increase in maternal labour force participation. Fortin's work has been corroborated by other studies, for example by Lefebvre and Merrigan and by Baker, Gruber, and Milligan who have also tied higher labour force participation rates in Quebec to the introduction of its daycare program, suggesting that the bulk of the evidence points to a strong causal relationship between the creation of daycare spots and an increase in maternal labour force participation in Quebec.

While the bulk of the research into the Quebec program found a positive impact on maternal labour force participation, other studies of programs in different countries did not reach the same conclusion as Fortin and others. Analysis of subsidized daycare programs in the U.S., Sweden, and Norway found that these programs crowded out other informal daycare programs and, consequently, that the net impact on overall female participation rates was negligible. However, a study by Thévenon found that access to child care was indeed one of the drivers of higher female employment across the 18 OECD countries studied in his analysis.

We contend that Fortin's analysis is very credible and that the bulk of the evidence in the literature suggests that the availability of subsidized daycare can lead to higher female labour force participation because it lowers the cost of working when governments provide financial support for families with young children. Indeed, if we look at the data for Canada, there is a gap between the labour force participation rates of women with young children and those with children aged 6 to 15 (when full-day school programs are available), reinforcing the conclusion that mothers with young children could benefit from programs that facilitate their participation in the labour force.

Income Inequality, Social Benefits, and ECE

High levels of income inequality have become the focus of increased debate in recent years. Work by the International Monetary Fund has summarized the many reasons why addressing income inequality is important, noting:

Inequality can be a signal of lack of income mobility and opportunity—a reflection of persistent disadvantage for particular segments of the society. Widening inequality also has significant implications for growth and macroeconomic stability, it can concentrate political and decision-making power in the hands Chapter 2 | The Conference Board of Canada

of a few, lead to a suboptimal use of human resources, cause investment-reducing political and economic instability and raise crisis risk.¹

If we look at the U.S., the wealthy have become even richer while the income of everyone else in the U.S. has either remained stagnant or declined. This problem is especially apparent in the U.S., but income inequality has also increased in Canada and Europe as well over the past few decades.

Given the growing and persistent issue of income inequality facing most developed countries around the world,² research has increasingly focused on policy measures that can help alleviate the problem. One of those potential solutions is improved access to ECE. (See Table 2.) More widespread use of ECE programs could help address the issue of growing income inequality by improving educational opportunities for disadvantaged children. Improvements in cognitive abilities, mathematical skills, and literacy enable these children to improve educational outcomes, reduce intergenerational poverty, and boost their earnings later in life. Furthermore, children's access to ECE can permit more low- and middle-income parents to enter the labour force, helping to reduce income inequality.

Table 2Social Benefits of Early Childhood Education

Date	Findings	
2017	Economically disadvantaged children and dual-language learners had greater learning improvements from preschool than more advantaged children did. However, evidence of long-term improvements is sparse.	
2016	ECE is important to future well-being, yet families at the top of the income distribution are able to afford ECE, whereas families in the bottom 10 per cent—where many First Nation families are found—are unable to afford private ECE. Sharp differences in school readiness exist for children in the top and bottom of the income distribution.	
2016	ECE helps reduce the risk of family and child poverty by allowing participation in paid work. Children from disadvantaged backgrounds are more likely to miss out on ECE.	
	Date 2017 2016	

(continued ...)

1 Dabla-Norris and others, "Causes and Consequences of Income Inequality," 5.

2 Developing countries are also dealing with income inequality, although it has diminished somewhat as a result of the rising middle class in countries like India. The reasons for income inequality in developing countries differ from those in mature economies in the West in that many of the problems are linked to the large size of the informal sector and the lack of education opportunities, especially for women.

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Table 2 (cont'd)Social Benefits of Early Childhood Education

Author(s)	Date 2015	Findings A study of the impact of Oklahoma's universal pre-kindergarten program on crime rates found that pre- kindergarten education resulted in African-American children being less likely to face criminal charges but had no impact on Caucasian children, suggesting it helped target higher-risk children.	
Smith			
Taggart and others	2015	A study of the impact of expanded ECE provision in the United Kingdom found that all children benefited from access to high-quality ECE, with disadvantaged children showing improvements in English and math scores as well as social behaviour development.	
Magnuson and Duncan	2016	ECE provides opportunities for higher long-run earnings, but 25 per cent of U.S. children don't attend preschool, and children from low-income families are least likely to attend ECE.	
Fitzpatrick	2008	A study of the universal pre-kindergarten program in Georgia found lasting academic achievements for children. Test scores for disadvantaged children living in rural areas increased by 12 per cent.	
Reynolds and others	2001	A study of the Chicago Child-Parent Centres (aimed at disadvantaged children) found beneficial results in delinquency, crime, and skill tests.	
Currie and Thomas	1995	The Head Start program (which focuses on disadvantaged 3- and 4-year-old children) in the U.S. closed around 30 per cent of the vocabulary gap observed in disadvantaged children. The impact faded after a few years for African-American children but persisted for other children.	

Source: The Conference Board of Canada.

The literature focuses on both the short- and long-term benefits for children attending ECE programs. The evidence suggests there are key short-term academic benefits from these programs, but some of these benefits dissipate over time, depending on the type of program the children attend. However, there is also evidence that the impacts drop at a faster pace in the years immediately after the program is completed compared with later years. This is an important finding, because a key reason to invest in ECE programs is that they can lead to important longterm effects for disadvantaged children on employment and earnings when the children become adults.

Some of the literature reveals that ECE programs are particularly beneficial for children from poorer households. Benefits for children from wealthier households are not as apparent. This stands to reason, as parents from wealthier families can provide even more assistance for their children over and above attending ECE programs. Since the benefits are more apparent in disadvantaged children, ECE investments can help reduce future income inequality.

Furthermore, the increase in maternal labour force participation discussed in the previous section brought about by access to affordable

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There are important benefits from ECE programs on later human capital accumulation. ECE can help reduce childhood and family poverty by providing the opportunity for more mothers to enter the workforce.

Our view on the link between ECE programs and inequality is that there are important benefits from these programs on later human capital accumulation. The potential for higher wages for children attending ECE programs, particularly for those from disadvantaged groups, and the increase in the participation rate for women are just two of the ways by which ECE programs can help lower income inequality. However, the exact mechanisms behind these effects are uncertain and can differ sharply depending on the ECE program under consideration since quality can vary greatly. Nevertheless, the bulk of the evidence suggests that efforts to expand children's participation in a variety of high-quality ECE programs will result in positive long-term impacts on the economy with the potential to lower inequality. More research will be required to understand the exact mechanisms by which early skills and behaviours can eventually translate into lasting long-term benefits for the children and economy. The ECE community needs to know which skills and program designs lead to the most positive outcomes for children later in life.

Labour Market Outcomes for Children Receiving ECE

The literature on ECE programs and inequality reviewed for the previous section found that children who attended these programs developed better human capital skills that potentially enabled them to find better jobs and earn higher incomes than children who didn't attend ECE programs.

Some of the literature has attempted to quantify the extra earnings attributable to attending ECE programs. The results vary considerably depending on the assumptions used in the analysis. Some studies concluded that earnings were sharply higher for children attending these programs, while others didn't find much of a difference. One study concluded that women benefited more than men in terms of future earnings from ECE programs, while other studies determined that children from more disadvantaged families had larger increases in wages in adulthood than children from more privileged backgrounds. Table 3 summarizes the literature examined for this report. It does not include an analysis of well-known, often-cited impacts from highly targeted programs in the U.S., including the Perry Preschool Project, the Abecedarian Project, and the Chicago Child-Parent Center Program comparing labour market outcomes. (See Appendix A for summaries of these programs.) In this report, we are trying to assess what the literature tells us we can potentially expect from an expansion of ECE programming in Canada, and that the type of impacts from these highintervention programs in the U.S. are not indicative of the impacts of a universal program.

Table 3 Labour Market Outcomes of Children Receiving ECE

Author(s)	Date	Findings	
Phillips and others	2017	Short-term impacts from ECE on school readiness and test scores are well established and often observed during elementary school. There is not enough evidence to suggest that benefits are retained in the long run, with some studies even suggesting negative outcomes.	
OECD	2013 and 2017	Improvements in science and math scores were tied to the duration of ECE; a statistically positive impact was found in many but not all countries.	
Lynch and Vahul	2015	ECE would lead to an increase of US\$ 1,832 in average wages in 2050 for children who had attended ECE. Guardians of children attending ECE saw their average wages increase by US\$ 1,202 before taxes. Wage benefits disproportionately accrued to low- and middle-income households.	
Cascio and Whitmore Schanzenbach	2013	The long-term effect of ECE programs was found to have positive benefits for low-income children but no benefit for higher-income children.	
Chetty, Friedman, and Rockoff	2013	The statistical relationship between improved academic test scores and future earnings was estimated to be that a 1 standard deviation increase in test scores led to a 12 per cent increase in future earnings. Based on the improvement in academic scores in Grade 4, this translates into a future earnings impact of 3.5 per cent. But the impact on academic scores diminishes over time and is low by the time the children reach eighth grade. When the boost to wages is measured using these lower test scores, the wage impact is 1.3 per cent.	
Havnes and Mogstad	2011	The expansion of universal child care in Norway decreased the probability of being a low earner by about 3.6 percentage points and increased the probability of having at least average earnings by 5.1 percentage points. Children were also less likely to drop out of high school and more likely to attend college.	
Cleveland and Krahinsky	1998	Children with access to ECE had improved cognitive abilities of between 4 and 10 per cent at age 10 and could end up with roughly the same increase in future wages.	

Source: The Conference Board of Canada.

The results from the reviewed literature are not conclusive, but there are nonetheless some broad observations that can be drawn from the empirical evidence. First, the impact from ECE on kids in elementary school is positive. Positive impacts may not be observed in every socio-economic group, but on balance, young children show improvement in

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On balance, young children show improvement in a range of indicators, from school readiness to academic achievement. a range of indicators, from school readiness to academic achievement. While the fact that enrolment in ECE programs is connected to positive benefits for children in their early elementary years supports expanding ECE, the time between the programming and the evaluation is short.

Where the evidence becomes murkier is on how long the benefits are expected to last. Some studies have shown that the benefits last in later grades but fade over time. Other studies have shown positive impacts but not across the entire sample. For example, the OECD studies showed that students in some countries showed academic gains but not in all countries. Similarly, the study by Cascio and Whitmore Schanzenbach showed gains were observed in low-income families but not in high-income families. On balance, we believe the current literature suggests there is indeed a long-term benefit on wages from attending ECE and are comfortable using this assumption when conducting our own econometric analysis. However, given some of the dissenting views in the literature, there is some risk that our analysis will overstate the benefits by including future wage gains.

Cost-Benefit Analysis of ECE Programs

The impact of some of the factors discussed above—including higher female participation rates and employment earnings linked to better cognitive, reading, mathematical skills, etc.—has been quantified in a number of cost-benefit analyses. Typically, researchers have compared the original costs of the ECE program per child with the benefits derived when the children reach adulthood from potentially higher employment earnings, higher taxes paid, and lower social welfare use and possibly reduced incarceration costs. Then the total costs of the ECE programs per child are compared with the benefits per child to obtain a return on investment.

In the U.S. and Canada, the studies all showed positive returns, ranging from \$2 per \$1 investment to as high as \$17 per \$1 of investment. The Canadian cost-benefit analyses differed somewhat from the American studies in that analysts included the benefits in terms of remuneration from the mothers who returned to work once their children enrolled in ECE programs. (See Table 4 for a summary of Canadian studies reviewed in this research.)

Table 4

Canadian Cost-Benefit Analysis of ECE

Author(s)	Study	Benefit-cost ratio
Fairholm (2012)	Economic Impact Analysis of Early Learning and Care for Children	2.5
Fortin, Godbout, and St- Cerny (2011)	Economic Consequences of Quebec's Educational Childcare Policy	1.7
Peters and others (2010)	Investing in Our Future: Highlights of Better Beginnings, Better Futures Research Findings at Grade 12	2.0
Prentice (2007)	Northern Childcare: Childcare as Economic and Social Development	1.6
Cleveland and Krashinsky (1998)	Benefits and Costs of Good Child Care	2.0

Source: The Conference Board of Canada.

With benefit-cost ratios ranging from 1.6 to 2.5, all the studies above clearly show a positive benefit from investment in ECE. However, as in all studies, the results above are determined based on the assumptions used to formulate the study. Therefore, prior to drawing any policy conclusions from the results, it is important to understand—and agree with—the underlying assumptions in the research. Given that many of the Canadian studies are older and that the literature on the benefits of ECE continues to evolve, our research includes our own costbenefit analysis of ECE investments based on what we believe are realistic assumptions about the expected costs and future benefits. This cost-benefit analysis is in Chapter 4. Before we delve into that analysis, however, it is important to first get a sense of what Canada is doing now for ECE provision and how Canada compares against its international peers.

Summary

From a broad perspective, the literature reveals that the widespread use of ECE programs not only helps children and their parents but can also have a major impact on the entire economy. While the increased participation rate of mothers in the workforce can have positive effects in the near term, the literature review also suggests that ECE programs can have a positive effect on the country's future workforce over the long term as well. The increase in human capital attributable to more highly Chapter 2 | The Conference Board of Canada

educated children can eventually lead to a higher-skilled workforce, which is an important consideration given that the aging of the population in developed and many emerging countries is already leading to a shortage of skilled workers. By enabling mothers to enter the workforce and children to earn higher future wages, ECE programs can also help reduce income inequality in a society and lower the incidence of poverty.

CHAPTER 3 Early Childhood Education in Canada

Chapter Summary

- Canada does a good job of ensuring that all 5-year-old children have access to ECE through kindergarten programs.
- ECE enrolment in the share of Canada's population under 5 years fall substantially below the OECD average.
- Bringing Canada's enrolment rate for children aged 2 to 4 to the OECD average would allow 134,000 more children to access ECE. Moving to the OECD optimal level would result in almost 400,000 more children attending ECE programming.
- The increase in ECE spots would have an impact on math performance at age 15 (as measured by PISA math scores) and translate into an increase in future wages.
- If Canada were to increase ECE rates to the top-performing level in the OECD, this would result in an additional 76,500 women in the workforce.

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Canada generally does a decent job of ensuring that most 5-year-old children have access to ECE programs through kindergarten programs. However, when we look at availability before age 5, there are some issues with ECE programs in this country, especially when compared with other OECD countries.

Unfortunately, the data sources for ECE in Canada and its provinces that provide the service are sparse, and this makes it challenging to address some of the shortcomings in Canada's ECE programs. Before we can make recommendations for Canada based on the literature, we need to understand where Canada is right now in order to accurately assess the magnitude of the problems and how policy-makers can improve ECE programs to enhance outcomes for children.

In this chapter, we examine the approach to ECE in Canada and how it stacks up against global best practices in delivering ECE. Data on current ECE enrolment in Canada and its international peers are also compiled and compared. To get a sense of the quality of ECE in Canada, we look at factors that influence quality and student educational outcomes. We then turn our focus to analyzing the results of the literature review and what it might mean for Canada by looking at specific issues, such as maternal labour force participation and inequality.

An Overview of ECE in Canada

Early childhood education refers to services that provide education and care for children before they enter school. In Canada, ECE is offered through two streams:

- 1. licensed child care with a curriculum-based approach, primarily designed to support the workforce participation of mothers
- 2. kindergarten and pre-kindergarten to prepare children for school

Child care is operated by public, non-profit, and for-profit agencies. The financial model may include some public subsidies, but programs are largely funded through fees charged to parents. Kindergarten and There is clearly a large gap between Canada and the countries with the most prolific coverage, such as Finland, Norway, Sweden, and Denmark. pre-kindergarten are offered by publicly funded schools. Fees are typically not charged.

The approach to ECE varies across provinces. Kindergarten for 5-yearolds is offered in all provinces and territories. Alberta, Saskatchewan, Manitoba, and Nunavut provide it on a part-time basis; the others provide full-day programs. Kindergarten for children age 5 is compulsory in Prince Edward Island, Nova Scotia, and New Brunswick but not in the other provinces. Some provinces also offer full-day kindergarten to 4-year-olds (Ontario, Northwest Territories, and Nova Scotia). Quebec is expanding 4-year-old kindergarten in vulnerable communities. Manitoba and Alberta also provide full- and half-day pre-kindergarten programs depending on the school district. Saskatchewan offers half-day preschool for 3- and 4-year-olds in half its schools, and Alberta funds children as young as 2 ½ in special circumstances.¹

The approach to ECE prior to the start of kindergarten is even less structured in Canada. Outside the school system, ECE before kindergarten can be delivered through private for-profit or not-for profit child care centres. While funding and staff training requirements are largely consistent across the country for school-delivered programs, funding, staff training requirements, and child-to-staff ratios for regulated child care all vary across the provinces and territories.

The unequal coverage across Canada notwithstanding, Canada does a decent job of ensuring that all 5-year-olds have access to ECE. However, when we compare Canada's approach to children below that age with international best practices, there is clearly a large gap between Canada and the countries with the most prolific coverage such as Finland, Norway, Sweden, and Denmark.²

In Finland, children start primary school at age 7, but all children have access to ECE before they start primary school. The number of hours of access is generally capped at 10 hours per day; however, there is flexibility depending on parental need, and low-income families have free access to 10 hours per day. Children aged 3 to 5 in Norway from

¹ Akbari and McCuaig, *Early Childhood Education Report 2017*, forthcoming.

² Information on Finland, Norway, and Sweden is from OECD, *Starting Strong 2017*. Information for Denmark is from Rock, "What Britain Could Learn From Denmark's Childcare Model."

low-income families have the right to 20 hours of free kindergarten per week. Universal access to child care is guaranteed from the age of 1, and Norway has both private and public preschools. The system is similar in Sweden: parents have a right to ECE for their children, and ECE is provided in both public and private schools. Parents are entitled to 15 hours of free preschool for their children starting at age 3. In Denmark, children can start care as early as six months (although age 1 is more common), and parents pay at most 25 per cent of the cost, less if they are low income.

ECE Enrolment in Canada

With education falling under provincial and territorial jurisdiction, there are notable differences in enrolment rates by province. (See Chart 1.) Only 1.1 per cent of children in Newfoundland and Labrador aged 0 to 1 are enrolled in ECE (defined as a curriculum-based program attended on a regular basis taught by trained educators), compared with 40.1 per cent in Quebec. There is a significant increase in enrolment across all provinces for children aged 2 to 4, although provincial differences remain pronounced. Saskatchewan and Alberta have the lowest enrolment, with only 36.6 per cent of children in that age range participating in ECE; Quebec once again has the highest enrolment rate, at 74 per cent. The enrolment gap narrows substantially for children aged 5, the age when all provinces offer kindergarten.

When we contrast Canada with other OECD countries, Canada compares well in ECE enrolment for children aged 5. (See Chart 2.) Most developed countries have over 90 per cent of their population aged 5 enrolled in ECE. At 94.3 per cent, Canada is roughly in line with the 95 per cent average across the OECD. However, the rate is almost or does reach 100 per cent in many countries, suggesting there is room for Canada to expand its current provision levels to match the top performers in this category.



Chart 1 ECE Enrolment Rates by Province, 2013–14 (per cent)

Note: Canada excludes Yukon, Nunavut, and First Nations on reserves. Sources: Ontario Institute for Studies in Education; The Conference Board of Canada.

When we look at ECE enrolment for children under age 5, Canada falls substantially below the OECD average. (See charts 3 and 4.) In Canada, the enrolment rate for children aged 2 to 4 years is 58.4 per cent, significantly lower than the OECD average of 69.6 per cent.³ Even the OECD average seems low compared with countries like France and Belgium where enrolment exceeds an estimated 90 per cent of all children aged 2 to 4.

For children aged 0 to 1, the OECD average is 25.3 per cent, while the Canadian average is just 18.2 per cent. The relatively low rate of enrolment for the 0 to 1 age group likely reflects the fact that paid parental leave in Canada generally lasts until a child turns 1 and that child care for infants is expensive, lessening the demand for ECE for children under the age of 1.

³ Canadian enrolment rates are not available from OECD, and the available data for Canada have a different age grouping than the data available from OECD. Thus, to compare the data, we estimated enrolment rates for the countries covered by OECD to match the Canadian aggregations. The OECD information on enrolments is available in aggregations of 0 to 2, 3, 4, and 5 years old. Enrolment rates for children aged 2 years were assumed to be the midpoint between the enrolment rates for those 0 to 2 and aged 3. Enrolment rates for the 2 to 4 cohort were then calculated using the enrolment rates for children aged 2, 3, and 4 and the corresponding population data to derive an estimate to match the available Canadian aggregate.

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Chart 2 International ECE Enrolment Rates, Children Aged 5 (per cent)

Note: Canadian data are from 2013–14; OECD data are from 2014, except Chile and Estonia, where data are from 2013.

Sources: OECD; Akbari and McCuaig; The Conference Board of Canada.

Chart 3

International ECE Enrolment Rates, Children Aged 2 to 4 (per cent)



Note: Canadian data are for 2013–14. OECD data are from 2014, except for children aged 3–4 in Estonia and Chile, where data are from 2013, and for children aged 2, where estimates are based on 2011 data for the U.S. and 2015 data for Chile. All OECD rates for 2-year-olds are estimates. Sources: The Conference Board of Canada; OECD; Akbari and McCuaig.

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Chart 4 International ECE Enrolment Rates, Children Aged 0 to 1 (per cent)

Note: Canadian data are for 2013–14; OECD enrolment data are from 2014. Sources: The Conference Board of Canada; OECD; Akbari and McCraig.

The data presented here show that Canada clearly lags its international peers in ECE enrolment. To get a sense of the scale of the issue, we calculated how many children would receive access to ECE if Canada were to increase enrolment to the OECD average or, even better, to

match the performance of the top three countries in each age group, referred to as optimal utilization. This part of the analysis assumes that gains can be made in the age 2 and over age cohorts and that no gains will be made in the 0 to 1 cohort.

Since Canadian enrolment rates for 5-year-olds are already high, the gains from improving enrolment rates for this age cohort are relatively small. An additional 2,000 5-year-olds would receive ECE if Canada's enrolment rate for this age were to hit the OECD average, and an additional 22,000 would receive ECE if Canada were to reach the optimal OECD enrolment rate. (See Table 5.)

Table 5

Ages 2 to 4 Age 5 Enrolment rates (per cent, 2013-14) Canadian enrolment rate 58.4 94.3 OECD average 69.6 95.0 OECD optimal 91.6 100.0 Impact on ECE enrolment in Canada, 2017 (000s) Baseline 682 369.0 OECD average 371.0 817 difference from baseline 134 2.0 OECD optimal 1,075 390.0 difference from baseline 393 22.0

Impact of Increasing ECE Enrolment in Canada

Sources: The Conference Board of Canada; OECD; Early Childhood Report 2014.

While the gains from increasing enrolment for 5-year-olds are small, there are substantial potential benefits to be realized from increasing Canada's enrolment for children aged 2 to 4. Bringing Canada's enrolment rate for this age cohort to the OECD average would allow 134,000 more children to access ECE. Moving to the OECD optimal level would result in almost 400,000 more children attending ECE programming.

Does Canada Provide Quality ECE?

As discussed in Chapter 2, for children to experience lasting benefits from ECE, the programs they attend must be high quality. Quality is

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One way to evaluate quality is to determine factors that have a measurable impact on learning outcomes. tricky to define because it is, by definition, a subjective concept. One way to evaluate quality is to determine factors that have a measurable impact on learning outcomes. OECD was able to link ECE to test scores at age 15 and found that the ECE factors most likely to improve test scores were the duration of ECE (more than two years), the child-to-teaching-staff ratio, and the public expenditure per child.⁴ OECD also found that staff training and job satisfaction and retention influence the quality of ECE environments.⁵

Although a curriculum-based approach is often highlighted in the literature as a key component of quality, the definition we use in this report for ECE is a program that is curriculum based. Therefore, it is a defining feature of all ECE, not a component of quality ECE.

When assessing quality, it is important to focus on the above factors that drive quality. It is tempting to assess countries based on their proportionate spending (for example, OECD publishes spending on ECE as a share of GDP). This is too simplistic a measure, since overall spending on ECE can vary significantly as a result of differences in the age when compulsory schooling begins, enrolment rates, and the relative size of the young child population. For example, in 2014, 6.5 per cent of Canada's population was below the age of 6, while the OECD average was 7.1 per cent. Differences in these demand drivers can have a notable impact on funding requirements.

In the same vein, while Quebec spends the highest proportion of its provincial budget on ECE,⁶ one of the explanations given for the occasional poor childhood outcomes from its universal child care program is that its programs are not consistently high quality—an indication that higher spending does not necessarily translate into better quality. Simply put, the level of spending as a share of GDP (or total public spending) is not an indicator of the quality of ECE. In the next few sections, we look at the available data to get a sense of how Canada is fairing on the indicators that influence quality.

- 5 Ibid., 86–87.
- 6 Akbari and McCuaig, Early Childhood Education Report 2014, 8.

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⁴ OECD, Starting Strong 2017, 33.

Duration of ECE

The duration of ECE is best assessed by looking at the enrolment rates discussed above. Canada does very well at assuring at least one year of access to ECE. But although many children receive more than one year, Canada falls below the OECD average. This is corroborated by evidence from the OECD's Programme for International Student Assessment (PISA) survey, an international student survey given every three years to children aged 15 to assess their countries' educational systems. Part of the PISA survey asks students to self-report the duration of their preprimary education. As shown in Chart 5, Canada has the third-lowest average duration of pre-primary education-a full year below the OECD average. There are potential concerns with using the self-reported duration since it depends on the students accurately remembering their duration of pre-primary education. However, the lower average duration of pre-primary education that is self-reported by Canadian students is corroborated by the official enrolment statistics from OECD that show that the enrolment of Canadian children in ECE is below the OECD average.

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Chart 5

Average Duration of Pre-Primary Education

(number of years as reported by students aged 15 in 2015)



Source: OECD.

Child-to-Teaching-Staff Ratio

In its *Education at a Glance 2016* publication, OECD publishes childto-teacher ratios for two different groups: International Standard Most provinces provide either hard or soft caps for kindergarten class sizes. Classification of Education (ISCED) 01 and 02.⁷ The ISCED 01 classification refers to ECE for children below the age of 3, while ISCED 02 covers pre-primary education from age 3 to the beginning of primary education.

Child-to-teacher ratio information is sparse for ISCED 01, with only a handful of countries providing data. Canadian data are not available, but for other countries, the child-to-staff ratio in ISCED 01 (under age 3) ranges from a low of 4:1 in New Zealand to a high of 16:1 in the U.S., with an average of 9:1 in the reporting countries.⁸ Canadian requirements for child-to-staff ratios in regulated child care vary across provinces. The ratio is as low as 5:1 in Newfoundland and Labrador, Prince Edward Island, and New Brunswick for children aged 2 to 3. It's 8:1 in both Quebec (for children aged 18 months to less than 4) and Ontario (for ages 2 to 4).⁹ Based on the limited data available internationally, Canada is doing slightly worse than the top performer, but better than the OECD average.

When we look at ratios for ISCED 02, there is also international variation. (See Chart 6.) In the OECD, the average of reporting countries shows a ratio of 14 children for every teacher. In Australia, the ratio is a low 5:1, while at the other end of the spectrum, the ratio is 25:1 in Mexico.

Given the lack of data for Canada that focus on children aged 3 to 5, it is difficult to assess how Canada performs in child-to-teacher ratios in pre-primary education. Most provinces provide either hard or soft caps for kindergarten class sizes. Kindergarten is not an exact comparison to the OECD data (provincial guidelines require a lower ratio for children aged 3, while kindergarten begins at either age 4 or 5). No Canadian provinces come close to the OECD average, although Ontario kindergarten classrooms (which have two instructors) will be very close when the hard cap of 29 students comes into effect in the 2018–19 school year, averaging 14.5 students per instructor, compared with the OECD average of 14 students for each teaching staff member. (See Table 6.)

- 8 OECD, Education at a Glance 2016.
- 9 Childcare Resource and Research Unit, Briefing Notes.

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⁷ The distinction in the ISCED 0 classification into two sub-groups (01 and 02) is relatively new and was made with the release of ISCED 2011. In the ISCED 1997 classifications, ISCED 0 matched the definition of ISCED 02 and there was no information for what is now ISCED 01.
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Chart 6

Ratio of Pupils to Teaching Staff, 2014

(ISCED 02-age 3 to primary education; full-time equivalents)



Source: OECD.

Table 6

Provincial Kindergarten Class Sizes

N.L.	Kindergarten soft cap: 20	
P.E.I.	Kindergarten hard cap: 20; average size is 14.5	
N.S.	Kindergarten hard cap: 22; pre-kindergarten hard cap: 24 (three staff when more than 20)	
N.B.	Kindergarten hard cap: 21	
Que.	Junior kindergarten hard cap: 17; senior kindergarten hard cap: 19	
Ont.	Full-day junior and senior kindergarten hard cap: 30 in 2017–18, 29 in 2018–19 (with a teacher and early childhood educator)	
Man.	Kindergarten current cap: 20; no cap as of 2017–18	
Sask.	No cap in kindergarten; pre-kindergarten (3- and 4-year-olds) hard cap: 18	
Alta.	Kindergarten guideline: 17	
B.C.	Kindergarten hard cap: 22	
Nun.	No cap	
N.W.T.	Full-day junior and senior kindergarten hard cap: 16	
Y.T.	Kindergarten hard cap: 18	

Note: Data are current as of August 2017.

Sources: Walsh, CBC News; Ontario Ministry of Education; Akbari and McCruaig.

Given the definitional differences between OECD and Canadian data, it is not surprising that the Canadian average is higher. However, class size does matter for providing a quality program, and many provinces could benefit from lowering class sizes or introducing a hard cap aimed at keeping class sizes at an acceptable size to provide a quality experience.

Public Expenditure per Child

Expenditures per child also affect the quality of ECE programming. OECD has data for two age groups: pre-primary education (from age 3 to the start of primary education) and children aged 0 to 5. (See charts 7 and 8.) © The Conference Board of Canada. All rights reserved. Please contact bit.ly/2HPgDOm with questions or concerns about the use of this material.

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Chart 7

Public Spending per Student on Pre-Primary Education, 2011

(US\$ 000s purchasing power parity converted)



Sources: The Conference Board of Canada; OECD Social Expenditure database 2013; OECD Education database; Eurostat for non-OECD countries.

Chart 8

Public Spending per Student Aged 0 to 5, 2013, or Most Recent Year Available

(US\$ 000s purchasing power parity converted)



Sources: The Conference Board of Canada; OECD Social Expenditure database 2013; OECD Education database; Eurostat for non-OECD countries; data for Canada are from Akbari and McCuaig, *Early Childhood Education Report 2014* measuring provincial funding for kindergarten, other ECE, and licensed child care divided by total enrolments for children aged 0 to 5.

According to the data from OECD, Canada spends an above-average amount per student on pre-primary education. Comparing our estimates from the Ontario Institute for Studies in Education's *Early Childhood Education Report 2014* to OECD data also shows that total public

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spending for children aged 0 to 5 is above average, suggesting that, on this metric, Canada has above-average quality.¹⁰ Canada does, however, fall short of average expenditures in the top spending countries.

Staff Training and Job Satisfaction

School-delivered kindergarten and pre-kindergarten are led by instructors with post-secondary credentials, either teachers or early childhood educators. Child care centres do not require all staff to have ECE certification, but are required to have a minimum number of early childhood educators as part of their staff.

Teachers generally require four years of post-secondary education with at least one year of study in teaching education. Requirements for early childhood educators vary between provinces, but generally a one- or two-year college certificate is required. (See Table 7.)

Table 7

Credential Requirements for Early Childhood Educators*

N.L.	Level 1: one-year ECE certificate; Level 2: two-year ECE diploma; lead staff member required to have at least Level 1; operators must have Level 2 or higher.	
P.E.I.	Level 1: one-year post-secondary certificate in ECE; Level 2: two-year post-secondary diploma in early childhood development; in Early Years Centres, supervisor and one staff member must have diploma.	
N.S.	Level 1: one-year ECE certificate; Level 2: two-year ECE diploma; Level 3: a degree in ECE or equivalent; 2/3 of staff must hold at least Level 1; centre directors require Level 2 or 3 qualifications.	
N.B.	One-year ECE certificate; 1/4 staff in a child care centre must have this qualification.	
Que.	Three-year diploma or one-year program + three years of experience for centres; 2/3 of staff must meet these requirements.	
Ont.	Two-year diploma; new regulations require two staff per group of children to have an ECE diploma.	
Man.	ECE II: two-year diploma; 2/3 of staff in a centre for children 0 to 6 or 1/2 of staff in nursery school or school-aged must be ECE II or above.	
Sask.	ECE I: 120-hour orientation course; ECE II: one-year certificate; all staff working 65 hours/month or more must be ECE I; 30 per cent must be at least ECE II.	
Alta.	Child Development Worker: one-year ECE certificate; 1/4 staff must hold this designation.	
B.C.	Early Childhood Educator: requires licensing and a basic certificate (takes one year to complete); staff requirements vary by type of institution.	
Nun.	First aid certification.	
N.W.T.	One-year ECE certificate; 50 per cent of staff should hold certificate.	
Y.T.	Child Care Worker I: 60-hour introductory course; Child Care Worker II: one-year ECE certificate; Child Care Worker III: two- year diploma; in centre-based programs, 20 per cent of staff must meet or exceed the Child Care Worker III qualifications, an additional 30 per cent must meet or exceed the Child Care Worker II qualifications, and the rest must meet or exceed Child Care Worker I qualifications.	

*refers to the most basic ECE requirements that require certification, not ECE assistants Source: Akbari and McCuaig.

10 Akbari and McCuaig, Early Childhood Education Report, 2014.

Pre-primary education teachers in Canada spend an average of 792 hours per year teaching, compared with the OECD average of 1,001. Classrooms across Canada led by teachers or early childhood educators are programs run by educated instructors. While child care centres do not require all staff to be educated in ECE, centres across the provinces are required to have as part of their staff early childhood educators who can help guide the delivery of high-quality programming.

Factors that affect job satisfaction include child-to-staff ratios, wages and benefits, reasonable schedules and workloads, staff turnover, good physical environment, and supportive management.¹¹ Factors such as physical environment and supportiveness are difficult to assess at the macro-perspective taken in this analysis, but we attempt to address some of the other factors affecting job satisfaction. Pre-primary education teachers in Canada spend an average of 792 hours per year teaching, compared with the OECD average of 1,001.¹² Furthermore, the ratio of pre-primary teachers earnings to other full-time, full-year workers with tertiary education is 1.05 in Canada compared with an OECD average of 0.8.¹³

While, on aggregate, salaries of pre-primary teachers compare well with the OECD average, it is reasonable to assume that salaries in Canada in this group are pushed higher by the fact that Canada's enrolment is highest in ages that attend kindergarten and the fact that teachers within the school system are paid substantially more than early childhood educators. As noted in the section on enrolment, participation in ECE for the 2 to 4 age group lags OECD averages. Therefore, if Canada were to target improvements in enrolments, attention would likely be focused on this age group. While some of the improvement could be achieved by starting kindergarten at age 4 in all provinces (with instruction provided either by teachers or a combination of teachers and/or early childhood educators), a large portion of any potential increase in enrolments is likely to be provided by programs from outside the school system. Therefore, when evaluating job satisfaction, it is important to look beyond the OECD wage data for pre-primary educators and instead look directly at early childhood educator wages.

- 12 OECD, Education at a Glance 2016.
- 13 Ibid.

¹¹ OECD, Starting Strong 2017, 87.

According to Statistics Canada's Job Vacancy and Wage Survey, fulltime, full-year early childhood educators and assistants earned an average hourly wage of \$18.70 in 2016.¹⁴ There is significant discrepancy across provinces, with wages well below that average in New Brunswick and relatively higher wages in Ontario and Quebec. (See Chart 9.) The higher wages in Ontario and Quebec are in line with the fact that educational requirements are more stringent in these provinces. These wage figures include ECE assistants, for whom education requirements are lower than for early childhood educators, and therefore likely lead to a small understatement in early childhood educator wages.

Chart 9





Note: Data for Newfoundland and Labrador are supressed by Statistics Canada because of confidentiality requirements. Source: Statistics Canada.

When we compare the average hourly wage of early childhood educators against those in other occupations with similar educational requirements,¹⁵ it is apparent that early childhood educators have relatively low wages given their educational attainment. Indeed, relative to elementary teaching assistants, ECE teachers earn close to \$9,000 less a year. (See Chart 10.)

14 Statistics Canada, CANSIM table 285-0050.

15 The occupations were chosen from a list compiled by the Alberta government that lists 15 careers that require two years of school or less. Alberta Government, 15 Careers That Require 2 Years of School or Less.

Chart 10

Average Hourly Wages in Occupations Requiring Two Years or Less of Education, 2016

(\$; full-time workers)



Source: Statistics Canada.

Despite the low wages paid to early childhood educators, the profession has a relatively low job vacancy rate, estimated at 2.3 per cent in 2016 below the 2.5 per cent average across all occupations.¹⁶ Furthermore, looking at the duration of job vacancies across all occupations (which provides a sense of the difficulty in recruiting—the longer a job is posted, the more difficult it is to fill) shows that 26 per cent of vacancies have been posted for 15 days or less. For early childhood educators, 43 per cent of job vacancies have been posted for 15 days or less. This suggests that despite the low wages, there is below-average difficulty filling positions in this occupation.

Educational Outcomes of Canadians Who Received Pre-Primary Education

As discussed in Chapter 2, one of the most important potential benefits for children who receive ECE is a permanent boost to their academic ability and improved future job prospects. Therefore, academic performance is an indicator of quality ECE. Indeed, OECD has found that 15-year-olds who had received at least two years of ECE as young

¹⁶ Calculated using the average of the quarterly data for 2016 from Statistics Canada's CANSIM table 285-0004 (job vacancies) divided by total payroll employees, full- and part-time from CANSIM table 285-0050.

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In math scores, Canadian students with pre-primary education had an average score 18 points higher than their peers who had not had this education. children performed better on PISA scores than other 15-year-olds. This result was significant for half of all countries after accounting for student and school-level socio-economic status.¹⁷

In the 2015 PISA survey, students were asked to self-report the duration of their ECE. OECD was then able to evaluate the impact of ECE duration on academic performance. As mentioned, there was a statistically significant positive impact on science performance for half the countries with available data.

For Canadian students, there was a three-point increase in the PISA science score for students who had had at least two years of ECE—a result that isn't different from zero from a statistical viewpoint. Even though there was no statistically significant difference in science scores for Canadians with two or more years of ECE, Canadian students already post among the highest PISA science scores across the OECD. In the latest survey, Canadian kids aged 15 had an average score of 528 compared with an OECD average of 493, with only Finland, Estonia, and Japan posting higher scores. (See Chart 11.)

Currently, gains in math scores tied to ECE are available only from the 2012 PISA, which shows a strong significant improvement in math scores for 15-year-olds who had attended ECE. Across the OECD countries, students who had attended pre-primary education for more than one year scored 53 points higher in math before accounting for socio-economic differences and 31 points higher after accounting for socio-economic differences compared with those who did not receive pre-primary education.¹⁸ In math scores, Canadian students with preprimary education fared better than their peers who had not received this education, with an average math score 18 points higher. (See Chart 12.) While the difference between those with more than one year of preprimary education and those without is smaller than average, it is still a significantly significant gap, indicating room for improvement in math scores by expanding access to pre-primary education.

17 OECD, Starting Strong 2017, 13.

18 OECD, PISA 2012 Results, 99.

Chart 11

Average Science Performance Across Countries, 2015 (mean PISA scores)



Source: OECD.

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Chart 12

Difference in Math Scores for Students With More Than One Year of Pre-Primary Education, 2012

(PISA scores after accounting for socio-economic status)



Source: OECD.

A 1 standard deviation increase in test scores resulted in a 12 per cent increase in earnings when workers reached their mid-to-late 20s. The quality of the ECE programming does not appear to be a major factor in the smaller observed gap since Canada is already one of the top-performing countries in math when measured by PISA math scores. (See Chart 13.) Achieving further gains will, therefore, be challenging.

The statistically significant relationship between receiving ECE and math scores shows improving the duration of ECE attendance could help Canada make gains in math scores. The standard deviation on the PISA scores is 100 points. Research by Chetty, Friedman, and Rockoff found a 1 standard deviation increase in test scores resulted in a 12 per cent increase in earnings when workers reached their mid-to-late 20s.¹⁹ We can use this relationship to calculate the probable impact of increasing ECE attendance in Canada on future wages. If an additional year of ECE attendance were to result in an 18-point increase (the average increase observed in the PISA math scores) in an individual's math scores, this could potentially increase his or her future wages by 2.16 per cent.

19 Chetty, Friedman, and Rockoff, Measuring the Impact of Teachers II, 19.

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Source: OECD.

Summary

To summarize, Canada provides a quality ECE experience, and Canadian children compare well in international testing. Nevertheless, there is room for improvement. Where Canada does well is in class sizes for young children, but the staff–child ratios in kindergarten classrooms are generally below the OECD average. Per student funding is above the OECD average. Teachers in kindergarten and pre-kindergarten classrooms are well educated, but educational requirements are low in licensed child care facilities. Remuneration is good for pre-primary instructors (using the OECD definition, which includes all instructors providing education to children before primary education begins), although when you dig deeper into the data, statistics suggest that ECEs in Canada are paid well below other workers with similar education levels. Most importantly, Canada needs to improve ECE enrolment and duration, given its strong correlation with future academic outcomes.

Potential Gains in Canadian Labour Force Participation

Many studies have looked at how female labour force participation rates change when there is access to affordable child care. The range of outcomes varies significantly across studies, with research into Norway's universal child care program showing no impact on maternal labour supply and, on the other end of the scale, Fortin's study in Quebec showing a significant uptick in women's labour force participation. The natural question that arises from the literature is, if Canada were to expand its access to early childhood education, what impact would it have on female labour force participation?

According to the OECD data, Canada has relatively high maternal employment rates for mothers with young children. The OECD average maternal rate for women with children aged 0 to 2 is 53.2 per cent, while the Canadian rate is 66.4 per cent. A smaller, though still sizable, gap exists in maternal employment rates when the youngest child is aged 3 to 5, with the OECD average rate at 66.7 per cent and the Canadian rate at 72.1 per cent. Chapter 3 | The Conference Board of Canada

Looking at the Canadian data, there is a substantial variation in maternal participation rates across provinces, with Quebec having the highest female participation rates for mothers with young children. (See Chart 14.) Interestingly, despite having relatively low ECE enrolment for children aged 2 to 4, Nova Scotia and New Brunswick have the highest maternal participation rates for women whose youngest child is between the ages of 3 and 5. Nevertheless, there is a substantial gap between the maternal participation rates in Quebec and most other provinces. Based on this fact, and the evidence in the literature, we can conclude there is a gap between female labour participation rates in Canada and Quebec and that increased access to affordable child care—like parents in Quebec already have—can help close the gap.



Chart 14 Female Labour Force Participation Rates, 2016 (per cent)

Sources: Statistics Canada; The Conference Board of Canada.

Given the existing gap in labour force participation rates, the next step is to quantify the potential labour market gains from expanding increased access to and enrolment in ECE programs. In Fortin's analysis of the Quebec program, the impact on maternal labour supply equated to about one woman entering the labour force for every two spaces created over 1997 to 2011—a substantial increase in female labour force participation. However, female labour force participation rates have continued to increase in Canada throughout the late 1990s and 2000s, and we cannot necessarily assume that past gains are representative of future benefits.

If ECE enrolment rates were to reach only the OECD average, an additional 57,600 women would be expected to enter the workforce. Indeed, if we increase enrolment to the OECD optimal level and assume the same increase in participation from Fortin's analysis, the maternal labour force participation rate would exceed 100 per cent.

Therefore, for the purposes of this study, we assume the labour force participation rate of women with children aged 5 and younger who access ECE would adopt the same participation rate as mothers whose children are aged 6 to 15 (when all children have guaranteed access to full-day schooling). If we increase the ECE enrolment to 93.5 per cent for children aged 2 to 5 (optimal enrolment rates for ages 2 to 4 and age 5, scaled by population in each age group), this would result in an additional 76,500 women in the workforce. If ECE enrolment rates were to reach only the OECD average, we expect an additional 57,600 women would enter the labour force.

In these calculations, the labour force gains per new space created are lower for the OECD optimal enrolment scenario than for the OECD average scenario. This is expected because in the OECD optimal scenario the enrolment rate is approaching 100 per cent for children aged 4 to 5 and there are diminishing returns to scale. When maternal labour force participation rates are relatively low, there are large gains to be had by expanding access to child care. But when maternal labour force participation is already high, the additional gains from expanding access to child care are lower in proportionate terms.

CHAPTER 4 Cost-Benefit Analysis of ECE Investments in Canada

Chapter Summary

- The duration of ECE attendance in Canada is well below the OECD average. This chapter examines the economic impact of having more children attend ECE programs for a longer period.
- The new ECE spaces created in this analysis are assumed to be high-quality spaces, meaning better staff-to-child ratios and better wages for early childhood educators.
- Two different assumptions about enrolments are considered (enrolments reach the OECD average and enrolments reach the OECD optimal level), and two different time periods are considered, leading to a total of four different scenarios.
- The results from this analysis show that expanding enrolment to the OECD average or the OECD optimal level returns benefits that outweigh the costs in both the time periods considered.
- Benefits accrue to the economy when more mothers enter the labour force and when children who have received additional ECE enter the workforce.

This chapter quantifies the economic benefits associated with expanding the quality of ECE in Canada. Specifically, we look at improving Canada's performance in the areas that affect quality and where the country's performance is currently weak: the duration of ECE attendance, staff-to-child ratios in kindergarten classrooms, and the pay of early childhood educators.¹

The economic impacts studied in this analysis include those from higher maternal labour force participation and higher future wage earnings for children who receive ECE. The costs include those associated with funding the new spaces, including instructor wages and the infrastructure required to accommodate an increase in enrolments.

Methodology and Assumptions

The scenarios described in this chapter are calculated under two main assumptions about improvements in the duration of ECE:

- Canada's enrolment for children aged 2 and above is brought to the OECD average.
- Canada's enrolment for children aged 2 and above is brought to the OECD optimal—defined as the average enrolment for the three OECD countries with the highest enrolment rates.

Additionally, each scenario is studied over two time frames to assess how the results change when a longer-term view is adopted. In each scenario, enrolment is assumed to be phased in over five years to allow for the necessary infrastructure to be put in place. Wages for early childhood educators and staff-to-child ratios are assumed to be the same in each of these scenarios.

The benefits include the impact on female participation rates and future wages for the children receiving ECE. The impact on maternal labour

¹ This study examines the impact of higher wages and reduced class sizes only for the newly created spaces and does not attempt to quantify the impact of improving these factors on currently existing ECE spaces.

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Expanding enrolment rates so that Canada reaches the OECD average for 2- to 5-year-olds would lead to a significant increase in the number of ECE spaces. force participation is calculated by bringing the participation rate for women with children age 2 to 5 who now have access to ECE up to the same level as women whose youngest child is aged 6 to 15. This provides the direct current impact on the economy through an increase in Canada's labour force.

The wage impact is determined by the increase in the number of new children who will now receive ECE by the age of 4. Even though this analysis looked at the impact of higher enrolments starting at age 2, the future wage benefit calculations are based on the number of children who will now receive at least two years of ECE. Since most children aged 5 already receive one year of ECE in kindergarten, the number of new children aged 4 receiving ECE will provide a measure of how many additional children will receive more than one year of ECE—the measure used by OECD to calculate the impact of pre-primary education on PISA math scores. The increase in wages for educators of these children is assumed to be 2.16 per cent, based on the calculation outlined in Chapter 3.

The costs include the salary and overhead costs associated with each new space created as well as the capital investments required to create the new infrastructure. For this analysis, it is assumed that new spaces created for children aged 4 to 5 will be in a kindergarten setting, replicating Ontario's full-day kindergarten program. The staffto-child ratio is set at 1:14 and is equally split between teachers and ECE. The new spaces created for children aged 2 to 3 are assumed to be taught by early childhood educators and have a staff-to-child ratio of 1:8 (the current guidelines for Quebec and Ontario). The number of new educators required is then equal to increased enrolment divided by the appropriate staff ratio. The average salary for Ontario teachers in 2014 is used as the benchmark salary, scaled to 2007 dollars (the base year for Statistics Canada's inflation-adjusted data) using average wage growth in the educational sector. ECE wages are assumed to be 60 per cent of teachers' salaries. Overhead costs are determined using the ratio of other input costs to salaries in Statistics Canada's supply-use tables for the elementary and secondary school sector. Infrastructure costs are assumed to replicate the estimated cost of the recent rollout of full-day kindergarten in Ontario (\$5,832 in 2017 dollars per space).

The net present value (NPV) of the benefits and costs is calculated because future wage benefits will occur many years from now while costs will be borne immediately. Discounting the inflation-adjusted costs and benefits by a social discount rate is important when analyzing impacts over a long time to reflect factors such as time preferences (the fact that a dollar today is worth more than a dollar in the future), the cost of borrowing, and the opportunity cost of private capital.

Results

Expanding enrolment rates so that Canada reaches the OECD average for children aged 2 to 5 would lead to a significant increase in the number of ECE spaces. (See Table 8.) Increasing enrolment to the OECD optimal enrolment rate points to the need to enrol close to 440,000 more children in ECE programs, requiring 40,400 early childhood educators and 5,800 teachers. Accommodating an expansion in enrolments to the OECD average would require enrolling 145,850 children and employing 13,700 early childhood educators and 1,800 new teachers. The average cost per spot created (not including costs for new infrastructure) for children aged 2 to 3 would be \$8,162 and for children aged 4 to 5, \$6,219.

Table 8

Number of New Spaces Created and Instructors Required

(000s in 2022 when fully phased in)

	OECD average	OECD optimal
New spaces age 2	47.69	138.45
New spaces age 3	47.74	138.61
New spaces age 4	47.73	138.60
New spaces age 5	2.69	23.31
Total new spaces ages 2 to 5	145.85	438.98
New ECE instructors	13.73	40.42
New teachers	1.80	5.78

Source: The Conference Board of Canada.

We assess the costs of creating those new spots against the benefits that will result from higher maternal labour force participation and greater earning potential for children who have access to at least two years of ECE. As shown in Table 9, the benefits from an expansion of ECE outweigh the costs even after applying a social discount rate to account for factors such as time preferences. (In this study, we use a social discount rate of 3 per cent to account for the fact that benefits and costs that occur in the future have a lower value than upfront benefits and costs. The further in the future the benefit or cost is incurred, the lower its net present value today; this means that a benefit that occurs in 2018 still has a high value today, but a benefit in 2093 has a relatively low value today.)

Expanding enrolment to the OECD average level through to 2093 would result in an NPV cost-benefit ratio of 1:5.8. In other words, every dollar spent expanding enrolment would result in a wider economic benefit of \$5.83. Expanding enrolment to the OCED optimal scenario would result in an NPV cost-benefit ratio of 1:3.4.

The NPV is smaller if we look out only to 2050 since the additional children receiving ECE begin to enter the workforce only around 2040. The cost-benefit ratio would be 1:3.6 in the OECD average scenario and 1:1.7 under the OECD optimal scenario.

Table 9 Return on ECE Investment

(\$ benefit for each \$ invested in ECE*)

	OECD average	OECD optimal
Ratio from 2018 to 2050	3.62	1.67
Ratio from 2018 to 2093	5.83	3.44

*Costs and benefits are adjusted for inflation and calculated using a social discount rate to reflect social and time preferences.

Source: The Conference Board of Canada.

One of the striking features of the analysis is that the NPV is larger when we bring enrolments only to the OECD average, rather than the optimal. This occurs because of the diminishing returns to scale in bringing women into the labour force. When we improve access so that it matches the OECD average of roughly 70 per cent of all children aged 2 to 4, this allows many more women to enter the labour force. There are further labour force gains realized when bringing enrolment to the OECD optimal level; however, a smaller share of the additional woman with access to ECE enter the workforce. This is because of our assumption that as more ECE positions become available, additional spots will have a smaller effect on the participation rate. In other words, those who are interested in going back to work are more likely to take advantage of early spots. In the OECD optimal scenario, we bring the participation rate for women with children aged 2 to 4 very close to the Canadian labour force participation rate for women with children aged 6 to 15 (who have universal access to full-day school). When the program is fully phased in (in 2022), an extra 57,600 women are in the labour force in the OECD average scenario compared with 76,540 in the OECD optimal scenario. (See Chart 15.)

Chart 15

Number of Mothers With Children Aged 0 to 5 Years Entering the Labour Force Due to Expanding ECE

(000s, relative to the baseline forecast)



Source: The Conference Board of Canada. f = forecast

While the NPV is larger in the OECD average scenario, the wage gains are more substantial in the OECD optimal scenario because more children will have access to many years of ECE. Wage gains start to accrue in both scenarios around 2040. In 2050, wages are up by only 0.04 per cent in the OECD average scenario and 0.1 per cent in the OECD optimal scenario. By 2093, economy-wide wages are 0.5 per cent higher in the OECD optimal scenario compared with a gain of 0.2 per cent in the OECD average scenario. (See Chart 16.) While

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Chart 16

Increase in Economy-Wide Wages From Expanding ECE

(per cent, relative to the baseline forecast)



Source: The Conference Board of Canada. f = forecast

the percentages may seem small, in the OECD average scenario, they translate into a gain in real disposable income of \$2.6 billion in 2050, rising to \$8.3 billion in 2093. In the OECD optimal scenario, real disposable income is \$4.2 billion higher in 2050 and \$17.7 billion higher in 2093.

The results of this analysis depend on the assumptions that were made about costs, the increase in maternal labour supply, and future wage gains. There are many factors that could result in the actual results from ECE investments being different from those presented here. Downside risks include cost overruns, a smaller maternal labour force response, or a weaker, less broad-based future wage response. While it is unlikely that the maternal labour force response would be stronger, it is possible that future wage gains could be stronger, providing upside risk to the projection.

CHAPTER 5 Impact of ECE Investments on Inequality

Chapter Summary

- This chapter examines the impact of ECE investments on income inequality.
- It was assumed that 76,540 mothers currently not in the labour force would become employed as a result of the ECE investments. The subsequent change in their family's income was then calculated to assess the change in income inequality.
- There is only a marginal change in the Canada-wide Gini coefficient from the ECE investments, but a more notable change in the Gini coefficient for families with young children.
- Household incomes in affected families would increase by 72 per cent when the family shifts from being a one-income family to a two-income family.
- The ECE investments would lift an estimated 23,000 families out of poverty.

In the previous chapter, we quantified the impact that better access to early childhood education is expected to have on Canada's economy. As discussed in Chapter 2, ECE can not only have an impact on near- and long-term economic prospects but can also lead to an improvement in inequality since many of the benefits accrue to lower-income households. In this chapter, we use the information from our analysis in Chapter 4 to determine the impact of the ECE investments on inequality in Canada by measuring the impact that the investment would have on the Gini coefficient, income distribution, and households living in poverty. (See "Gini Coefficient.")

Gini Coefficient

The Gini coefficient measures income distribution and is commonly used to assess the extent to which income is distributed equally among the population.

Possible values range from zero to one. A score of zero represents a perfectly equal distribution of income, while a score of one represents one person in the population having access to all the income. Consequently, a lower Gini coefficient is indicative of a more equal income distribution.

Methodology and Assumptions

The analysis in this section falls into two main categories: assessing the impact on the Gini coefficient (Canada-wide and only for families with young children) and the direct impact on households by calculating shifts in the income distribution and the impact on poverty.

The data used in this analysis are from Statistics Canada's T1 Family File, which is built using tax-return data.¹ The measure of income used in this analysis is after-tax income of census families (family units of more than one person) since the purpose of the analysis is to determine how family incomes can change when mothers enter the workforce.

The data in our sample consist of three different breakdowns that were required to create a distribution: income from all Canadian census families and non-census families (one-person households), census family income for families with young children (0 to 4 years old) with the mother working, and families with young children where the mother is not working. (See Exhibit 1.) In all groupings, the data are aggregated into \$2,000-income brackets.

Exhibit 1

Data Sources for Income Analysis



Source: The Conference Board of Canada.

In the OECD optimal scenario, we estimated that an expansion of ECE services would allow about 76,540 mothers from families with young children who are currently out of the workforce to return to work. To calculate the impact of this policy, we take these 76,540 census families where the mother doesn't work and estimate how their family income

1 Statistics Canada, Annual Income Estimates for Census Families and Individuals (T1 Family File).

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A key benefit of expanding ECE is creating more equitable opportunities for children. would change if the mother was working. We assume the mother's decision to enter the workforce is not based on the family's income. In other words, we assume that higher-income families are just as likely as the lower-income families to take advantage of the program and re-enter the workforce.

However, we also assume that the families with the mother re-entering the workface will have the same income distribution as census families with women working. For example, if 5.0 per cent of census families with young children where the woman is not working make under \$20,000, this is the share that is removed from the distribution making under \$20,000. Then, if 10 per cent of census families with women working make \$25,000 to \$30,000, 10 per cent of the 76,540 new workers will be placed into that income bracket.

To calculate how many families would exit poverty, we use Statistics Canada's low-income cut-offs for census metropolitan areas in 2011.² These low-income cut-offs are provided by number of people per household. Family size by income bracket is created using Statistics Canada data on census families by number of children³ and applying the share of families of each size to the number of census families in each income bracket. (This assumes family size is independent of income, a simplifying assumption.) Then, using the low-income cut-offs, the number of families below the cut-off before and after the policy change are counted and compared.

Results

A key benefit of expanding ECE is creating more equitable opportunities for children. While much of the benefit accrues from providing equal access to education, part of the benefit accrues from the impact that ECE has on maternal employment. It is well established that children from higher-income households have better access to learning and development opportunities (through, for example, private preschool, music lessons, sporting activities, etc.). By drawing more mothers into

² Statistics Canada, *Low Income Lines, 2010 to 2011.*

³ Statistics Canada, 2011 Census of Population.

the workforce, access to ECE can boost household incomes, allowing more children to participate in these activities. In this chapter, we demonstrate the boost to household incomes from ECE and what that means for inequality in society, the distribution of income across families, and poverty.

Impact on Gini Coefficient

The Gini coefficient is the standard measure of income equality. Our calculation of the Gini coefficient does not adjust for household size. As a result, the Gini coefficient should be interpreted as that of census families and non-families rather than individuals.

By moving 76,540 census families from a situation where the mother is out of the labour force to one where the mother is employed, the Canada-wide Gini coefficient improves marginally from 0.4419 to 0.4414. The impact on the Gini coefficient is minor given that the number of families that benefit from ECE is small compared with the total number of families across Canada. In our analysis, 76,540 census families would see a boost to their incomes, which is indeed a significant benefit. However, because the calculation of the Gini coefficient includes nearly 16 million census families in Canada, the overall impact would be small.

However, the small change in the national Gini coefficient brought about by the ECE investments should not be interpreted as a minimal social impact. If we narrow our focus to the impact on families with young children, the impact on the Gini coefficient is more pronounced. For families with young children (0 to 4 years old), the Gini coefficient would change from 0.360 to 0.352, a much more substantial improvement. Indeed, this represents a 2.3 per cent reduction in income inequality for families with young children, which is sizable for a policy investment that affects 0.5 per cent of census families.

Impact on Income Distribution

Another way to assess the impact of ECE investments on income equality is by examining changes in average incomes and the distribution of income. For all census families with young children, average income would rise from \$78,551 to \$80,286. While the average increase would Chapter 5 | The Conference Board of Canada

be roughly \$2,000 per family, the average masks the important impact the investments would have on families that benefit from this policy. The 76,540 families with mothers entering the labour force because of expanded ECE access would see their median income rise from \$51,380 to \$88,270—an increase of 72 per cent. Not only would median incomes rise, the distribution among families with children would become more equitable as families move from lower- to higher-income brackets. After the increase in maternal employment, there would be a smaller share of families in the lower-income brackets and a higher share of families making \$60,000 or more. (See Chart 17.)

Chart 17 Share of Families With Low Incomes Would Fall Under Optimal ECE Scenario (share of people in given income bracket, per cent)



Source: The Conference Board of Canada.

Impact on Poverty

Micro-level income data from Statistics Canada show that 43 per cent of families with young children where the mother doesn't work have family incomes below \$36,000—the low-income cut-off for a family with two children—compared with just 12 per cent of families with young children where the mother does work. Our analysis shows that investments in ECE that bring mothers into the workforce would result in a significant movement of families toward median incomes and away from lower incomes. (See Chart 18.) Overall, we estimate there would be 24,143 fewer census families earning less than \$36,000.

Chart 18

Changes in Income Distribution for Families With Children Aged 0 to 4 Under Optimal ECE Scenario

(change in number of families in each income range, versus baseline forecast)



Source: The Conference Board of Canada.

Moving families from the low end of the income distribution toward the middle of the income distribution would move many families out of poverty. Accounting for family size (families with three children, for example, have a higher low-income cut-off), our results show that improving access to ECE and moving 76,540 women back to the workforce would reduce the number of families living in poverty by 23,277. Because of our assumption that the families of women entering the labour force would have the same income distribution as families where the mothers are working, we see gains even at the higher income brackets.

Summary

Overall, the results of our analysis suggest investments in ECE would have only a small impact on the Canada-wide Gini coefficient. However, narrowing the focus to just families with young children shows ECE investments having a more substantial impact on the Gini coefficient. Furthermore, ECE investments that result in an additional 76,540 mothers entering the workforce would lift 23,000 families out of poverty while leading to a substantial boost in household incomes for those families.

CHAPTER 6 Policy Recommendations

Chapter Summary

- Despite the evident benefits of extended access to early childhood education, Canada lags its international peers in providing this service to young children.
- Governments face fiscal constraints, but policy-makers should prioritize initiatives with the highest economic and social returns, like ECE.
- Based on compelling evidence that the duration of ECE is an important factor in boosting math scores, which in turn leads to higher future wages, provinces should expand their provision of ECE services.
- Provinces and territories that do not currently offer full-day ECE programming to all children aged 4 and 5 should draft and implement a plan to provide these services so that children have equal access to the programming irrespective of their province or territory of residence.
- Provinces where full-day programming is already available to children aged 4 and 5 should plan to extend the provision of ECE to children aged 3. The remaining provinces and territories should work toward matching this coverage after they have implemented full-day programming for 4- and 5-year-olds.

The evidence presented in this report shows a clear return on investments in early childhood education. Not only does the investment return sizable economic benefits, but it also helps reduce inequality in society and raises many families out of poverty.

The results of our analysis have been mirrored in other studies, prompting this question: If ECE will benefit the economy and society, why are more funds not being spent on it to ensure that Canadian children receive the same access as children in other countries? There is no simple answer to this question, but from a practical point of view, it is reasonable to assume that part of the reason is limited fiscal capacity. Furthermore, with ECE investments, the cost is borne upfront. There are some immediate benefits from increased labour force participation, but many of the benefits accrue in the future when children who receive ECE enter the workforce. While empirical evidence can be used to estimate the probable future return, the benefits are not guaranteed, and although the costs of the program may deviate from the initial estimate, it is certain that implementing an expanded ECE program will require substantial funding.

Policy-makers must make difficult fiscal choices. The key is putting priority on initiatives that will have the highest economic and social return. Based on the evidence presented in this report, ECE is very likely to provide future benefits that outweigh the cost of the investment. Indeed, our analysis in Chapter 4 quantified only the impact of higher maternal labour force participation and a boost to future wages due to improved math scores, but the literature suggests there might also be important long-term benefits to human capital skills from ECE.

The results from this research show that where Canada is most lacking in its ECE provision is in the enrolment and duration of programming, and these factors are key determining factors in improving PISA math scores. With the literature suggesting that the longer a child has access to ECE the better, the most logical place to start is by ensuring fullday coverage across the country for children aged 4 and 5. Full-day Chapter 6 | The Conference Board of Canada

Some provinces and territories still require additional investments to make access to at least two years of ECE universal across the country. coverage is an essential component of any program expansion, given that the most immediate benefits accrue from higher maternal labour force participation, and a full-day program that includes access to care before and after school provides the best conditions to entice mothers into the workforce.

Some provinces have already made significant gains in ensuring ECE coverage for children aged 4. The next step for these provinces should be to expand service provision to children aged 3. However, other provinces and territories still require additional investments to make access to at least two years of ECE universal across the country. Ultimately, the goal for these regions would be to also expand ECE services to children aged 3 once they have provided full-day programming to kindergarten students.

Currently, 82 per cent of Canadian 5-year-olds and 37 per cent of 4-yearolds attend full-day kindergarten programming. Ensuring all children aged 4 to 5 have universal access would therefore necessitate creating full-day kindergarten spots for 316,500 children. Using the per student estimates for increased operating costs from our analysis in Chapter 4 (\$6,219 per student) and information on infrastructure costs from Ontario's expansion for children aged 4 and 5 (\$5,832 per student), this would cost \$2 billion in operating costs and \$1.8 billion in construction costs.

Additionally, if Canada were to expand ECE to reach the OECD average ECE enrolment rate of 69.9 per cent for 3-year-olds, an additional 87,600 children would need to be enrolled in programming. The per student operating cost is estimated at \$8,162 based on the child–staff ratio detailed in Chapter 4. This would result in an additional annual operating cost of \$715 million, assuming that the service is government provided. However, if the government were to expand its publicly provided ECE to reach the OECD average, it would also have costs for children currently enrolled in private ECE. Consequently, expanding ECE provision to 3-year-old children to reach the OECD average ECE enrolment rate of 69.9 per cent would cost \$2.2 billion in annual operating costs. If the program was universal, the annual operating costs would total \$3.2 billion.

While the costs of a government-funded ECE program are not insignificant, expanding early childhood education and care in Canada would provide sizable benefits. These include boosting the participation of women in the workforce, improving the educational outcomes for children (especially disadvantaged children), and reducing income inequality. Based on our analysis, the economic benefit derived from this investment would exceed the cost, and therefore further investments in ECE are recommended.

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APPENDIX A Summary of the Literature

This appendix summarizes the numerous articles that we looked at for background information to help us with the empirical analysis in this report. Insights into female participation rates attributable to ECE programs and employment and earnings for children when they reach adulthood have been garnered for the vast and varied literature on ECE programs. A summary of the literature and our conclusions are available in Chapter 2 of this report.

The appendix is divided into several different subsections, including the effect of ECE on female participation rates, inequality, children's behaviour and future earnings, and the benefits of these programs compared with the costs.

Female Participation Rates

Instead of analyzing the economic impact of ECE on children participating in the programs, some analysts have looked at the effect on mothers of children with access to these services. Economist Pierre Fortin examined the effect of Quebec's subsidized child care program, which was introduced in 1997, on mothers' labour force activities. He set out to answer several questions, including the degree to which mothers decided to seek employment as a result of the availability of subsidized daycare and the ensuing benefits for the Quebec economy from the additional employment.

For many mothers, the absence of reliable and affordable daycare can be a barrier to entering the labour force. Some remain out of the labour force entirely, while others work part time. Fortin analyzed the gap between women who worked irrespective of the availability of daycare services and those whose decision to work was due to these services. As of 2008, close to two-thirds of Quebec children aged 1 to 4 had access to subsidized \$7 per day daycare services. (The cost increased on January 1, 2017, to between \$7.75 and \$21.20 per day, depending on family income.) According to Fortin, families in other provinces have far less access to daycare services (less than 20 per cent). Demand for Quebec's program has increased sharply since its inception in 1997 and continues to outstrip supply.

Fortin noted that before the implementation of the daycare program, women from Quebec were less likely to work outside of the home than mothers living in other provinces. Over the past 20 years, this situation has changed significantly, as women from Quebec now have a higher participation rate than other women in Canada. Between 1998 and 2016 in Quebec, the participation rate for women aged 20 to 44 increased from 76 to 85 per cent. In other provinces, the rate increased by only 2 percentage points (78 to 80 per cent). In earlier research, Fortin found that the participation rate for women in Quebec aged 15 to 64 increased from 63 to 75 per cent between 1996 and 2011. For the rest of Canada, the rate increased from 68 to 74 per cent. Before the subsidized child care program was introduced, women in Quebec were less likely to participate in the workforce; they have subsequently matched or even surpassed women in other provinces in Canada.

Fortin concluded that by 2008, 70,000 more Quebec women were working outside the home because of the availability of subsidized daycare. That translated into a close to 4 per cent increase in women's employment in the province. The addition of more women to the labour force boosted Quebec's GDP by 1.7 per cent, according to Fortin. The higher income attributable to two-income households in Quebec generated more tax revenue and reduced demand for government transfers and credits. Parents of children enrolled in the subsidized daycare program don't qualify for the province's refundable tax credit, thereby reducing the cost of the credit for the provincial government.
The total increase in the province's GDP was \$5.1 billion in 2008. The higher GDP included the direct value of the additional labour supplied by the mothers and the revenue generated by added business investment in non-residential construction and in machinery and equipment required to employ the new labour entrants productively. Fortin also concluded that every \$1 spent on early child care resulted in an extra \$1.05 in higher taxes and lower family payments from the Quebec government. His analysis found that Quebec has a higher percentage of children from low-income families attending preschool compared with the other provinces.

Others researchers, who used data from the National Longitudinal Study of Children and Youth, confirmed Fortin's conclusions that the subsidized daycare program in Quebec had a significant impact on female participation rates. An analysis by Michael Baker and others found the employment rate for mothers with children aged 1 to 4 increased by 8 per cent between 2000 and 2008. Also, there was a 7 per cent gain in the participation rate for mothers of children aged 6 to 11. By 2010, the employment rate for mothers in Quebec had increased by 12 per cent.

Baker and others also found the participation rate for mothers with children aged 0 to 4 increased from 53 to 64 per cent between 1994 and 2003. In the rest of Canada, the rate expanded from 59 to 63 per cent. As with Fortin's research, Baker and others found the participation rate for women expanded at a faster clip in Quebec than in other Canadian provinces.

It is worth noting that while Baker and others concluded that Quebec's child care program had a positive impact on women's participation rates, their research was also critical of the effect of the program on the cognitive and non-cognitive outcomes for participants. They suggested that participants may have done well from an academic perspective but had worse outcomes for factors like health, life satisfaction, and crime compared with children in other provinces without access to subsidized child care. Critics of this research point out that the analysts linked child care to the behavioural outcomes of all Quebec children even though around half of them didn't participate in the subsidized program.

Other research has also been critical of some of the conclusions reached after analyzing Quebec's daycare program. The Fraser Institute has been very critical of the Fortin analysis, specifically the claim that the subsidized daycare program in Quebec has helped boost the female participation rate and income. The Institute contends that the increase in Quebec mothers' labour force participation rate since 1997 hasn't been a result of the child care program because the participation rate also increased in Atlantic Canada, even though there wasn't a similar child care program available in this region. Also, the Institute claims that only 40 per cent of the child care subsidy is recovered by the provincial government and, consequently, that Fortin can't claim the program pays for itself.

Fortin counters that there were other factors behind the increase in the female participation rate in Atlantic Canada in the late 1990s and 2000s. Atlantic Canada recorded better economic growth than Quebec during this period, and this led more women in Atlantic Canada to join the workforce. In the absence of the daycare program in Quebec, the weaker economic performance in Quebec should have resulted in a lower participation rate, according to Fortin. The fact that the participation rate for women increased in Quebec, despite poorer economic conditions, clearly indicates the importance of the subsidized daycare program in enticing more women into Quebec's labour force.

Other analysts have examined the experience of other countries regarding female labour market participation. Tarjei Havnes and Magne Mogstad's research on the effect of daycare on female participation rates in Norway concluded that the country's new subsidized child care programs crowd out informal care arrangements, resulting in almost no net increase in total care use or maternal labour supply. The effect of a 0.1785 increase in the child care coverage rate is estimated to have caused less than a 1 percentage point increase in maternal employment. This implies a 0.04 percentage point increase in maternal employment per percentage point increase in the child care coverage rate, which in turn suggests that the new child care slots were associated with a 96 per cent crowding out of informal care.

Elizabeth Cascio found that the introduction of subsidized kindergarten had no impact on maternal labour supply in the U.S., and Daniela Lundin and others found minimal effect on maternal labour supply in Sweden. This is not to suggest that the literature finds no impact on female labour force participation from access to child care outside of Quebec. In a study published by OECD, Olivier Thévenon found that access to child care was indeed one of the drivers of higher female employment across the 18 OECD countries studied in his analysis.

Income Inequality, Social Benefits, and ECE

Income inequality has increased over the past few decades, with growth accelerating sharply since the end of the 2008–09 recession as the wealthy have become even richer while the income of everyone else in the U.S. has either remained stagnant or declined. Unfortunately, the reasons behind the disparity in income suggest that growing income inequality will be a difficult challenge to solve over the next few years. This problem is especially apparent in the U.S., but income inequality has also increased in Canada and Europe over the past few decades.

The U.S. has historically trumpeted the fact that it is a middle-class society. However, changes in income distribution since the late 1970s belie this claim. The share of income going to the top 1.0 per cent of U.S. families grew from 8 per cent in 1979 to 18 per cent in 2008. In fact, the gains were even greater the further up the income distribution scale. The super-rich—families at the 99.99th percentile—saw their real incomes surge by over 300 per cent between the late 1970s and 2008. At the same time, real median household incomes increased by a miniscule 7 per cent. Even when household income is adjusted to include benefits such as employer contributions to health care plans, incomes for average American families have grown by only around 1 per cent per year since 1980.¹

Several researchers studying the effect of ECE contend that these programs could help address the issue of growing income inequality by improving educational opportunities for disadvantaged children. This

1 Beckman, "Is Income Inequality a Fact of Life in the U.S. Economy?"

could enable these children to escape the poverty trap and boost their earnings later in life. Fewer people living in poverty and more people reaching the middle class could possibly reduce the gap between the rich and poor in Western society.

OECD has noted that access to affordable ECE allows for participation in the labour force, boosts family income, and helps reduce the risk of family and child poverty. It has also noted that disadvantaged children are disproportionally more likely not to attend formal ECE.²

Other researchers have looked at how the gap in earnings between low- and high-income Canadian families affects attendance in ECE programs. In 2016, Rachel Bryce and others also examined the issue of income inequality as it relates to ECE. They note that the top 10 per cent of wage earners in Canada receive around \$200,000 per year or more. This high income enables these families to provide their children with quality child care and extracurricular activities; their children also have a high probability of attending university. Conversely, families at the bottom 10 per cent generally earn about \$30,000 per year, less than half the average annual family income in Canada of close to \$80,000. The bottom 10 per cent is where many First Nations families are positioned. The median income of Canada's Indigenous population in the 25 to 64 age cohort is about \$11,000 lower than their non-Indigenous counterparts. In 2011, the post-secondary graduation rate for First Nations young people was only 35 per cent, compared with 78 per cent for their non-Indigenous counterparts.

The authors note that numerous studies reveal that early child development is important for future well-being and that the role of education can't be neglected, especially given its potential impact on future income, health, and life expectancy. Extensive research reveals that early child literacy skills, even those acquired prior to attending kindergarten, can have a positive effect on academic achievements. Apart from Quebec, Canadian provinces spend very low percentages of GDP on ECE, and this can influence later development. In British Columbia, for instance, around one-third of children who

2 OECD, Who Uses Childcare?

start kindergarten are vulnerable in at least one key area of early child development.

Canada consistently ranks among the highest countries in having an equitable education system. However, Bryce and others note that socioeconomic issues that affect the quality of early education continue to be a problem in elementary and secondary school systems. When comparing students from families in the top and bottom 10 per cent of earners, there remain sharp differences in children's readiness for school and the ability of parents to support their children's education. Children from low-income families have far greater behavioural problems than children from wealthier families and are less likely to attain an education that would enable them to escape poverty and earn incomes that could potentially lower income inequality in Canada.

Brenda Taggart and others highlight several results from studies of The Effective Preschool, Primary and Secondary Education Project, which focused on analyzing the impact of preschool in the United Kingdom. Research from this project has pointed to short-term benefits in both academic achievement and social behaviours. The effects tended to lessen over time, but high-quality preschool programs were consistently tied to better academic and social outcomes in later years. The research also indicated that when students attended a high-quality preschool, there were improvements in social behaviour at age 11 that were especially apparent in boys, those with special needs, and students from disadvantaged backgrounds. Even at age 16, there were large improvements in English and math scores for children from homes with parents who had low or no qualifications compared with similar children who had not had the opportunity to attend a high-quality preschool.

From a U.S. perspective, Katherine Magnuson and Greg Duncan contend that ECE provides key support for human capital development that provides long-run opportunities for higher earnings. There is also convincing evidence suggesting that attending a high-quality prekindergarten program for a year or two leads to long-lasting gains in educational attainment and earnings. However, the benefits can vary depending on the areas being served and the emphasis of the different programs. Currently, around 25 per cent of U.S. children don't attend preschool before going to kindergarten. Because children from low-income families are less likely to attend ECE programs than children from wealthier families and because income gaps in early childhood are a good predictor of human capital accumulation later on in life, Magnuson and Duncan advocate for government policies to increase attendance in ECE programs. Policies to expand enrolment should consider barriers to attendance like language and location. They estimate that although it would cost close to \$10 billion to provide publicly funded ECE programs for children in the bottom three income quintiles, even ECE programs with relatively miniscule benefits on children's achievements would break even over the long term.

The literature also contains numerous studies focusing on the superior cognitive abilities of children attending ECE programs. Better human capital skills can result in better employment opportunities later in life, less teenage pregnancy, and lower incarceration rates, thereby potentially reducing income inequality when the children who attended ECE programs reach adulthood.

Ron Haskins and W. Steven Barnett found that early mathematics, reading, and attention skills are sound indicators of educational attainment. Other research in the U.S. by Betty Hart and Todd R. Risley concluded that poor verbal skills by age 3 can lead to weaker language and literacy skills once the child starts school, and these trends tend to continue for the entire time the child is in school. ECE programs can also provide parental support and education to reduce these inequities.

OECD conducted one of the largest benchmark studies assessing the skills of children who had access to ECE education compared with those who didn't. The results, detailed in *Starting Strong 2017: Key OECD Indicators on Early Childhood Education and Care,* clearly revealed that children involved with ECE tended to perform better than those who didn't over a wide range of indicators.

Studies also reveal that children who start kindergarten with a higher skill set generally experience fewer grade repetitions and higher post-secondary attendance than those who start with weaker skills. Consequently, job prospects are more numerous and earnings are

higher, a development that sharply lowers the likelihood of young adults ending up on welfare. The Centre for Spatial Economics found that children participating in early childhood education programs were later less likely to smoke and use drugs and were also far more likely to own a car or home as adults.

From a U.S. perspective, New Jersey's Abbott preschool program provides compelling evidence of the impact of ECE on children's development. The program provides high-quality pre-kindergarten to all children in 31 New Jersey communities with elevated levels of poverty. The children in this program were analyzed in terms of the program's impact on learning and development. The 4th and 5th grade followups for children involved in the state program found they had higher achievements in language, arts, and literacy than children who weren't enrolled in the program. Two years of pre-kindergarten involvement beginning at age 3 had even larger and more persistent impacts than one year of pre-kindergarten.³

Similarly, the state of Tennessee has conducted several assessments of the effectiveness of its pre-kindergarten program to verify the degree to which children who participated in the program had better educational outcomes than children who didn't attend pre-kindergarten. It concluded that children attending the Tennessee program learned more quickly than children in the control group. The results were especially significant for children from disadvantaged homes who attended pre-kindergarten programs. However, consistent with studies in other jurisdictions in the U.S., the positive results for academic skills associated with these ECE programs started to dissipate by Grade 2.⁴

Several studies looking at the effect of ECE programs on social skills have focused on Head Start, an American preschool program for less privileged 3- and 4-year-old children. The program began in the 1960s as part of President Johnson's "War on Poverty." The purpose of Head Start has been to bring low-income children closer to the level of their more advantaged counterparts by the time they are ready to attend regular public schools. The program was designed to accomplish these goals

Find Conference Board research at www.e-library.ca.

³ Barnett and others, Abbott Preschool Program Longitudinal Effects Study.

⁴ Strategic Research Group, Assessing the Effectiveness of Tennessee's Pre-Kindergarten Program.

by providing a wide range of programs, including medical screenings, nutritious meals, and parental training.

Janet Currie and Duncan Thomas used data from the U.S. Bureau of Labor Statistics' National Longitudinal Survey of Youth to compare children who attended Head Start with their siblings who didn't participate in the program. They concluded that the vocabulary gap for children aged 5 in Head Start and average children closed by around 30 per cent. However, the program failed to bring poor children up to the average child in vocabulary skills. They also found that the effect of Head Start faded for African-American students after three or four years, although the results of Head Start did not dissipate for non-African-American students. The reason why Head Start doesn't have the same long-term benefits for African-American children is linked to the fact that many children go on to attend inferior quality schools compared with children from more advantaged families.

David Deming also found that the effect of Head Start on math and communication skills faded for African-American and other disadvantaged children as they progressed through grade school. However, these children experienced benefits on non-test-score outcomes like grade repetition, learning disabilities, high-school graduation, and health. He argues that Head Start provided 80 per cent of the benefits of more intensive programs at about 60 per cent of the cost.

Other studies examining the effect of Head Start and similar programs include an analysis of the Chicago Child-Parent Centers, an intervention that started with an enriched preschool followed by an enriched curriculum for school-aged children up to age 9. The program is like Head Start. Arthur J. Reynolds and others followed the children in this program through high school and compared them with children from the same regions who had not taken part in the program. They found beneficial results in terms of reduced delinquency and crime and improved skill tests.

Jens Ludwig and Douglas L. Miller examined the poorest 300 counties in the U.S. that were given special assistance when applying for Head Start funds. The presence of assistance means that children from those

counties were more likely to attend Head Start than children in betteroff counties that received no application assistance. They found that the availability of Head Start was linked with lower mortality rates among 5- to 9-year-old children and with a greater chance of finishing high school.

Maria Fitzpatrick examined the impact of pre-kindergarten on math and cognitive skills in Georgia. She notes that universal pre-kindergarten like the one implemented in Georgia differs from programs like Head Start in that access is open to all children. Fitzpatrick used data from the National Assessment of Educational Progress to assess the long-term educational achievements of children who attended pre-kindergarten. She found that universal pre-kindergarten programs resulted in lasting benefits for the academic achievements of children, with a 12 per cent increase in test scores for disadvantaged children in Georgia living in regions with low levels of population density. Given that disadvantaged children in rural areas make up close to 20 per cent of the student population in the state, these results are important. The results are consistent with other studies of pre-kindergarten programs in the U.S., which revealed that children in rural areas benefit the most from these programs. Fitzpatrick also found that the results weren't as robust for children living in urban areas.

David Figlio and Jeffrey Roth studied the effects of public prekindergarten participation in Head Start programs on student behavioural outcomes in Florida. They found that positive behavioural outcomes weren't attributable to the presence of community-based Head Start programs. Instead, better behaviour was due to the differences in the communities where the programs operated. The behavioural advantages of programs like Head Start were concentrated in the poorest neighborhoods where Head Start tends to operate. Conversely, in well-to-do communities, they didn't find reliable evidence suggesting that public pre-kindergarten programs lead to positive behavioural outcomes. The authors attribute the differences to superior community institutions in wealthier communities and the availability of private prekindergarten alternatives.

Alex Smith's research on ECE focused on the effect on criminal activity later in life. He notes that the share of U.S. children aged 4 attending

pre-kindergarten reached close to 30 per cent by 2013, double what it was in 2002. The Wall Street Journal referred to the sharp increase as the most significant expansion in public education in America in the 90 years following the end of the First World War. Proponents of ECE funding contend that both economic and social difficulties like crime and teen pregnancy can be alleviated by having more children attend pre-kindergarten.

Smith used data on criminal activity in Oklahoma to run regressions and estimate the impact of the state's universal pre-kindergarten program introduced in 1998. He differentiated the results of the regressions by race given that African-American children are four times more likely to face criminal charges by the age of 18. He found that African-American children were less likely to become involved with the criminal justice system in Oklahoma if they attended universal pre-kindergarten programs. Smith also concluded ECE programs didn't have an impact on criminal behaviour for Caucasian children. This indicates that the benefits of ECE programs may be concentrated with higher-risk populations.

One of the most important analyses of the effect of ECE on children's behaviour later in life was completed by Deborah Phillips and others in 2017. They reached several key conclusions from a review of the vast amount of literature on the effect of ECE programs in the ECE literature going back a few decades:

- "Studies of different groups of preschoolers often find greater improvement in learning at the end of the pre-k year for economically disadvantaged children and dual language learners than for more advantaged and English-proficient children.
- Pre-k programs are not all equally effective. Several effectiveness factors may be at work in the most successful programs. One such factor supporting early learning is a well implemented, evidence-based curriculum ...
- Children's early learning trajectories depend on the quality of their learning experiences not only before and during their pre-k year, but also following the pre-k year. Classroom experiences early in elementary school can serve as charging stations for sustaining and amplifying pre-k learning gains ...

- Convincing evidence shows that children attending a diverse array of state and school district pre-k programs are better prepared for school at the end of their pre-k year than children who do not attend pre-k. Improvements in academic areas such as literacy and numeracy are most common; the smaller number of studies of social-emotional and self-regulatory development generally show more modest improvements in those areas.
- Convincing evidence on the longer-term impacts of scaled-up pre-k programs on academic outcomes and school progress is sparse, precluding broad conclusions. The evidence that does exist often shows that pre-k-induced improvements in learning are detectable during elementary school, but studies also reveal null or negative longer-term impacts for some programs."⁵

Most of the literature examining the effect of ECE programs on social, cognitive, behavioural, and literacy skills reveals that there are positive outcomes for children who are fortunate enough to attend these programs. However, there are important qualifiers. Much of the research shows that ECE programs are particularly beneficial for children from poorer households. Conversely, the benefits for children from wealthier households are not as apparent. This stands to reason, as parents from wealthier families can provide even more assistance for their children over and above attending ECE programs. These include hiring of private tutors if required.

Quality is important not only in the ECE programs themselves but also in subsequent education. Some of the research discussed above suggested that the benefits from ECE programs for disadvantaged children begin to fade after a few years. This could be attributable to the fact that a child benefiting from an ECE program could quickly lose the gains if the elementary school is of inferior quality. The best ECE programs can't overcome the problems that children encounter in schools where violence, poor equipment, and subpar teachers are a fact of life. This is major problem in many major U.S. cities, but Canada is not immune from these difficulties.

5 Phillips and others, The Current State of Scientific Knowledge on Pre-Kindergarten Effects, 29.

Labour Market Outcomes for Children Receiving ECE

The previous section looking at the literature on ECE programs and inequality found that children who attended these programs developed better human capital skills that potentially enabled them to find better jobs and earn higher incomes than children who didn't attend ECE programs. Some of the literature has attempted to quantify the extra earnings that children can attain by attending ECE programs. The results vary considerably depending on the assumptions used in the analysis. Some studies concluded that earnings were sharply higher for children attending these programs, while others didn't find much of a difference. One study concluded that females benefited more than males in terms of future earnings from ECE programs, while others determined that children from more disadvantaged families had larger increases in wages in adulthood than children from more privileged backgrounds. This makes intuitive sense, as children from more privileged families are more likely to earn more money than children from poor families irrespective of whether they attended ECE programs.

A 2011 study by Tarjei Havnes and Magne Mogstad looked at the longrun impacts on children who received care under the universal child care program implemented in Norway in 1975. They estimated that universal child care decreased the probability of dropping out of high school by nearly 6.0 percentage points while increasing the probability of attending college by almost 7.0 percentage points. They concluded that the expansion of universal child care programs decreased the probability of being a low earner by about 3.6 percentage points. In comparison, the probability of having at least average earnings increased by 5.1 percentage points. However, the effect on high and top earners went in the opposite direction, reducing the probability of higher earnings by around 3.0 per cent. It should be noted, however, that the estimation results for high and top earners were not as robust as the other findings. On balance, the evidence from this research suggests that universal child care programs have an equalizing effect on income equality.

Gordon Cleveland and Michael Krashinsky linked the potential for future earnings to improved cognitive performance. They found that for

Canadian children with access to ECE programs, improved cognitive abilities of between 4 and 10 per cent at age 10 can result in similarly higher wages of 4 to 10 per cent.

Raj Chetty, John Friedman, and Jonah Rockoff found similar results. Using a school district and tax records for more than 1 million children, they estimated that a 1 standard deviation improvement in test scores correlated with a 12 per cent increase in earnings when workers reach their mid-to-late 20s. Assuming this relationship continues to hold across the rest of the workers' careers, this estimate implies an annual earnings impact of 1.3 per cent.

Robert Lynch and Kavya Vaghul recently completed a major econometric analysis of the effect of ECE programs on future earnings in the United States. They found that worker compensation would increase by \$108.4 billion (in 2014 dollars) through 2050 for children who attended ECE programs. This worked out to an average increase of \$1,832 for each ECE participant plus an increase of average compensation of \$1,202 for the guardians of pre-kindergarten participants prior to taxes. The authors concluded that the benefits accrued disproportionally to children from lower- and middle-income households because these children benefited the most from high-quality ECE programs. Children attending these programs from wealthier families don't benefit as much because their families can afford to send them to other educational assistance programs.

Some of the literature didn't find a significant increase in adult earnings for children who attended state ECE programs in the United States. Elizabeth Cascio and Diane Whitmore Schanzenbach looked at the long-term effect of ECE programs on a wide variety of indicators, including earnings in adulthood. Their study found that attending preschool boosted test scores of low-income children as late as Grade 8 while also increasing the probability that mothers worked. There was no positive impact on high-income children, as they would have been enrolled in private preschool programs if there hadn't been the public program.

In the PISA surveys, OECD asks students to self-report the duration for which they received pre-primary education. OECD is then able to determine how much improvement in science and math scores is a result of having access to more than one year of ECE. After accounting for socio-economic differences, half of the OECD countries showed a statistically significant improvement in science scores at age 15 after having attended ECE, although there was no statistically significant benefit in Canada. There was also an observed difference in math scores based on the duration of ECE, with Canada showing a statistically significant increase in math scores for children who attended more than one year of ECE. This is a notable finding given the above evidence in the study by Chetty, Friedman, and Rockoff that shows that higher test scores can econometrically be linked to higher future wages.

Cost-Benefit Analysis of ECE Programs

Some of the factors discussed in this appendix—including higher female participation rates and employment earnings linked to better cognitive, reading, mathematical skills, etc.—have been quantified in numerous studies referred to as cost-benefit analyses. Typically, the researchers compare the original costs of the ECE program per child to the benefits derived when they reach adulthood from potentially higher employment earnings, higher taxes paid, lower social welfare use, and possibly reduced incarceration costs. Then the total costs of the ECE programs per child are compared with the benefits per child to obtain a return on investment. Many of these studies are examined below.

Economists from Canada have completed cost-benefit studies of investing in preschool programs. Canada's largest study was led by Ray Peters at Queen's University. The study looked at eight different communities and focused on children from birth to 4 years of age and on kindergarten-aged children to 8 years of age. Each site received funding to improve, among other things, in-school activities, homework support, home visits, and parenting classes. Long-term positive impacts were found for children from the communities with enriched programming in the children in the 4 to 8 age cohort but not for the younger age cohort (0 to 4). Data were collected for children who took part in the superior programs in grades 3, 6, 9, and 12. Overall, the study revealed that the children used health, special education, social services, and criminal justice services less than those children in the control group. The

lower use of special education services, for instance, saved more than \$5,000 per child by Grade 12.

Peters attributes the lack of positive benefits from preschool programs for younger age cohorts (0 to 4) to the fact that most young children don't have access to the support programs that are available to children when they start school. Canada has a strong public school education program and, consequently, when children turn 5, they have a multitude of programs available to their families to improve both cognitive and noncognitive skills.

Susan Prentice from the University of Manitoba and Molly McCracken examined the impact of Winnipeg's child care sector on the regional economy. They found that for every child daycare job, 2.15 other jobs were either created or sustained in the local economy. Every \$1 invested in child care provided a return of \$1.38 for the Winnipeg economy and \$1.45 for Canada's economy. In 2007, Prentice also examined the child care programs in rural and francophone regions of Manitoba. This analysis found higher returns: every \$1 spent on child care generated \$1.58 of positive economic effects for the region.

Robert Fairholm has examined the economic benefits for Canada from ECE programs. He concluded that both the GDP and employment multipliers for investment in ECE are high because leakages from imports (reduced economic benefits due to spending on imports instead of domestic goods and services) are low and the labour share of total costs is high. The direct and indirect GDP multiplier (the overall increase in GDP caused by a \$1 increase in spending on ECE) is 0.9, one of the highest for all industries in the country (given that it is a labour-intensive industry), behind only financial services, education, and retail trade. The direct, indirect, and induced multiplier is 2.3, higher than every other industry in Canada. The GDP multiplier for Ontario is also 2.3, while for Nova Scotia the multiplier is 2.2. When interpreting the results of this analysis, it is important to note that Fairholm used multiplier numbers that are much higher than the multipliers reported by Statistics Canada for the sector. The U.S. multiplier for investment in ECE, meanwhile, is 1.9, while the U.S. direct employment multiplier is 36.9 jobs for every \$1 million invested in the economy.

Fairholm also concluded that investing in preschool education led to lower grade failures for children, less reliance on special education, and lower rates of smoking. Investing \$1 in ECE programs resulted in a payback of \$2.54 after considering all the benefits and costs for the child over the long term.

Craig Alexander and Dina Ignjatovic at TD Economics offer some word of caution when assessing cost-benefit analyses in Canada. While the studies are uniformly positive, claims that initiatives will somehow pay off themselves should raise some degree of skepticism. The costs of setting up ECE centres can be higher than anticipated, as construction costs, for instance, can easily run over budget. Operating costs can also run above estimates.

The benefit side of the analysis is even more complicated because it is challenging for researchers to separate some of the factors that influence labour market participation rates. Analysts frequently assume that the labour participation rate will increase as mothers return to work and earn income once their children are enrolled in child care programs. Studies of the situation in Quebec have revealed that the female participation rate increased following the provision of subsidized daycare. However, the participation rate also increased in the rest of Canada during the same time period, suggesting that other factors in addition to daycare led more women to enter the workforce. It is worth noting, however, that, while the participation rates for women have increased in every province in Canada, it remains highest in Quebec.

These costs-benefit analyses also assume mothers can find jobs that meet the average hours worked assumed in the studies and that workers are paid the median or average salary. If women returning to work end up in low-wage, low-skilled positions, the benefits attributed to ECE would not be as high as expected and the anticipated costbenefit analysis could be inaccurate. Long-term benefits are even more difficult to quantify because of the many unknowns that can transpire in the future.

Both the experimental and control groups used in cost-benefit analysis can be influenced by external factors that add a bias to the subsequent results. For instance, changes in parental involvement with their children

can affect the positive outcomes from ECE programs. Studies reveal that young children benefit significantly from having their parents read to them, for instance. Consequently, the benefits attributable to ECE programs later in a child's life could be due to parental involvement as opposed to ECE. Alternatively, it could also be argued that parents' exposure to ECE programs could encourage them to become more involved in their children's early education.

Turning to the U.S., several researchers examined the effect of preschool education on children from disadvantaged backgrounds. The participants were mainly African-American children from families with low incomes and one-parent families. Since many of these studies looked at targeted programs aimed at high-risk children, the results cannot be considered indicative of benefits from a universal program.

The Perry Preschool Project, the Abecedarian Project, and the Chicago Child-Parent Center Program tracked the participants in ECE programs for decades and found that children in the preschool groups had higher high-school and college graduation rates compared with the control group. For the children with mothers who didn't finish high school, graduation rates from high school were about 10 per cent higher while rates of substance abuse were around 10 per cent lower compared with children who didn't attend preschool. The results were particularly superior for male children who attended pre-kindergarten.

The returns from investing in preschool education ranged from \$4 to \$17 for every \$1 invested. The studies looked at employment outcomes, taxes paid, and costs incurred from incarceration to estimate the costs and benefits of these investments.

Robert Lynch and Kavya Vaghul also studied the costs and benefits of ECE programs in the United States. They note that past research strongly suggests that investments in ECE provide significant benefits for children and society and can also lead to accelerating economic growth and a reduction in inequality. Their research looked at the benefits and costs of investing in public, voluntary high-quality prekindergarten programs made available for all 3- and 4-year-old children in the entire country. They broke down the benefits and costs at the state and national levels and found that the programs have improved the economy's competitiveness while, at the same time, improving a range of fiscal, social, and health problems in the country. The authors concluded that a universal pre-kindergarten program would easily pay for itself. By 2050, a universal pre-kindergarten program would result in \$8.90 in benefits for every \$1 invested, leading to total benefits of \$304.7 billion by 2050. Close to \$82 billion of the benefits would come from government savings, \$109 billion from savings for individual families, and \$115 billion from a combination of less criminal activity and better health outcomes.

Jennifer MacGillvary and Laurel Lucia examined the economic impact of ECE in California. ECE is an important industry in the state, as it serves more than 850,000 children and families. The program brings in gross receipts of labour of \$5.6 billion annually. The authors note that previous analysis of ECE in California concluded there have been substantial savings over the past few decades attributable to a reduced need for remedial and special education, lower teen pregnancy, and incarceration rates. Their research found that every \$1 spent on ECE led to \$2 in economic output for the California economy. This occurs because ECE expenditures result in demand for suppliers and at the businesses where ECE families purchase goods and services. Also, spending on ECE supports 200,000 jobs—direct positions in the ECE sector and jobs in educational supply, food, health care, and other industries. The ECE sector provides state and municipal governments with an extra \$500 million annually.

Jorge Luis García and others looked at the impact of two preschool programs in North Carolina. The programs provided developmental resources to disadvantaged African-American children from birth to age 5, including nutritional, health, and early learning services. The authors note that most research on the impact of ECE programs focuses on short-term increases in academic performances. Their research looked at human development right up to age 35.

For females, the programs had a positive impact on high-school graduation, years of education, adult employment, and income compared with children who didn't participate in the programs. For males, the results show lower drug use and higher education and income. The

authors also found that the mothers of the children taking part in the programs were in a better position to enter the labour force and increase earnings.

The rate of return for the North Carolina programs indicated they were an excellent investment. Every \$1 spent on disadvantaged children from birth to 5 years of age delivered a 13 per cent annual return on investment. These economically sensitive returns accounted for the welfare costs of taxation to finance the programs. The costs of the programs were \$18,514 in 2014 U.S. dollars. The authors noted that child poverty is an increasingly common problem in the U.S. and, consequently, investing in quality ECE programs represents a powerful and cost-effective way to mitigate the impact of poverty and poor health on child development.

Williams T. Dickens, Isabel Sawhill, and Jeffrey Tebbs analyzed the impact of ECE on economic growth in the United States. They noted that economists generally contend that investments in education are a key source of economic growth and potential. In the three or four decades prior to the Great Recession, real output in the U.S. increased at an average annual pace of about 3.5 per cent. Growth in labour productivity—the driving force behind rising standards of living— expanded at a 2.4 per cent annual pace. Economists estimate that education's contribution to productivity growth was around 13 to 30 per cent of the total gain. In fact, the contribution of education to labour productivity has likely increased in importance as the economy has shifted from an industrial to a more knowledge-based economy.

The authors used an econometric model to estimate the impact of preschool policy intervention on education and then looked at the effects of the added education on economic growth compared with the growth without the additional education attributable to pre-kindergarten programs. They used evidence from national preschool programs from the entire population of 3- and 4-year-old children in the U.S. to simulate their econometric model and assess the effects on economic variables like GDP and employment. This type of econometric analysis is referred to as "shock minus control." The authors concluded that preschool programs at the national level could add \$2 trillion to annual U.S. GDP

by 2080. By 2080, a national pre-kindergarten program would cost the federal government close to \$60 billion but would generate enough additional growth in government revenue to easily cover the cost of the program. The superior education outcomes from a national program would lead to higher employment and income which result in greater GDP over the long term.

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