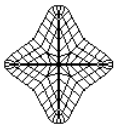

The Centre for Spatial Economics

Assessing past, present and future economic and demographic change in Canada

Early Learning and Care Impact Analysis

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Abstract

About this Report

This report examines the benefits and costs of the early learning and care system proposed by the Pascal report on early learning and care for Ontario. The short and long-term economic benefits are calculated for the Ontario economy from the operation of the proposed early learning and care system. It is found that the early learning and care system boosts the economy by $2.0 per dollar of expenditure in the short run. In the long run, the benefit to cost ratio is estimated to be 2.4 to one.

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Executive Summary

The implementation of the proposed early learning and care system outlined in Pascal (2009) will create substantial short, medium and long-term benefits for Ontario. This report examines the economic implications of the proposed changes as of the first year of full operation in 2012-13 using conservative assumptions.

Pascal proposes to increase expenditures by up to $990 million in order to introduce an Early Learning Program (ELP) for children aged 4-5 years so that they can have full day learning provided by school boards at no additional cost to parents. Extended day/year learning and care programs for children in kindergarten, primary grades and children 9-12 will be provided where numbers warrant on a fee per child basis. The report also proposes a significant re-engineering of current services for children 0-3 in order to develop Child and Family Centres (CFC) to provide integrated services for these children and their parents. It is envisioned that this will be accomplished by reallocating $1 billion of current funding. Capital costs worth $1.7 billion over 25 years will be needed to build new classrooms and to renovate existing classrooms. Funding for these initiatives will be accomplished by using $1 billion of new funding, and re-organizing $1 billion of current spending.

These proposals will boost the amount of spending in the economy by 2012-13 via several channels. First, as expressed by Pascal, the introduction of the ELP for children 4-5 will result in new expenditures of up to $990 million. Moreover, the introduction of all day learning for children 4-5 will likely boost the utilization rate for this group, which we estimate will lead to an additional 12,800 children receiving JK/SK education. Second, Pascal foresees that the re-organization of Early Learning and Care (ELC) will lead to lower fees for extended day/year programming for children 4-8. Since Canadian parents are very price sensitive this will cause a significant increase in utilization rates for these programs. We estimate that lower fees will encourage an additional 126,300 children aged 4-8 to use extended day/year programs. This will cause total parental expenditures to rise by an estimated $480 million. Third, although the reorganization of CFC will not have a significant net effect on the economy in the short-term because total spending stays the same, there is the prospect of rising utilization over time. Fourth, Capital costs over 25 years are expected to be $1.7 billion, but the cash costs are estimated to be $570 million on average over the first three years to ensure that there are sufficient classrooms for the programs to commence. In total, the injection of money into the economy from the proposed changes is $2,040 million by 2012-13. This spending will cause a large increase in GDP.

For the proposed system, it is estimated that one dollar of spending for ongoing operations increases GDP in Ontario by $2.02 and by $1.90 for the GTA and Toronto. For capital spending, one dollar of spending adds $1.47 to GDP for Ontario and $1.36 for the GTA and Toronto. Combined these effects are worth 1.87 per dollar of spending in 2012-13. The total employment multiplier for the operation of the new system is estimated to be 29.3 for Ontario, 27.6 for the GTA and 27.6 for the city of Toronto per million dollars of spending. The total number of jobs created per million dollars of capital expenditures is 20.1 for Ontario and 18.8 for the GTA and Toronto. Notably, the multiplier effects from ongoing operations in particular are above the stimulus to the economy from the expansion of most other industries and are above the short-term impact on the economy from an increase in taxes to pay for these proposals.

After factoring in the change in revenues and costs of the new extended day/year programming for children 0-12, we estimate there would be roughly $60 million in extra funding available to support additional fee subsidies. At the expected amount of fees per child in the new system, this would provide an additional 6,420 subsidized spaces for children 0-3 or 12,890 subsidized spaces for children 6-8. If subsidies are distributed across all age groups in the same proportion as current subsidies there would be 9,710 new subsidized spaces. In total our estimates suggest that Pascal's proposals will increase the number of children receiving early learning by 139,200. The more children receiving quality education the greater the long-term benefits are to society.

Long-term benefits from the implementation of the proposed ELC system can be divided into benefits to children and parents/mothers. The primary quantifiable benefit to children is higher future income due to lower high-school dropout rates and consequently higher post-secondary attendance rates. The primary quantifiable benefits to parents/mothers are increases in present earnings due to higher labour force participation rates and increases in future earnings due to more work experience and higher post-secondary completion rates. Qualitative benefits include improved psychological outcomes from higher quality care. It is found that the ratio of long-term benefits relative to long-term costs for Ontario is 2.42, and is estimated to be 2.21 for the GTA and 2.24 for the city of Toronto. These long-term estimates are based on conservative assumptions and are in the range of the benefit-to-cost ratios that other researchers have estimated for universal programs. These short and long-term benefits clearly indicate that the implementation of the Pascal recommendations will benefit the Ontario economy and society.

The number of children who will benefit from improved access to quality education is expanding. Demographic projections show that the number of children needing ELC will expand for the foreseeable future, which means the net economic benefits from changing the ELC system will be magnified in the future beyond the estimates for the first year of the operation of the new ELC system highlighted in this report.

Introduction

This report analyzes the short- and long-term economic implications of the implementation and operation of the early learning and care system (ELC) as outlined in Pascal (2009) for Ontario and the city of Toronto. The focus of the report is on the ELC system when first fully implemented by 2012-13.

To understand the economic implications of the Pascal report it is helpful to understand several factors including: the proposed changes to early learning and care services, the number of children who likely will be affected by these changes, the short and long-term economic effects that flow from these changes.

To simulate the short-term impact of the Pascal report on the economies of Ontario and Toronto, the direct and indirect economic impacts resulting from a change in money injected into the Ontario economy is estimated using Statistics Canada's input-output model simulations for Ontario. These results were distributed to sub-provincial areas based on the number of affected children. The induced economic impact was also estimated to ensure that the full short-term effects are included. The approach to determine the induced effect used the C_4SE Ontario regional model. The Ontario regional model has the Greater Toronto Area (GTA), but not specifically the city of Toronto. The induced effect was distributed between the city of Toronto and the GTA outside of Toronto based on the number of children affected.

The long-term benefit/cost analysis rests on the approach taken by Fairholm (2009a) and uses various data for Ontario, the GTA, the Toronto Census Metropolitan Area (CMA) and the city of Toronto. The basic approach is to calculate the net present value of all benefits to children, parents and the economy, as well as the net present value of costs to society over the next 80 years.

The analysis is divided into four main sections. The first section supplies a brief synopsis of the proposed changes to the ELC system in Ontario and some broad discussion of the implications. The second section identifies the number of children in Ontario and Toronto who will potentially be affected by changes to the early learning system. The third section outlines the short-term economic impacts of the proposed early learning and care system, and the fourth section outlines the long-term economic impacts of the proposed early learning and care system. A detail discussion of the methodology used can be found in the appendices.

Pascal Report Synopsis

The Pascal report recommends several changes to the early learning and care services in Ontario. Some changes will affect children in all age groups, while other changes will affect specific demographic groups. The proposals will clearly involve children in four distinct cohorts: 0-3, 4-5, 6-8 and 9-12 years. Other proposals have the potential to affect children with special needs. The proposals will influence the number of children using ELC services, potentially the quality of ELC, as well as the developmental and educational outcomes for children. To understand the potential effects it is helpful to summarize the changes that are proposed and the broad implications of these proposals and the assumptions used in the analysis before examining the impacts in detail.

Pascal proposes a common programming framework for all of Ontario's early childhood settings based on Early Learning for Every Child Today (ELECT). The continuum of development and guidelines of practice in ELECT will provide a common approach, tools and guidance for working with children zero to eight years, including in Child and Family Centres (CFC), the Early Learning Program (ELP) and the primary grades.

Pascal also states that Ontario needs a consistent approach to screening all children as early in life as possible. He proposes using the Nipissing District Developmental Screens (NDDS) throughout the province. The NDDS offers 13 screens that assess children's development at intervals between 1 month of age and 6 years. The NDDS is also included in the enhanced 18-month well-baby visit

now in development in Ontario. Pascal envisions the visit as being a prime occasion to connect parents with CFC and other community services. He also proposes that a further developmental check should be carried out at registration for the Early Learning Program. Therefore Pascal proposes assessments of children shortly after birth, 18 months and registration for the full-day ELP. Assessments have the potential of identifying children with special needs.

Pascal also thinks these assessments will provide parents with information about their child and complement the detailed portfolios of each child's progress in early years programming. This information could help to engage more parents in their children's education. In particular, Pascal notes the importance of parental involvement in their children's education and partnerships between educators and parents. He proposes informal outreach for some parents, and a process through flexible program models that support two-way partnerships. Pascal notes that achievement gaps can be reduced by regular participation in quality programming that helps make parents aware of how their children learn and gives them ideas and resources to support their children's development. If these gaps are eliminated there could be a very large impact on the long-term effects.

For children 0-3, the report notes that the current arrangement is spread among multiple providers and under a variety of auspices. Pascal recommends that programs be integrated into Best Start CFC under a single municipal system manager in each area. The centres would provide a variety of services including flexible, part-time and full-day/full-year early learning/care options for children up to 4 years of age. The preferred location of these centres would be in schools. Non-school locations would be partnered with a school or family of schools. The operation of CFC could be provided by local or regional governments, school boards, postsecondary institutions, or non-profit agencies. Non-profit and commercial providers could continue to operate licensed child care in accordance with current program standards. All service expansion would take place through CFC and school boards. Fees would continue to be charged for some aspects of ELC.

For children aged 4-5, there would be a shift from the provision of half-day kindergarten to a system that provides a full-day, school-year ELP, operated by school boards. The full-day implementation would start in 2010-11 and take three years to be implemented, so that the plan would be fully implemented by the 2012-13 school year. There would be no parent fees, so these services would be financed via general provincial tax revenue. Parents would have the option of extended programming before and after the school day and year, not as an add-on, but as part of the ELP provided by school boards. Parent would pay fees for extended day/year programming.

The Pascal report also proposed that extended programming would also be available for primary school children. For children 6-8, there would be extended programming provided by school boards before and after the traditional school day, and during summer and school holidays. For children 9-12, school boards would be obligated to ensure there is after school programming (e.g., sports, arts, communications, etc.). These extended day/year programs would be made available at the request of 15 or more families in a school. Parents would be charged fees for extended day/year programs.

Pascal's proposals extend beyond the above reforms. He suggests that after the above programs are established that by 2020 paid parental leave should expanded to up to 400 days on the birth or adoption of a child. Six weeks are for the exclusive use of the father or other non-birthing parent; if not used the time would be deducted from the 400 days. This provision, however, would not impact single parents who would be entitled to the full 400 days. Coverage would be expanded to include self-employed parents. The program would be flexible to allow parents to extend and supplement their leave by returning to work part time. In addition, there would be ten days of job-protected family leave for parents with children under 12. Since this report is focused on the economic impact of the ELC system when first fully implemented the economic effects of expanded parental leave will not be examined.

Economic Implications of Measures in Pascal Report

This section discusses the implications of the changes proposed by the Pascal report. Global implications are discussed first and then those for specific cohorts are discussed next. Where possible the analysis will identify if the proposals affect the short-term versus long-term analysis.

The short-term analysis focuses on the change in expenditures to operate the new system. If governments spend more on direct expenditures, such as salaries and infrastructure, then near-term economic activity receives a boost. An increase in government transfer payments does not directly boost economic activity. It is only when the money is spent by the recipient, such as households, school boards or municipal governments that economic activity is increased. This distinction is important because spending in different sectors affect the economy differently. Moreover, since the re-organization of ELC is expected to lower fees, ELC utilization will rise. If total spending on ELC increases there can be an additional leveraged economic effect.

For the long-term analysis, it is important to determine not only the magnitude of the impact on societal costs and benefits but also the timing of these impacts so that the net present value of the long-term benefits and costs and the benefit/cost ratio can be calculated.

Some of the proposed changes are straightforward to quantify, while others are more difficult. To help in the calculation of the economic effects, it is useful to differentiate between the impact on an average or representative child and the total number of children who will be affected. The effects per child or child hour are obtained from the literature that examines the impact of different types of early learning programs on children's developmental and/or educational outcomes.[1] The number of children affected are calculated by using an average of parental fee sensitivity that was found by Powell (2002) and the situation in the U.K. (see Appendix A) The implications of the proposed changes are more difficult to quantify when dealing with changes that affect the quality of ELC services or the behaviour of parents. In some cases there is insufficient information to quantity the effect on the average child or the number of children affected using reasonable assumptions. In these cases the effect is noted, but the impact is not included in the quantitative analysis.

General Implications

It is important to note that Pascal is proposing a number of complementary changes to the early childhood learning and care system. These ECERS changes could influence the quality of ELC, early identification of special needs children and provide a system that successfully increases the involvement of parents in their children's education. If successful, the proposals could dramatically improve the developmental and educational outcomes for children of all ages and therefore would boost the long-term economic benefits flowing from Pascal's proposals. Many of the proposals could also boost demand for ELC services in the short, medium and long-run. The combination of increased benefits per child with greater demand (more children using the ELC services) means that the total effect could be larger than the sum of the partial effects discussed below.

Pascal proposes a common programming framework for all of Ontario's early childhood settings based on Early Learning for Every Child Today and use of NDDS throughout the province. In Pascal's view these assessments will provide parents with good information about their child and complement the detailed portfolios of each child's progress in early years programming. This approach appears to be part of a process by which to engage parents in their children's education. The involvement of parents in their child's learning can pay large dividends.

Jeynes (2005) states that meta-analysis show that parental involvement is associated with higher student achievement outcomes. These findings emerged consistently whether the outcome measures were grades, standardized test scores, or a variety of other measures, including teacher ratings. For the overall population of students, on average, the achievement scores of children with highly

[1] see Fairholm (2009a) for a review of the literature.

involved parents was higher than children with less involved parents. This academic advantage for those parents who were highly involved in their education averaged about 0.5 to 0.6 of a standard deviation for overall educational outcomes, grades, and academic achievement.

Unfortunately, it is beyond the scope of the present study to include the potential economic impact from changes in parental involvement. There are two reasons for this limitation. First, the current rate of parent involvement is unknown. Second, the impact that the new system will have on parental involvement is unknown. Omitting this effect will cause the long-term benefit/cost estimates to be conservative.

Special Needs Children

Early identification and intervention is widely acknowledged to offer improved outcomes to children with learning disabilities.[2] If early assessment is successful in identifying special needs children, then there could be a large payback for these children. For children with established disabilities, meta-analysis finds that early intervention improves cogitative development by 0.5-0.75 of a standard deviation (SD).[3] However, La Paro et al. (2002) indicate that establishing criteria for the entry of infants and toddlers into services is difficult because the majority of very young children eventually identified as developmentally delayed or learning disabled (LD) display no organic basis or overt marker. Jenkins and O'Connor (2002) find that approaches used to identify children with reading/learning disabilities tend to either over or under predict the number of children with persistent learning difficulties. Both over and under prediction have costs.

Pascal recommends a higher frequency of assessments using NDDS. NDDS is a parent based screening tool with 13 screens that assess child development. Nagy, et al. (2002) found a high rate of agreement between NDDS and the Ages and Stages questionnaire.[4] And Dahinten and Ford (2004) examined parent completed NDDS with results obtained through direct child assessments by professional and found that NDDS is effective at capturing children with severe delays compared with direct child assessments using the Mental Development Index of the Bayley Scales of Infant Development-II. Children with mild to moderate delays were less well identified. These studies, however, compare NDDS with other assessments, but not versus longer-term developmental outcomes. No studies that show the predictive success of NDDS were found, so the actual number of over-referrals and under-referrals cannot be estimated.

There appears to be greater success in identifying LD at older ages, so having multiple assessments as proposed by Pascal could lead to a better identification of LD than a single assessment. The degree of improvement, however, is unknown. Furthermore, there is no estimate of the cost of the increased frequency of the assessments. Even in a system of parent-based screening, false positives that require additional assessments by professionals would have a cost. It is not clear if these costs are expected to be offset by a reduce number of false positives using the current system. Since there is a lack of information regarding the potential benefits and the costs, this part of the Pascal report cannot be explicitly included in the benefit/cost analysis.

Children 0-3

The implicit assumption in the Pascal report concerning the Child and Family Centres for children 0-3 is that there would be a reallocation of funding and no net change in spending. There would be significant re-engineering of existing programs that would reduce costs in some areas and increase costs in other areas, but that there would be no net change in the overall operating costs once the

[2] see Casto and Mastropieri (1986), Shonkoff and Hauser-Cram (1987), and Guralnick (1997)

[3] Guralnick (1991). Guralnick (2004) also states that declines in intellectual development for children at risk in the U.S. can be 0.5 to 1.5 SD.

[4] Dahinten and Ford (2004), NDDS 1 flag: total agreement 78.3% over referral 21.2%, under referral 0.5%, NDDS 2 flags: total agreement 93.4%, over referral 21.2% and under referral 0.5%.

new system is in full operation. Since operating costs remain the same, there will not be a significant short-term economic impact from the operation CFC in the new system.[5]

The Pascal report did indicate that there may be a need for transitional funding, but the magnitude was not identified and would presumably not continue during the normal operation of the new system, which is the focus of this examination. The report also suggests that once services are organized to reflect what families want and need, they will have a better idea about the levels of new investment required for expansion. So there may be more money later for this aspect of the proposals, but the magnitude of this expansion was not specified in the original proposals and therefore was not included in the current analysis of the short-term effects. Furthermore, if fees for ELC services for children 0-3 remain the same there would not be any change in utilization rates, which would keep total parental fees at the same level. So the net short-term impact would be zero.

Long-term benefits depend on the effects per child from the operation of the new system and from changes in the utilization rate. For children 0-3, there may be long-term benefits because the new system will be delivered by ECE trained providers and special needs resource teachers. More highly trained staff tends to improve the quality of ELC services and therefore the long-term benefits for participating children. Also more highly trained staff could help to identify special needs children earlier, which would provide additional long-term benefits. The Pascal report also suggests that the staff-child ratios and age groups should be reviewed, which could result in a change in the staff-child ratio.[6] A higher staff-child ratio likely would improve the quality of the ELC services provided to children and would boost long-term benefits. Higher staff-child ratios would also boost costs and these expenditures would have an immediate short-term impact. Any change in the staff-child ratios, however, is likely to occur beyond 2012-13, which is the focus of the current study.

It is not clear what additional long-term benefits may accrue to children 0-3 years from the introduction of the new system since these benefits depend in part on the early identification and intervention for special needs children, and from increased parental involvement. Any additional impact on the long-term benefits and costs would therefore depend on whether the utilization rate increases in the new system. Since costs of the system remain the same it is unlikely there would be an increase in the utilization rate.

Children 4-5 School Day Program

The proposal to replace the half-day kindergarten program with a full-day ELP for 4-5 year olds would cause an increase in the utilization of school provided ELC during the normal school day and a decrease outside the school system. Parents would favour the all day ELP over non-school services for two reasons. First, the direct cost to parents of using these services would fall to zero since the system would be funded by general tax revenues. Second, the actual and perceived quality of ELC provided by the school system would likely be higher than what generally is provided outside the school system in part because the new system uses teachers and ECE trained staff.

If parents perceive that the quality of ELC provided by the school system is higher than what is currently available there will be an increase in demand for these services. We have assumed that enrolment rates for JK rises from 83% to 87.5%, and that the enrolment rate for SK rises from 88% to 92.5% and averages 90% for the combined 4-5 age cohort (see Appendix A for a discussion of the assumptions). Also better trained staff means the developmental and educational outcomes will be better for children in the new system, which will boost the long-term benefits.

[5] Ontario's direct and indirect GDP multipliers are: 0.99 for child care, 0.92 for education and 0.86 for health care and social services. There could be a small positive net impact depending on the mix of spending changes. Since the re-engineering is mostly administrative costs, it is not possible to determine the impact.

[6] McCartney (2004) states a ratio of one teacher for three or four infants (1:3-1:4) is accepted as a quality threshold. Current Ontario's staff-child ratios are 3:10 for children less than 18 months and 1:5 for children 18 to 30 months. The former is in McCartney's quality threshold range, but the latter is not. Pascal suggests a ratio of 1:4 for children up to 30 months, which is in McCartney's range.

Children 4-12 Extended Programs

Extended day/year care can be beneficial to children, particularly disadvantaged children. Durlak and Weissberg (2007) state that one meta-analysis of 35 studies found that the test scores of low-income, at-risk youth improved significantly in both reading and mathematics after they participated in after-school programs (Lauer et al., 2006). They report, however, that academic outcomes for other youth have been inconsistent (Kane, 2003; Scott-Little, Hamann and Jurs, 2002; Vandell et al., 2004). Durlak and Weissberg's find that youth who participate in after-school programs that use evidence based skill training approaches improve significantly in three major areas: feelings and attitudes, indicators of behavioral adjustment, and school performance. They also reduced problem behaviours (e.g., aggression, noncompliance and conduct problems) and drug use. They find that effective after-school programs improve academic achievement measures by 0.31 SD and is similar in magnitude to successful primary prevention programs

Similarly the research that examines extended year programs tend to find positive results. In a meta-analysis of summer school results for elementary and middle school children Cooper et al. (2000) reported that children benefited by 0.14 to 0.25 standard deviations on academic achievement measures from summer school programs. And Kim (2006) found that those studies employing the most rigorous (random assignment) evaluation designs showed even larger effects. Winship et al. conclude that these meta-analyses imply that summer academic programs typically increase students' test scores by one-fifth of a standard deviation, which is equivalent to moving a student from the 50th percentile of the distribution to the 58th percentile.

For 4-8 year olds we have assumed that the utilization rate for extended day/year programming rises based on the drop in fees and the higher utilization rate for wrap around care found in the UK. Using an average of these estimates, means that the utilization rates for 4-5 will rise from 34% to 52%. For 6-8 year olds, it is assumed that the utilization rate rises from 7% to 24%.[7] Since there is no drop in fees for children 9-12, the utilization rate for this age cohort is assumed to remain the same after the change in after school programs. (see Appendix A for a discussion)

Costs/Funding

The Pascal report recommends the following new spending:

- $990-million for staffing, occupancy and operating of full school day/year preschool program for 4-5 year olds and occupancy costs, administration, supervision, program and professional development for an extended day/year program for 4-12 year olds
- $1.7-billion in capital for school expansion
- Reallocate child services spending of up to $1 billion, and re-engineering of services provided by CFC. To be managed by municipalities
- Transitional funding for municipalities –not specified

Pascal suggests the following funding sources:

- $500 million of committed funding. The Ontario government's funding commitment is for $200 million in 2010 and $300 million in 2011.
- Reallocate up to $1-billion of children's service spending (Ministry of Children and Youth Services (MCYS) and municipal) to municipalities
- Re-engineering of services provided by CFC.
- $1-billion of new funding out of general revenues.

[7] The number of children 6-8 in extended programs is unknown. The utilization rate for the children 6-12 is used instead in the calculations.

- Parents' contribution for fee based programs: early learning and care program for children 0-3 and extended day/year for children 4-12.

Table 1: Government Costs and Funding of New Early Learning System First Year of Operation*	
Costs	($ Millions)
Early Learning Program for Children 4-5**	$990
Municipal Spending for CFC & Subsidies for children 0-12	$1,000
Capital Expansion***	$570
Transitional Funding for Municipalities	Not Specified
Total Spending	$2,560
Funding	
New Funding	$1,000
Reallocated From MCYS & Municipal Share to Municipalities	$1,000
Parent Fees	Not Specified
	$2,000

* First year of full operation expected to be the 2012-13 school year

** Pascal estimates costs in the range of $790 and $990 million. The higher figure is presented in the table

*** Pascal estimated capital costs of $130 million per year and $1.7 billion over 25 years. There would be more capital costs in the first three years of the transition to the new system as classrooms are renovated and built. If the total costs of $1.7 billion are spread over three years cash cost would average $567 million and total costs would be $2,557 million after which costs would fall to $1,990.

Program Costs and Fees

For children 0-3, the Child and Family Centres will be funded by reallocating to municipal authorities all existing transfers for programs/resources that will be consolidated under CFCs, plus resources associated with regulation and oversight, plus all child care savings generated from the implementation of the ELP.[8] After this reallocation, total funding is estimated to be $1 billion. The report does not suggest fees for children aged 0-3. If fees for children remain at the same level as for 2008, then the total revenues (costs to parents before subsidies) would be $780 million by 2012-13 using the same percentage of children using ELC as in 2008.

It is envisioned that in the new full-day kindergarten system, children aged 4-5 years will be in school 6 hours a day and 188 days a year. These services will be mandatory for school boards to provide with no parent fees. The program will therefore be funded from general government revenues. Pascal estimates that the increase in staffing costs will be $430 million for the ELP and that operating and occupancy costs will increase in the range between $360 and $560 million for a total of between $790 and $990 million (see Table 2). This report uses the $990 estimate.

The above funding of $990 million will also be used by school boards to help fund the extended day/year programming for children 4-12 years of age. The money will cover occupancy, administration, and professional development costs and program costs for the extended day/year programming and program costs during the school year. Parent fees will fund the cost of lunch, snacks, staff and supervision costs of the extended day/year programming and program costs during the summer. Parent fees are expected to be $27/day for 4-5 year olds; $20/day for 6-8 year olds. The report does not suggest fees for children 9-12.

Table 2: Estimated Costs of Full-Day Learning ($ Millions)	
Staffing Costs	430
Operating Costs	360-560
Total Costs	790-990

[8] MCYS (2009): for fiscal 2009-10, child care and early learning $868.9 million, healthy babies/healthy children $86.5 million, early years community support $177.6 million for a total of $1,133.0 million.

Source: Pascal (2009)

If 52% of all children 4-5 use the extended day/year programming on average in 2012-13 there would be 50,900 more children served. At $27 per day and 250 days per year, the total revenue (cost to parents before subsidies) would be $1,000 million (see Table 3). If the utilization rate for children 6-8 for an extended day/year program rises to 24% on average, then there would be 75,400 more children served. At $20 per day and 250 days per year, the total revenue (costs to parents before subsidies) would be $500 million. Fees are not specified for children 9-12 years of age, so the total revenue cannot be directly estimated. If fees for 9-12 year olds remain at $26.24 per day then the total revenues (costs to parents before subsidies) would be $270 million by 2012-13 using the same percentage of children as in 2008. (see Appendix A for utilization rate assumptions)

Pascal estimates that to make room for full-day learning and CFC that significant renovations of exiting classrooms and new purpose-built classrooms would be needed. The report estimates that the capital costs would be $130 million per annum or $1.7 billion over 25 years. The cash costs of this provision seems to be front end loaded to the first three years of the program to ensure that sufficient space is available to make room for full-day learning. If the total capital costs of $1.7 billion are spread over the first three years, the cash cost would average $567 million.

Based on the above calculations, government policy will encourage a $480 million increase in the consumption of early ELC services (as quantified by total parent fees) so there would be a boost to the economy from this spending. The additional $990 million for the ELP and the $570 million in construction spending would also provide a short-term boost to the economy. The reallocation of $1 billion in spending for CFCs would have a small effect because the total amount stays the same.

Table 3: Revenues from Parent Fees For CFC and Extended Day/Year Programs Utilization Rates for Children 4-8 Rise Based on Lower Fees
($ Millions)

Age of Children	New System	Existing ELC	Change in Fee Revenues
0-3	780	780	0
4-5	1,000	840	150
6-8	500	200	330
9-12	270	270	0
Total	2,580	2,100	480

Gross revenues estimated by multiplying fees by the number of children estimated to be enrolled in child care in 2012-13. Totals may not add up due to rounding.

Staffing Costs of Programs

The Early Learning Program is to be staffed by well-trained teams of teachers and early childhood educators. Staffing is calculated on one staff to approximately ten children 4-5 years of age. For a group of up to 20 children, the staff team would include a half-time kindergarten teacher, a full-time Early Childhood Educator (ECE) during traditional school hours and another ECE for traditional school hours and extended hours. ECEs are expected to earn wages of $47,000 per year plus benefits worth an additional 24% for a total annual labour income of $58,300.[9] Kindergarten

[9] Using an hourly wage of $26.85, 250 days a year and 7 hours a day the annual wage is $46,987.5, which rounds to $47,000. Adding 24% benefits brings the total labour income to $58,264.5 per annum.

teachers' salaries will be determined by collective agreements. In 2005, the census indicates that kindergarten and elementary teachers earned $59,273 on average for full-time, full-year employment. If teachers also receive benefits worth 24% of wages, their average labour income would be $73,499. As discussed in the previous section, Pascal estimates that the total increase in staffing costs of the ELP to be $430 million.

The new system envisioned by Pascal will feature educators with age-specific qualifications, which may require upgrading of skills for these workers. Some certified primary school teachers may have acquired specific early childhood knowledge and skills through prior postsecondary education, in-service professional development, or early learning additional qualification courses. Others may have acquired the equivalent knowledge and skills through experience and learning opportunities. Pascal suggests that a rigorous process for prior learning assessment and recognition (PLAR) should be established to recognize equivalency. Those without these qualifications would complete an early childhood additional qualification course or its equivalent within five years to qualify as an educator in the ELP. ECEs in the ELP would hold an ECE degree or diploma. The costs of the PLAR process and the upgrading of qualifications are not quantified, although as noted above the $990 million increase in funding includes professional development.

The Pascal report does not directly indicate staffing costs for CFC. The report does suggest that over time there may be an increased in enrolment in child care for children aged 0-3. If the same percentage of children by age groups –Infant, toddlers, and 2 ½-3 years—use ELC by 2012-13 as in 2008 and staff-child ratios remain the same, children average 6.4 hours per day and hours worked average 7 hours per day, then there would be an increase in staffing costs by $260 million because of the increase in labour costs of ECE workers to $58,300 per annum (see Table 4).

Staffing costs for the extended day/year program for children 4-5 would increase $340 million in 2012-13 if 52% of all children in the target age group attend extended care, and using the same staff-child ratios, ECE labour costs per worker of $58,300 per annum, average hours of children in care in care of 4.2 and average work days of seven hours.

The Extended Day Primary program for children ages 6 to 8 years will be lead by school board employees with an ECE degree or diploma. Staffing is calculated based on one staff to 15 children. ECEs are expected to earn $58,300 in wages plus benefits. Pascal envisions that staffing costs will be funded by parent fees in the Extended Day Primary program. Total costs depend on the number of children using extended day/year programs. If the percentage of children using extended care rises to 24%, then there would be an increase in staffing costs of $110 million.

The After School program for children 9 to 12 years is to be lead by staff knowledgeable about the developmental needs of 9 to 12 year olds. Staffing is expected to be one staff to 15 children. This program is organized by school board employees with a variety of appropriate qualifications: ECE, recreation, teaching, child and youth, who may draw on the resources of community partners such as municipal parks and recreation services or appropriate community organizations. There is no indication what these workers would earn in the future nor is the composition of the workforce specified. These unknowns make estimating staff costs impossible to calculate.

For example, according to the most recent census, program leaders and instructors in recreation, sport and fitness earned $29,533 in 2005. If all workers earn this wage and 15% benefits then by 2012-13 the cost of staff would be roughly $60 million if the same percentage of children use after school programs as did in 2008 and the staff-child ratio stays the same. In comparison if all the workers earn $47,000 plus 24% benefits then staff costs would be around $80 million. It is assumed that the pay and composition of the workforce stays the same, so there is no net change in costs.

Table 4: Staff Costs For CFC and Extended Day/Year Programs
Utilization Rates for Children 4-8 Rise Based on Lower Fees
($ Millions)

Age of Children	New System	Existing ELC	Change in Staff Costs

0-3	710	450	260
4-5	580	240	340
6-8	150	40	110
9-12	60	60	0
Total	1,570	780	710

Staff cost estimated by multiplying labour income per worker by the number of staff required based on staff-child ratios and the estimated number of children expected to be enrolled.
Totals may not add up due to rounding.

Table 5: Change in Net Income For CFC and Extended Day/Year Programs Utilization Rates for Children 4-8 Rise to 50%
($ Millions)

Age of Children	Change in Fee Revenues	Change in Staff Costs	Change in Net Income
0-3	0	260	-260
4-5	150	340	-180
6-8	330	110	220
9-12	0	0	0
Total	480	710	-220

Staff cost estimated by multiplying labour income per worker by the number of staff required based on staff-child ratios and the estimated number of children expected to be enrolled.
Totals may not add up due to rounding.

The increase in revenues for the extended day/year programming for 4-12 year olds more than offset the increase in salary expenses under the assumptions used above (see Table 5). The estimates, however, show that the increase in labour income will increase costs for municipalities operating the CFC. There would be other cost savings to offset this increase in staff costs, however.

Re-Allocation and Re-Engineering

Municipal authorities will be responsible for the creation and management of CFCs. These new centres will be developed and expanded by consolidating and re-engineering the resources, governance and mandates of existing child care, family resource and early intervention services. These include regulated group and home child care, family resource programs, Ontario Early Years Centres, Parenting and Family Literacy Centres, Healthy Babies/Healthy Children, Preschool Speech and Language, Child Care Special Needs Resourcing, and family literacy coordinators.

Currently the MCYS and municipalities spend about $1-billion on these services (Table 6). These funds would be used by municipalities to fund the operation of CFCs. Compared with what municipalities currently receive there would be an increase in funds from fee subsidises for children 4-12, wage subsidies for staff currently providing services for 4-12 year olds, and municipalities would receive the parental co-payments from child care fee subsidies for children 0-3. Assuming that fee subsidies are distributed evenly across children receiving these subsidies by age, this would amount to $308 million (Table 7). If wage subsidies are distributed across all staff, then there would be an extra $84 million available from staff providing services to children 4-12. And if parental co-payments are distributed across all children, then for children 0-3 there would be $18 million.

Municipalities would also derive cost savings from the re-engineering of these services. The magnitude of the cost savings from this re-engineering was not specified in the Pascal report. There could be administrative cost savings, which tend to be in the range of slightly less than 10% of total program costs, and there could be other savings from overlapping costs, such as occupancy costs, which tend to be in the range of 7% of total costs. Applying these savings to the costs of the special needs and family resource services would provide savings of $19.9 million. (Table 7)

Table 6: Total Expenditure Estimates for 2008/09

($ Millions)				
	Province	Municipalities	Subsidy Users Co-payments	Total
Fee Subsidies	473.6	51.4	40.1	565.1
Wage Subsidies (Regular CC)*	167.3	29.9		197.2
Special Needs	91.4	15.5		106.9
Family Resource Programs	11.8	2.8		14.6
Administration	51.4	38.1		89.5
Total	795.5	137.7	40.1	973.3

Source: City of Toronto. *Excludes wage subsidies for Special Needs and Resource Centres

Table 7: Funding for CFC from Re-Engineering and Re-Allocation of Services
($ Millions)

Fee Subsidies For Children 4-12 Shifted to CFCs	310
Wage Subsidies For Children 4-12 Shifted to CFCs	80
Parent Fees Subsidy Co-Payments	20
Administrative & Occupancy Savings	20
Total Funding Available*	430
Extra Costs From Higher Paid Staff	260
Extra Funding Available For Children 0-3*	170

Totals may not add up due to rounding.
*Costs include fee subsidies for children 0-3, so total & extra funding available are after subsidies

Table 8: Funding for Extended Day/Year Programming
($ Millions)

Change in Net Income	40
Savings from Shifting Costs to School Boards	90
Parent Fees Subsidy Co-Payments	20
Extra Funding Available Children 4-12*	150

Totals may not add up due to rounding.
*Subsidies have been shifted to CFCs, and are not included.

There will be cost savings for the extended day/year programming from the shifting of occupancy, administration, and professional development costs to school boards as well as programming costs for the extended day programming. Using City of Toronto data to estimate the percentage of total costs that are represented by these aspects, the cost savings would amount to roughly $90 million and after adding in the increase in net income (fees less costs) of $40 million and subsidy co-payment reductions the total extra funding available for child 4-12 would amount to $150 million.

Combining the extra funding for children 0-3 and 4-12 together, there would be $320 million in available funds from the program re-engineering and reallocation of funding. Since the costs of subsidies for children 0-3 were not removed from expenses, the $320 figure already includes those costs. These funds can be used to provide additional fee subsidies to children. Since the funding for fee subsidies for children 4-12 were reallocated to municipalities in the calculations above it is likely that children 4-12 who require subsidies will be taken care of first.

Pascal highlights possible savings on fee subsidies because of lower fees for 4-8 year olds. As fees drop for children in the 4-5 and 6-8 cohorts, fewer parents will require fee subsidies and fee subsidies for parents receiving subsidies will drop. These savings will free up subsidies for other families. The implications of these changes can be estimated.

Table 9: Fee Subsidies

	Child Receiving Subsidies	Children in Child Care	Subsidized Children / Children in CC ratio
Infants	4,994	7,759	0.644
Toddlers	10,019	27737	0.361
Age 2.5-3.8	19,579	39,240	0.499
JK/SK	19,668	96578	0.204
School Age	22,930	72287	0.317
Total	77,190	243,601	0.317

Source: Pascal (2009)

Table 10: Eligibility for Fee Subsidy

Net family income($)	Daily fee for subsidized families ($)
20,000	0
30,000	4
40,000	8
50,000	19
60,000	31
70,000	42

Source: Beach et al (2009), effective 2007/08

There are 77,190 children receiving fee subsidies of all ages (see Table 9). The percentage of children receiving subsidies relative to the total number of children in child care by age range from 64% of infants to 20.4% of children in JK/SK. There are close to 20,000 children currently in JK/SK who receive fee subsidies who would not require subsidies to attend the full day kindergarten. These children, however, would remain eligible to receive subsidies for extended day/year care. Since extended day/year care is less expensive than current child care fees, there would be a reduction in the dollar amount of subsidies to support these children.

To understand the dollar magnitude of the subsidies that will be freed-up it is helpful to consider that the current subsidy system provides a full fee subsidy to families earning $20,000 or less. For families earning above $20,000 to $40,000 the subsidy is at a rate to ensure that the family pays 10% of their pre-tax income. Once a family earns 40,000 per year and above, the subsidy ensures that they will pay 30% of all additional income (see Table 10). The reduction in daily fees for children in JK/SK from an average of $34.42 to $27 per day means that the dollar amount of the daily subsidy will drop by at most $7.42 per day (see Table 11). For 250 days this will amount to at most $1,855 per subsidized child. Since there are just under 20,000 children in JK/SK receiving subsidies, the drop in fees will add up to $36 million of savings.

There will also be a reduction in fees and therefore subsidies for children aged 6-8 of $6.24 per day. For 250 days the savings will add up to $1,560 per annum. If the estimated number of school age children receiving subsidies are distributed based on population, the number of children 6-8 receiving subsides by 2012-13 would be just under 10,000 and savings would add up to $15 million.

If the same number of children 4-12 receive subsidies as do currently, and after taking into account the lower fees in the new system, then the subsidies to children 4-12 would represent $260 million. This is $60 million less than the available funds systemically (see Table 12). This means there would be roughly $60 million in funding available to support additional fee subsidies. This estimate assumes that the stabilization of existing funding for children 0-3 is the first priority. At the expected fees in the new system, this would amount to an additional 6,420 subsidized spaces for children 0-3 or 12,890 subsidized spaces for children 6-8. Assuming subsidies are distributed across all age groups in the same proportion as current subsidies there would 9,710 new subsidized spaces.

Table 11: Child Care Fees		
	Current Fee	New System Fee
Infant	52.37	---
Toddler	43.67	---
2 1/2 – 5	35.14	---
3 8 m - 4	34.42	27
4 8m - 5	34.42	27
6 – 8	26.24	20
9-12	26.24	---
Source: Pascal (2009)		

Given the current distribution of family incomes and subsidies there would be no shortage of families available to utilize these subsidies (see Table 13). The total number of families earning less than $20,000 with children less than six years of age was around 50 thousand in 2005. The number of subsidized spaces for children less than six was 55 thousand, which exceeds the number of families earning less $20,000, although it should be noted that these data do not indicate the total number of children less than six in these families. The total number of subsidized spaces is 62% of the number of the families in the two lowest income groups combined. Once all eligible income groups are combined–up to $70,000— subsidized spaces represent only 19% of the number of eligible families. Since there are families with higher income than $20,000 who receive subsidized spaces, as witnessed by the $40.1 million in subsidy co-payments in Table 6, there would be a large number of children in the lowest family income cohorts who do not currently receive subsidies.

Table 12: Extra System Funding Available for Fee Subsidies ($ Millions)	
Extra Funding Available 0-3*	170
Extra Funding Available 4-12	150
Total Extra Funding Available 0-12	320
Subsidy Costs for Children 4-12	260
Net Systemic Funding Surplus	60
Totals may not add up due to rounding. * Includes fee subsidies for children 0-3	

Table 13: Number of Subsidy Eligible Families						
	Net family income($)					
Number of Families	$20,000	$30,000	$40,000	$50,000	$60,000	$70,000
Families with Children <6	49910	37900	48215	49310	49110	49805
% of eligible families by income	17.6%	13.3%	17.0%	17.3%	17.3%	17.5%
Cumulative % of Total Subsidies <6	108.7%	61.8%	39.9%	29.3%	23.1%	19.1%
Families With Children 6-12 yr*	86298	65937	81573	79100	77960	78558
% of eligible families by income	18.4%	14.0%	17.4%	16.9%	16.6%	16.7%
Cumulative % of Total Subsidies 6-12	26.6%	15.1%	9.8%	7.3%	5.9%	4.9%
Source: 2006 census, Beach et al (2009) & calculations by author, * estimated from number of families with children less than 17.						

Summary of New Spending

To estimate the short-term economic effect, the magnitude of the injection of money into different parts of the economy needs to be calculated. Table 14 summarizes the net new spending in the economy as a consequence of Pascal's recommendations and expected results. As expressed by

Pascal the introduction of the Early Learning Program for children 4-5 will result in new expenditures of $990 million. The reorganization of CFC lead by municipalities will not have a significant net effect in the short-term on the economy because total spending stays the same, although there would be a small net impact as a result of the re-organization because different sectors have different short-term multipliers and higher paid employees spend less of every extra dollar. As expressed by Pascal the re-organization of ELC will lead to lower fees and higher utilization rates that will cause total parental expenditure to rise by an estimated $480 million. Capital costs over 25 years are expected to be $1.7 billion, but with an estimated annual cash costs $570 million on average over the first three years to ensure that there are sufficient classrooms for the programs to commence. The analysis uses these estimates to calculate the short-term impacts.

Table 14: Summary of Net New Spending First Year of Full Operation*

	($ Millions)
Early Learning Program**	990
Capital Expansion***	570
CFC	0
New Parent Spending****	
0-3	0
4-5	150
6-8	330
9-12	0
Sub-Total	480
Total	2,040

Totals may not add up due to rounding.
* First year of full operation expected to be the 2012-13 school year

** Pascal estimates costs in the range of $790 and $990 million. The higher figure is presented in the table.
*** Pascal estimated capital costs of $130 million per year and $1.7 billion over 25 years. There would be more capital costs in the first three years of the transition to the new system as classrooms are renovated and built. If the total costs of $1.7 billion are spread over three years cash cost would average $567 million.
****Assuming an increase in utilization rates for 4-5 and for 6-8 year olds to 52% and 24% respectively and no change in utilization rates for 0-3 and 9-12 year olds.

Benefits and Costs of Early Learning and Care

The net benefits of an ELC program to an economy can be illustrated in two different ways. A multiplier can be estimated, which shows the rise in overall economic activity in the short run per dollar increase in expenditure for that particular program. Alternatively, the present value of the benefits and costs can be estimated, the dollar amount of the net benefits of the program can be calculated and the benefit/cost ratio can be determined.

The literature on the short-run effects of spending on ELC programs typically find that they are among the largest of all sectors. Fairholm (2009a) examines direct and indirect GDP multipliers in different sectors of the Canadian economy. He finds that the ELC sector provides one of the largest direct and indirect GDP multipliers of all the major sectors—tied for fifth largest—using estimates from Statistics Canada's Input-Output model. Furthermore, the ELC sector has one of the highest induced multipliers. When the direct, indirect, and induced effects are combined, ELC boosts the economy by 2.3 dollars per dollar of spending, which is one of the largest short-term multipliers of all the major sectors. Prentice (2008) finds that the local area multiplier for a sub-provincial area is quite high, with a

multiplier of 1.58 for a local area of Manitoba. Similarly, US research also shows that ELC program multipliers are higher than multipliers for other key sectors of the economy.[10]

The literature that estimates long-term costs and benefits of child care programs consistently shows that the benefits exceed costs. The extensive Chicago child-parent centres program and two randomised studies: the High Scope/Perry and Carolina Abecedarian programs in the US show costs being repaid several times over for disadvantaged children. Other child care programs, both targeted and universal, show positive albeit smaller net benefits to society per dollar spent. For Canada, Fairholm (2009a) found that the net present value of benefits to be 2.54 per dollar invested and Cleveland and Krashinsky (1998) estimated high quality child care in Canada would return over $2 for every dollar invested. For the US, Karoly and Bigelow (2005) estimated that a universal child care program in California would yield benefits of $2-$4 for every dollar invested, and Belfield (2005) estimated that every dollar invested provides future benefits worth $2.25 for the Louisiana child care system.

Short-term analysis

In order to estimate the short-term economic benefits as accurately as possible several sets of impact estimates were taken from Statistics Canada's detailed Ontario input-output model. This permits the analysis to reflect the economic impact from the removal of different components of existing ELC services and the implementation of the proposed ELC services.

The removal of the current ELC system for 0-8 year olds used the "child care, outside the home" GDP and employment multipliers.[11] The implementation of the full-day Early Learning Program for 4-5 year olds uses the education category. The implementation of new extended day/year ELC for 4-5 and 6-8 year-olds and the CFC system for 0-3 year olds used adjusted GDP and employment multipliers. The ELC multipliers were adjusted to reflect the higher wages and benefits in the new system and to reflect the changed share of non-labour cost spending by child care centres. For children 9-12, fees and the number of children using after school care remains the same and there is no known change in costs, so the net impact is zero and are not included below.

Short-term economic impacts were calculated for direct and indirect multipliers obtained from Statistics Canada and from induced multipliers calculated by the authors (see Appendix B for the detailed methodology). The induced economic effect occurs because of the increased spending by households that happens because of the direct and indirect change in employment and labour income. The magnitude of the induced effect will vary by sector based on the share of labour costs in total costs for that sector, and based on the wages of the workers employed. In general, lower wage workers have a lower marginal tax rate, and a tendency to save less (spend more) from an extra dollar of income than higher wage earners. More income for lower wage workers therefore cause a larger induced effect per dollar than for higher wage workers.

To estimate the short-term economic impact for a particular infusion or withdrawal of spending caused by the transformation of ELC into the new system, the spending estimates were multiplied by the related multiplier. All of these short-term economic impacts were transformed into hourly estimates for Ontario, the GTA and Toronto using data for hours and costs of hourly child care (see Appendix C for calculations of hours and costs). This allowed the estimation of costs and the resulting impact on gross domestic product (GDP) and employment for these jurisdictions.

[10] Warner and Liu (2004) find that child care has a direct and indirect (type I) multiplier of 1.49 and a direct, indirect and induced (type II) multiplier of 1.91 for the US economy.

[11] A special simulation of Statistics Canada input-output model was undertaken to estimate the impact of changes in child care services. In the IO model, this was done by increasing output for the commodity, "Child care, outside the home", since the North American Industry Classification System (NAICS) Industry 6244—"Child day-care services"—was not represented in the worksheet level model. This custom simulation is helpful because it illustrates the impacts on the overall Ontario economy from changing ELC output and by design can be compared with the impacts on the economy from increasing output in other industries.

For construction spending, the direct and indirect construction industry multipliers from Statistics Canada along with induced effects calculated by the authors are used to estimate the impact on the Ontario economy. The capital costs are not decomposed by type of construction or by geographic location, however. In order to estimate the sub-provincial effects, it is assumed that the capital costs are distributed based on the number of children hours in different geographic locations.

The GDP multiplier reflects the increase in value added (or GDP) in Ontario from a change in industry output or spending. These multipliers exclude leakages such as imports and avoid double counting of intermediate inputs. For the proposed system, one dollar of spending increases GDP by $2.02 for ongoing operations and by $1.90 for the GTA and Toronto. For capital spending, one dollar of spending adds $1.47 to GDP for Ontario and $1.36 for the GTA and Toronto.

The employment multiplier measures the number of jobs created per million dollars spent. Using the wages and benefits provided by the Pascal report, it can be estimated that one million dollars spent on early learning in Ontario directly creates 13.6 jobs in the ELC sector. As suppliers increase output as a result of the rise in the ELC sector's activity they will also hire an estimated 1.1 additional people. One million dollars spent on the early learning in the GTA creates 13.6 jobs in the ELC sector and 1.0 additional jobs by suppliers. In the city of Toronto one million dollars creates 13.7 jobs in early learning and 1.0 additional jobs by suppliers. The total employment multiplier is estimated to be 29.3 for Ontario, 27.6 for the GTA and 27.6 for the city of Toronto.

Table 15 - Proposed Early Learning - Ratios and Multipliers - ELC Expenditures

	Ontario	GTA	Toronto
GDP (per dollar of expenditure)			
Direct GDP	0.89	0.89	0.89
Direct and indirect GDP	0.96	0.96	0.96
Total GDP multiplier	2.02	1.90	1.90
Ratio of total to direct GDP	2.27	2.13	2.13
Labour Income (per dollar of expenditure)			
Direct labour income	0.80	0.81	0.81
Total labour income multiplier	0.85	0.85	0.85
Ratio of total to direct labour income	1.06	1.05	1.05
Employment (per million dollars of expenditure)			
Direct Employment	13.59	13.65	13.67
Direct and indirect Employment	14.70	14.62	14.64
Total Employment multiplier	29.26	27.62	27.65
Ratio of total to direct Employment	2.15	2.02	2.02

The total GDP multiplier for capital expenditures is 1.47 for Ontario and 1.36 for the GTA and Toronto, and the total number of jobs created per million dollars of capital expenditures is 20.1 for Ontario and 18.8 for the GTA and Toronto (see Table 16).

Notably, the stimulus to the economy from implementing Pascal proposals is larger than the direct negative shock on the economy from the higher taxes that may be needed to finance these proposals. In the short-run the impact of tax changes is less than one because of the impact of tax changes on savings and therefore the marginal propensity to consume, which lowers the multiplier.

Table 16 - Early Learning - Ratios and Multipliers - Capital Expenditures

	Ontario	GTA	Toronto
GDP (per dollar of expenditure)			
Direct GDP	0.52	0.52	0.52

Direct and indirect GDP	0.76	0.73	0.73
Total GDP multiplier	1.47	1.36	1.36
Ratio of total to direct GDP	2.83	2.63	2.63
Labour Income (per dollar of expenditure)			
Direct labour income	0.41	0.41	0.41
Total labour income multiplier	0.57	0.56	0.56
Ratio of total to direct labour income	1.39	1.35	1.35
Employment (per million dollars of expenditure)			
Direct Employment	7.86	7.86	7.86
Direct and indirect Employment	10.95	10.61	10.61
Total Employment multiplier	20.13	18.78	18.78
Ratio of total to direct Employment	2.56	2.39	2.39

Long-term Economic Impact Analysis

Early learning also provides long term benefits. This section summarizes a benefit-cost analysis that provides a more complete assessment of the benefits to society from early learning than a short-term economic impact assessment can produce. Both the costs of providing early learning and the overall benefits to participating children and mothers are estimated. The main parts of the benefit-cost analysis are:

- number of hours;
- early learning costs per hour;
- early learning cost savings per hour;
- child benefits from early learning;
- mother/parents benefits from early learning; and
- calculation of benefit-cost ratio.

The net long-term impacts of implementing early learning are found by subtracting the costs and benefits from current formal ELC which would be replaced by the new early learning system from the costs and benefits of the new early learning program. Total costs and total benefits are estimated from costs per hour and benefits per hour times the number of hours. The net present value (NPV) calculations of costs and cost savings, benefits to children and benefits to mothers, along with an overall benefit-cost ratio from implementing the early learning program are listed in Table 17 (using a real discount rate of 3%). 2005 is chosen as the base year instead of 2013 because the most recent census data are from 2005 and 2006. The selection of the base year to estimate the inflation adjusted expenditures has no impact on the ultimate benefit-cost calculation if inflation affect benefit and costs equally.

These calculations show that the benefit-cost ratio is 2.42 for Ontario, 2.21 for the Greater Toronto Area and 2.24 for the city of Toronto. These estimates are based on conservative assumptions and are in the range of the benefit-to-cost ratios that other researchers have estimated for universal programs. Note that the benefit-to-cost ratio for universal ELC programs is generally lower than benefit-to-cost ratios for programs that target disadvantaged children.

Table 17: Summary of Costs and Benefits from ELC

	Ontario	GTA	Toronto
NPV hourly costs of early learning	$5.52	$5.64	$5.63
NPV hourly costs savings on informal child care	-$1.57	-$1.53	-$1.58
NPV hourly net cost of early learning	$3.95	$4.11	$4.05

NPV hourly net benefits mothers/parents	$7.69	$7.79	$7.73
NPV hourly net benefits children	+$1.88	+$1.28	+$1.34
NPV hourly net benefits from early learning	$9.56	$9.07	$9.07
Benefit-cost ratio of early learning	2.42	2.21	2.24

Profile of Children and Families

In order to understand the potential impact on the province from the implementation of the proposed ELC system it is important to understand the demographic situation. The number of children in the province in different age groups matters because the proposed programs vary by age and the utilization rate is expected to vary by age as well. Furthermore, there are higher staff-child ratios for younger children than older children, which mean that per child more early childhood educators are needed for younger age groups. Current staff-child ratios in Ontario rise from 3:10 for children from birth to 18 months to 1:15 for the oldest age cohort (see Table 18).

Table 18 - Ontario Staff-Child Ratios for Regulated Child-Care Centres

Age Groups	Staff-Child Ratios	Maximum Group Sizes
0 < 1 ½ yrs	3:10	10
1 ½ - <2 ½ yrs	1:5	15
2 ½ -5 yrs	1:8	16
3 yrs 8 mns -5 yrs 7 mns	1:10	20
4 yrs 8 mns -5 yrs 7 mns	1:12	24
5 yrs 8 mns -12 yrs	1:15	30

Source: Beach et al. (2009)

In 2006, there were 1,876,555 children aged zero to 12 years of which 28.5% were 0-3 years, 14.5% were 4-5 years, 23.1% were 6-8 years, and 33.9% were 9-12 years (see Table 19). According to the mid-range Ontario Ministry of Finance population projection published in 2009, by 2013 when the ELC system is to be fully implemented there are estimated to be 1,913,160 children aged zero to 12 years, which is a 2% gain. And the number of children 0-12 years is projected to reach 2,312,720 by 2026, which is a gain of 23.2% and by 2036 this population is projected to reach 2,465,880 for a gain of 31.4%. These estimates illustrate that the number of children needing ELC will continue to expand for the foreseeable future, which means the net economic benefits from changing the ELC system will be magnified in the future beyond the estimates for the first year of the operation of the new ELC system highlighted in this report.

In 2006, there were 353,820 children aged 0-12 in the city of Toronto (see Table 20). Of these children, 30.8% were aged 0-3 years and 14.7% were aged 4-5 years, while 22.6% were aged 6-8 years and 31.9% were aged 9-12 years. This age distribution is slanted more toward younger children than for the province as a whole. This means that once the new system is implemented that

Table 19 - Children by Age in Ontario (2006)

Age	Number of Children	%
Children 0-12	1,876,555	100.0%
Total 0-3	535,210	28.5%
Under 1 year	132,180	7.0%
1	133,255	7.1%
2	135,705	7.2%
3	134,070	7.1%
Total 4-5	272,690	14.5%
4	135,550	7.2%

5	137,140	7.3%
Total 6-8	432,715	23.1%
6	142,665	7.6%
7	142,930	7.6%
8	147,120	7.8%
Total 9-12	635,940	33.9%
9	151,735	8.1%
10	158,680	8.5%
11	163,145	8.7%
12	162,380	8.7%

Source: 2006 Census

there will be a larger relative increase in the need for ECE trained workers in the city of Toronto than in the rest of the province because younger children required more trained staff than older children. Over time, the pace of population growth for children in Toronto is expected to lag behind that for the Province, with a gain of roughly 21.5% from 2006 to 2036.

Table 20 - Children by Age in City of Toronto (2006)

Age	Number of Children	%
Children 0-12	353,820	100.0%
Total 0-3	108,945	30.8%
Under 1 year	28,275	8.0%
1	27,410	7.7%
2	26,915	7.6%
3	26,345	7.4%
Total 4-5	52,145	14.7%
4	26,035	7.4%
5	26,110	7.4%
Total 6-8	79,935	22.6%
6	26,780	7.6%
7	26,010	7.4%
8	27,145	7.7%
Total 9-12	112,795	31.9%
9	27,550	7.8%
10	28,415	8.0%
11	28,870	8.2%
12	27,960	7.9%

Source: 2006 Census, Census Division

As illustrated in Table 21, there were 886,330 children aged 0-12 in the Greater Toronto Area (GTA) in 2006 according to the census. There were relatively more children 0-3 and 4-5 years of age than in Ontario as a whole, with 29.2% and 14.7% respectively. The implication of this observation is that the GTA will require relatively more ECEs than the rest of Ontario because these age groups have higher staff-child ratios. And the number of children 0-12 is expanding quickly in the GTA, with this group expected to grow by 51.3% from 2006 to 2036. Most of this population growth will occur in the GTA outside of Toronto. The children's population of the GTA outside Toronto is expected to grow by 71% from 2006 to 2036.

Table 21 - Children by Age in GTA (2006)

Age	Number of Children	%
Children 0-12	886,330	100.0%
Total 0-3	259,170	29.2%
Under 1 year	64,680	7.3%
1	64,630	7.3%

2	65,410	7.4%
3	64,450	7.3%
Total 4-5	129,965	14.7%
4	64,730	7.3%
5	65,235	7.4%
Total 6-8	203,750	23.0%
6	67,780	7.6%
7	66,635	7.5%
8	69,335	7.8%
Total 9-12	293,425	33.1%
9	70,705	8.0%
10	73,795	8.3%
11	74,865	8.4%
12	74,060	8.4%

Source: 2006 Census, Durham, York, Peel, Halton and Toronto Census Divisions

As of 2006, there were 990,230 children aged 0-12 in the province of Ontario outside the GTA (see Table 22). Proportionately fewer children outside the GTA are in the 0-3 and 4-5 cohorts than in the province as a whole, with 27.9% and 14.4% respectively. This implies that the need for ECE trained workers will be relatively less in this area compared with the number of children because of lower staff-child ratios for older age groups. Moreover, the population growth in this region is below that for the province, with the projected increase from 2006 to 2036 being 13.0% compared with 21.5% for the province as a whole.

Table 22 - Children by Age in Ontario Outside GTA (2006)

Age	Number of Children	%
Children 0-12	990,230	100.0%
Total 0-3	276,040	27.9%
Under 1 year	67,500	6.8%
1	68,625	6.9%
2	70,295	7.1%
3	69,620	7.0%
Total 4-5	142,725	14.4%
4	70,820	7.2%
5	71,905	7.3%
Total 6-8	228,965	23.1%
6	74,885	7.6%
7	76,295	7.7%
8	77,785	7.9%
Total 9-12	342,515	34.6%
9	81,030	8.2%
10	84,885	8.6%
11	88,280	8.9%
12	88,320	8.9%

Source: 2006 Census

Conclusion

The implementation of the proposals laid out in the Pascal report will have significant short, medium and long-term economic implications. The short-term stimulus from these proposals would be in the order of 2.02 per dollar spent for the operation of the system, and 1.47 for the capital spending. Combined these effects are worth 1.87 per dollar of spending in 2012-13. This level of multiplier is above the stimulus to the economy from the expansion of most other industries and is above the short-term impact on the economy from an increase in taxes to pay for these proposals.

Pascal's proposals would also increase the number of children receiving early learning by an estimated 139,200. The more children receiving quality education the greater the long-term benefits are to society. The long-term benefits to the economy are estimated to exceed costs by a factor of around 2.4 for every dollar invested. These short and long-term benefits clearly indicate that the implementation of the Pascal recommendations will benefit the Ontario economy.

The short-term multipliers and the long-term benefit/cost estimates were calculated using conservative assumptions regarding the impact of the implementation of the new system. Consequently, there is the likelihood that the benefits to the economy will exceed estimates provided in this report. Even with conservative assumptions there are considerable benefits to the economy from implementing these proposals.

The demographic projections illustrate that the number of children 0-12 in Ontario will be expanding over the next twenty years, with a gain of over 31% from 2006 to 2036. The area outside Toronto in the GTA will see the largest increase at around 71%. These estimates illustrate that the number of children needing ELC will continue to expand for the foreseeable future, which means the net economic benefits from changing the ELC system will be magnified in the future beyond the estimates for the first year of the operation of the new ELC system highlighted in this report.

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Appendix A: Assumptions for Utilization Rates

An idea of how the new system will affect ELC utilization rates can be derived from economics and other research. Basic consumer theory states that demand for a service depends on income, the price of the service and consumer preferences. Household income is unlikely to change significantly as a result of the introduction of the new system because the dollar magnitude of proposed changes was estimated by Pascal at less than $1 billion. This direct change in expenditures is not large enough to significantly affect total Gross Domestic Product (GDP) or household income in an economy that will be around $675 billion by 2013. [12] An increase in expenditures of $1.0 billion would boost personal income by around 0.2-0.3%. Therefore there will not be a large change in the demand for these services caused by moving to the new system based on the change in household income alone.

Another consideration is that there will be a change in available family resources because of the reduction in the amount of money that parents directly pay for ELC for children 4-5 because of the availability of the full-day ELP. Some of these funds could be redeployed to pay for other ELC services. According to the Pascal report the average daily child care fee for children in JK/SK is $34.42 and would be $27 in the new system for extended care. This suggests that using a 50 week year the savings per child would be $1,855 per child. If the additional spending is distributed evenly across all expenditures there would be only a relatively small additional amount available for children 0-3 years since total household expenditures on child care represented only 0.5% of total expenditures of all households in Ontario in 2008 and roughly 5% of all expenditures for households reporting child care expenses. This suggests that 5% of the $1,855 would be used for child care on average, which represents $92.75 per year or 0.1% of total expenditures. Therefore, other factors would need to change for the utilization rate to change significantly.

Children 0-3

Pascal does not provide an estimate of the fees for children 0-3. If fees stay the same, then there will not be any change in the number of children utilizing ELC services as a result of this factor. Beyond, child care fees there are a number of other factors that could potentially influence parental preferences and therefore utilization rates.

The quality of the services could influence demand. Evaluating quality, however, can be notoriously difficult. Helburn (1995) found that 90% of parents rated their child's classroom of being very high quality, while trained observers rated most of these classrooms poor to mediocre. Mocan (2001) compared consumer evaluations of quality to actual quality and finds that parents do not utilize all the available information in forming their assessment of quality. Mocan (2002) indicates that the evidence suggests that parents value quality, but that parents have difficulty in assessing the quality of child care they are purchasing. This can occur because parents interpret the signals of quality incorrectly, for example, equating clean reception areas with high quality of child care. Furthermore Mocan (2001) finds some evidence of moral hazard whereas the centres with clean reception areas tend to produce lower level of quality for unobservable items. Furthermore, it is widely reported that cognitive dissonance occurs, because parents have few affordable options and have to convince themselves that the quality is acceptable.[13] These challenges means that the perception of quality can have an impact on demand, while the actual quality ELC services will have an impact on the long-term benefits that children gain from ELC.

[12] Future GDP estimate from C_4SE 2009 forecast. Family income before tax would be increased by the proposals, but taxes would likely be increased to pay for the new system. The short-term impact on GDP is larger for direct expenditures than taxes, so there would be a net positive short-term impact on GDP. The increase would likely be less than half of the full amount of the expenditure increase. Taxpayers with young children would experience a net benefit, but other households would experience a net tax increase.

[13] Emlen et al. (1999)

Another factor that could influence utilization is a lack of accessibility. If the existing system is suffering from a lack of available spaces, so that parents cannot access quality child care, the level of utilization would be below what parents want. Therefore, if there is an expansion in the number of spaces available there would also be an expansion in utilization. It appears, however, that the Pascal report is suggesting reorganizing existing child care spaces, and keeping existing providers, before determining additional need and expanding the system in the future. So there does not appear to be a change in the number of spaces or types of organizations providing these services in the near term. If the same organizations are providing these services there is the likelihood that parents will not perceive any change in the quality of services offered. If the perceived quality of ELC services remains the same, [14] then the initial impact on utilization would be minimal since it is unlikely that preferences would change otherwise.

If accessibility is better where shortages currently exist or the perceived quality of these services is better there would be an increase in the utilization rate. At this point it is not clear if any of these factors will occur and boost demand by 2012-13, although many of these factors will likely occur later. Therefore, it cannot be assumed that there will be a change in the utilization of the system for 0-3 year olds at the point the full-day 4-5 year ELP is first implemented by 2012-13, which is the focus of the present analysis. But it can be assumed that the money freed-up from the re-allocation of funding and responsibilities could lead to an increase in the number of subsidized spaces and therefore demand by around 6,420 spaces. This amounts to roughly an increase of 8.6%, although it should be noted that the rise in enrolment would also increase staff and other operating costs. Since the distribution of these funds is unknown and to be conservative, it is assumed that there is no change in the enrolment for children 0-3 by 2012-13.

Over time, the utilization rate likely will change because of the structure of the new system. The new system will employ ECEs, whereas the existing system employs people with and without ECE education. A higher portion of providers with ECE education will directly increase structural quality and is found to be positively related to process quality. If parents perceive that there has been an improvement in the quality of services provided, then there will be an increase in demand. The streamlining of the system to a one stop shop could reduce non-financial costs of using the services provided by CFC. Moreover, the inclusion of the 18-month well-baby visit as an entry point into the new system could increase participation. And any additional funding to expand the system by lowering fees or improving accessibility to quality services would obviously impact the utilization rate. The exact degree of change in participation is unknown, however, until the fee, accessibility and quality are determined.

Currently, the rate of participation of children 0-3 in child care centres is around 10% based on the available data for regulated child care spaces by different age groups and the detailed population by age data from the census. In OECD countries there are a range of ELC utilization rates for children three and younger –8.6% in Germany, 18.7% in Italy, and 35% in Finland—for systems that charge fees and generally higher utilization rates in countries that charge no fees.[15] Therefore, there is scope for an increase in the utilization rate over the longer term.

Children 4-5

The current rate of kindergarten enrolment is roughly 83% for junior kindergarten and 88% for kindergarten. In the new system there would likely be an increase in these enrolment rates. We have assumed a 4.5% increase for each group and that an average of 90% of eligible children will take part in the ELP provided by the new system, which means an additional 12,800 children. This

[14] Certified teachers working with 4 – 5 year old children will have an opportunity to upgrade their ECE skills to achieve the appropriate level of education within five years. The focus of the current analysis is the operation of the system after three years. At that point in time, those currently without ECE training will still have two more years to obtain this qualification, so some of these benefits will occur later.
[15] OECD (2006)

assumption is less than the rate found in some countries with systems similar to that proposed by Pascal. For example, 95-99% of the 3-6 year age cohort is enrolled in the universal (voluntary and free) preschool programs in Belgium, France, and Italy.[16] Given that Canadian parents are generally found to be very price sensitive, there is the distinct possibility that the increase in ELC utilization will rise above 90%.[17] This means the long-term benefits of this study are conservative.

The proposed new early learning and care system for 4-5 year olds will also provide extended hours during the school year, and 50 weeks each year. These ELC services will be associated with the school system and delivered by ECE trained staff. Parents will pay for extended day/year programming in the new system. Parents now pay for extended day/year ELC. If the cost to parents remains the same, then there would be no change in demand based on fees alone.

Since the new system is designed to be provide improvements in a number of important areas there is the likelihood that over time demand will increase significantly for three basic reasons. First, the new system will be provided by the school system using ECE trained personnel. ECE training tends to improve the quality of ELC. Therefore, there is the likelihood that parents will perceive that the new system is better than traditional child care in terms of quality and there will be an additional increase in demand for these services. Second, since children are already in school for the whole school day compared to the current part-day or every-other-day there would be an extra incentive to place children in the extended day/year programs that are located at the school, since there would not be the logistical problem of transporting the children to another location. This would reduce the effective cost for parents. Third, there would be an incentive to parents to extend the time their children are in ELC to include extended day programming for economic reasons, such as work and education. The addition of extended day ELC would mean that parents could be employed during the standard work day. In the UK, for example, around one in two children aged 5-7 are in wraparound care.[18]

Pascal states that the cost of providing extended day/year programming will fall and that these cost savings will be passed onto parents. The current average fee for child care is estimated to be $34.42 per day for children aged 4-5 years although rates vary widely throughout Ontario, with fees higher in the large urban areas and lower in smaller urban and rural communities.[19] Pascal estimates that the new extended day/year ELC fee will be $27 per day for these children. This means there will be a fee reduction of 21.6%. For Canada Powell (2002) found that for married mothers a 1% drop in fees results in a rise in the probability of using centre-based care of between 1.4% and 2.0% using a mixed logit and universal logit models respectively. Notably, Kimmel and Connelly (2000) found that single parents are much more sensitive to changes in fees than married mothers, which suggests that for all Canadian parents there could be a larger increase than Powell's estimates above.

For the current study, three assumptions are averaged: that 50% of children aged 4-5 would use extended day/year child care, that the decline in fees will cause an increase in demand by 1.4% and 2.0% for every 1% drop in fees. The average of these estimates means that the utilization rate rises to 52%.

[16] Kamerman (2003). These programs cover the normal school day, lasting 7 or 8 hours a day, and have "wrap-around" services that supplement the school day/year program (at income-related fees).

[17] Fairholm (2009b) reported that Canadian parents are very sensitivity to fees compared with other countries. Powell (2002) and Cleveland et al. (1996) reported price elasticities of -1.0 or larger, which mean that the demand for ELC increases by 1% or more for a 1% drop in fees. Powell (2002) estimated price elasticities of the various types of child care ranging from -1.4 for day-care centres to -3.6 for sitters in their own homes.

[18] Bryson et al. (2006)

[19] Current fees appear to include the cost of half day programs, so these services are not directly comparable to extended child care in the new system. Extended child care will be provided by the school system, which means that there will be lower occupancy and administrative costs that could result in lower fees to parents.

Children 6-8

For children 6-8 years old, the Pascal report proposes extended day/school care that will be provided by the school boards and employ people with ECE training. As described above the research suggests that after-school and summer programs can have significant effects on the academic outcomes of children, particularly disadvantaged children. Both after-school and summer programs are found to improve academic outcomes by around 0.2-0.3 SD for disadvantaged children. These effects mean there will be additional long-term benefits to society from implementing these proposals. When examining the impact on 6-8 year olds, the question then becomes how many children will be in these programs.

Pascal states that there will be a reduction in ELC fees for children 6-8 from $26.24 to $20 per day. This represents a decline of 23.8% in fees. Given the price sensitivity of Canadian parents, the rise in demand would be in the range of 33-47%. If the new system is perceived to be of higher quality than the current system, or there is improved access where there were accessibility problems before then the increase in demand would be even larger. As mentioned above in the UK 50% of 5-7 year olds are enrolled in wraparound care.

For the current study, three assumptions are averaged: that 50% of children aged 4-5 would use extended day/year child care, that the decline in fees will cause an increase in demand by 1.4% and 2.0% for every 1% drop in fees. The average estimate means that the utilization rate rises to 24%.[20]

Children 9-12

For children aged 9-12, the proposed new system will provide after-school programs delivered by school boards when requested by 15 or more families in a school. There is no indication of the costs or fees for these programs in the Pascal report. It is therefore assumed that the costs and fees will remain the same as the current approach. This means there would not be any change in demand for these programs for children aged 9-12 based on fee changes. Since the change in household income would be minimal from the introduction of the new system there would not be any change from the income effect. Therefore any change in demand would rest on changes in preferences.

If parents perceive that these services are superior to those currently available then there could be an increase in demand. Furthermore, if there is currently a lack of available programs, which limits demand, then there could be an increase if programs in the new system were more available than the existing ELC. Since there does not appear to be any additional funding explicitly provided to these programs by the Pascal report and to be conservative we have assumed that there is no change in the level of utilization for these services.

[20] The current utilization rate is unknown because the number of children 6-12 is recorded but not the two sub-groups 6-8 and 9-12. The current number using extended care was estimated based on the share of population for children 6-12.

Appendix B: Short-term effects methodology

The methodology used to estimate the short-term stimulus effects of the new ELC system is discussed below. To calculate the economic impact of the implementation of the new ELC system, several economic effects are first calculated, including: provision of existing ELC services, operating the new ELC system, and the impact of capital expenditures. The final estimates are shown on a net basis by subtracting the gross stimulus for current ELC services from the stimulus derived from implementing the proposed early learning system.

In general, the economic impact estimates for current ELC services and new ELC system use multipliers from Statistics Canada's child care, outside the home commodity, although the multipliers for the new system had to be modified to reflect different wages and benefits than current ELC services. Since some of the services are to be delivered by the education system, a set of education sector multipliers also were used. And construction industry multipliers were used to estimate the short-term effects from capital expenditures on the economy (See Table B1).

Table B1: Statistics Canada Multipliers Used For Analysis (Multiplier per $ Output)

	Child Care Outside the Home	Education	Non-Residential Building Construction
Direct labour income	0.90	0.79	0.41
Indirect labour Income	0.02	0.06	0.16
Direct GDP	0.96	0.85	0.52
Indirect GDP	0.04	0.09	0.24
Direct employment*	25.63	13.50	7.86
Indirect employment*	0.42	1.39	3.09

*employment per $million of output
Source: Statistics Canada Ontario IO model simulations

Methodology for stimulus provided by current ELC

The methodology for estimating the economic impact from removing current ELC services involves the calculation of several factors discussed below. The results are reported in Table B2.

- For the stimulus from current ELC; direct labour income, indirect labour income, direct GDP effect, indirect GDP effect, induced GDP effect, direct employment effect, indirect employment effect and induced employment effect were calculated as follows.
    - Direct labour income was the labour cost of current ELC.
    - Indirect labour income was found by multiplying the non-labour costs of current ELC by the wage share of non-labour cost (from the child care outside of home commodity input-output simulation).
    - Direct GDP effects were found by multiplying total costs of current ELC by the direct GDP multiplier (from the child care outside of home commodity input-output simulation).
    - Indirect GDP effects were found by multiplying non-labour costs of current ELC by the GDP impact per dollar non-labour cost (from the child care outside of home commodity input-output simulation).
    - Induced GDP effects were found by multiplying labour costs of current ELC by the induced GDP to wage multiplier for an income group similar to that of workers in ELC (see Fairholm (2009a) for more details). The induced GDP effect of the indirect labour income is also included.

- Direct employment effects were calculated by dividing labour costs of current ELC by the yearly wage of a worker in ELC.
- Indirect employment effects were found by multiplying non-wage costs by the employment impact of an extra dollar spent on non-wage cost (from the child care outside of home commodity input-output simulation).
- Induced employment effects were by multiplying induced GDP effects by the ratio of indirect employment effects to indirect GDP effects. This give a reasonable estimate of the employment effect from extra wages of ELC workers being spent.

Table B2: Current ELC (per $million of expenditures)

	Ontario	GTA	Toronto
Direct labour income	751,437	744,081	739,915
Indirect labour income	57,478	52,676	53,534
Direct GDP	797,884	790,073	785,649
Indirect GDP	90,619	83,049	84,401
Induced GDP	1,105,746	977,106	973,064
Direct employment	24.40	24.16	24.03
Indirect employment	1.21	1.11	1.13
Induced employment	14.77	13.06	13.00

Source: Statistics Canada IO simulations & calculations by authors

Methodology for stimulus provided by the proposed Early Learning Program

The methodology for estimating the economic impact from operating the proposed ELP system involves calculation of several factors discussed below. The results are reported in Table B3.

- The stimulus from the proposed ELP; direct labour income, indirect labour income, direct GDP effect, indirect GDP effect, induced GDP effect, direct employment effect, indirect employment effect and induced employment effect were calculated as follows.
  - Direct labour income was the labour cost of the proposed ELP.
  - Indirect labour income was found by multiplying the non-labour costs of the proposed ELP by the wage share of non-labour cost (from the education industry input-output simulation).
  - Direct GDP effects were found by multiplying total costs of the proposed ELP by the direct GDP multiplier (from the education industry input-output simulation).
  - Indirect GDP effects were found by multiplying non-labour costs of the proposed ELP by the GDP impact per dollar non-labour cost (from the education industry input-output simulation).
  - Induced GDP effects were found by multiplying labour costs of the proposed ELP by the induced GDP to wage multiplier from an income group similar to that of educators in kindergarten (see Fairholm (2009a) for more details). The induced GDP effect of the indirect labour income is also included.
  - Direct employment effects were calculated by dividing labour costs of the proposed ELP by the yearly wage of an educator in kindergarten.
  - Indirect employment effects were found by multiplying non-wage costs by the employment impact of an extra dollar spent on non-wage cost (from the education industry input-output simulation).
  - Induced employment effects were by multiplying induced GDP effects by the ratio of indirect employment effects to indirect GDP effects. This give a reasonable estimate of the employment effect from extra wages of the ELP educators being spent.

Table B3: Proposed expanded kindergarten (per $million of expenditures)			
	Ontario	GTA	Toronto
Direct labour income	674,020	674,020	674,020
Indirect labour income	89,620	79,772	79,772
Direct GDP	848,225	848,225	848,225
Indirect GDP	138,746	123,500	123,500
Induced GDP	944,452	840,671	840,671
Direct employment	11.42	11.42	11.42
Indirect employment	2.13	1.89	1.89
Induced employment	14.49	12.89	12.89

Methodology for stimulus provided by school-delivered extended hour/full year program

The methodology for estimating the operating of the proposed school-delivered extended hour/full year program involves calculation of several factors discussed below. The results are reported in Table B4.

- For the stimulus from the proposed school-delivered extended hour/full year program; direct labour income, indirect labour income, direct GDP effect, indirect GDP effect, induced GDP effect, direct employment effect, indirect employment effect and induced employment effect were calculated as follows.
    - Direct labour income was the labour cost of the proposed school-delivered extended hour/full year program; direct.
    - Indirect labour income was found by multiplying the non-labour costs of the proposed school-delivered extended hour/full year program by the wage share of non-labour cost (from the child care outside of home commodity input-output simulation).
    - Direct GDP effects were found by multiplying total costs of the proposed school-delivered extended hour/full year program by the direct GDP multiplier (from the child care outside of home commodity input-output simulation).
    - Indirect GDP effects were found by multiplying non-labour costs of the proposed school-delivered extended hour/full year program by the GDP impact per dollar non-labour cost (from the child care outside of home commodity input-output simulation).
    - Induced GDP effects were found by multiplying labour costs of the proposed school-delivered extended hour/full year program by the induced GDP to wage multiplier from an income group similar to that of workers in new system ELC (see Fairholm (2009) for more details). The induced GDP effect of the indirect labour income is also included.
    - Direct employment effects were calculated by dividing labour costs of the proposed school-delivered extended hour/full year program by the yearly wage of a worker in ELC.
    - Indirect employment effects were found by multiplying non-wage costs by the employment impact of an extra dollar spent on non-wage cost (from the child care outside of home commodity input-output simulation).
    - Induced employment effects were estimated by multiplying the induced GDP effects by the ratio of indirect employment effects to indirect GDP effects. This give a reasonable estimate of the employment effect from extra higher wages of ELC workers being spent.

Table B4: Proposed new non-kindergarten system (per $million of expenditures)			
	Ontario	GTA	Toronto
Direct labour income	848,339	852,425	853,969
Indirect labour income	35,070	30,376	30,058
Direct GDP	900,775	905,113	906,753
Indirect GDP	55,291	47,890	47,389
Induced GDP	1,092,329	975,753	977,058
Direct employment	14.38	14.45	14.47
Indirect employment	0.74	0.64	0.63
Induced employment	14.60	13.04	13.06

Methodology for stimulus from capital investment

The methodology for estimating the impact of new capital investment involves calculation several factors discussed below. The results of the calculations are reported in Table B5.

- For the stimulus from capital investment; direct labour income, indirect labour income, direct GDP effect, indirect GDP effect, induced GDP effect, direct employment effect, indirect employment effect and induced employment effect were calculated as follows.
    - Direct labour income is calculated from multiplying capital investment expenditures by the labour income share from the non-residential building construction industry input-output simulation.
    - Indirect labour income is calculated from multiplying capital investment expenditures by the indirect labour income share from the non-residential building construction industry input-output simulation.
    - Direct GDP effects are calculated from multiplying capital investment expenditures by the direct GDP multiplier from the non-residential building construction industry input-output simulation.
    - Indirect GDP effects are calculated from multiplying capital investment expenditures by the indirect GDP multiplier from the non-residential building construction industry input-output simulation.
    - Induced GDP effects are found from multiplying direct labour income by the induced GDP to wage multiplier from an income group similar to that of workers in the non-residential building construction industry. The induced GDP effect of the indirect labour income is also included.
    - Direct employment effects are calculated from multiplying capital investment expenditures by the direct employment multiplier from the non-residential building construction industry input-output simulation.
    - Indirect employment effects are calculated from multiplying capital investment expenditures by the indirect employment multiplier from the non-residential building construction industry input-output simulation.
    - Induced employment effects were by multiplying induced GDP effects by the ratio of indirect employment effects to indirect GDP effects. This give a reasonable estimate of the employment effect from extra wages of non-residential building construction workers being spent.

Table B5: Proposed Capital Expenditures (per $million of expenditures)			
	Ontario	GTA	Toronto
Direct labour income	412,059	412,059	412,059
Indirect labour income	161,968	144,170	144,170
Direct GDP	519,633	519,633	519,633
Indirect GDP	239,112	212,837	212,837
Induced GDP	710,288	632,239	632,239
Direct employment	7.86	7.86	7.86
Indirect employment	3.09	2.75	2.75
Induced employment	9.18	8.17	8.17

Methodology for aggregating the first two components

The stimulus effects of implementing the new early learning system are found by adding the kindergarten and non-kindergarten components of the new system. This is done for the following variables: program costs, direct labour income, indirect labour income, direct GDP effect, indirect GDP effect, induced GDP effect, direct employment effect, indirect employment effect and induced employment effect.

Multipliers from implementing the new ELC system are found by dividing the following variables by the total cost (or expenditures) of the program: direct labour income, indirect labour income, direct GDP effect, indirect GDP effect, induced GDP effect, direct employment effect, indirect employment effect and induced employment effect. The results of the calculations are listed in Table B6 below.

Table B6: Proposed Early Learning (per $million of expenditures)			
	Ontario	GTA	Toronto
Direct labour income	801,717	805,093	806,604
Indirect labour income	49,660	38,703	38,403
Direct GDP	886,721	890,021	891,348
Indirect GDP	77,611	60,483	60,014
Induced GDP	1,052,779	836,633	837,740
Direct employment	13.59	13.65	13.67
Indirect employment	1.11	0.87	0.86
Induced employment	14.57	11.57	11.58

Appendix C: Benefit-Cost Analysis

This section contains a benefit-cost analysis that provides a more complete assessment of the benefits to society from ELC than an input-output economic impact assessment can produce. As well, Appendix D examines the long-term human capital benefits of quality ELC.

Costs of providing ELC, as well as hours, are estimated and these results are used for both the long-run and short-run analysis. The long-run overall benefits to participating children and mothers are calculated. The analysis concludes with an overall benefit-cost ratio per hour of ELC in 2005. The four main parts of the benefit-cost analysis are:

- ELC costs and cost savings and hours;
- child benefits and costs of ELC;
- mother benefits and costs of ELC;
- adjusting for quality; and
- calculation of benefit-cost ratio.

This analysis is undertaken for Ontario first and then tables for the GTA and the city of Toronto are added to illustrate any differences in the analysis between Ontario, Toronto and the GTA. These differences are most prevalent in the calculations of costs, hours and quality of early childhood programs.

Benefits to participants in early learning and their parents are calculated mainly using the same methodology as outlined in Fairholm (2009a). Unlike in Fairholm (2009a) that uses Canada data, the source data used for the benefit calculations uses Ontario, GTA and Toronto specific data as much as possible.

Ontario, GTA and Toronto specific data from the census and C4SE models were used to calculate the increase in earnings for early learning participants and their parents. And child care data were provided by the City of Toronto. Demographic breakouts and forecasts were made for Ontario, GTA and Toronto. In addition, other data such as percent of school funding allocated to special education, the costs of school and post-secondary education and smoking rates were for Ontario and Toronto. Higher educational quality in the new system was taken into account by adjusting for Ontario specific child-staff ratios and the percentage of staff with an ECE degree.

Hours and costs

To estimate the net increase in hours and costs from the proposed early learning system, it was necessary to first net out the impact of current services in place for children 0-8 from the impact of the new system.

As discussed previously, the cost of the current system for 9-12 year olds was assumed to be the same as the new system, so there is zero net impact in the short-term and the long-term benefit/costs are also the same when analysing the first year of full implementation of the full-day Early Learning Program. Current services for 0-8 year olds can be divided into child care provided to 0-3 and 4-5 year olds in daycare centres, half-day kindergarten for 4-5 year olds and afterschool care provided to 6-8 year olds. The new system for 4-8 year olds would provide a universally-available school-day/year for all children, with fees charged to parents if their children remain for extended hours and/or during school holidays and the summer break. The new system would re-engineer services for children 0-3 years. That meant that our analysis focussed on six components. First, the current child care provided to 0-5 year-olds is removed. Second, the current after-school care provided to 6-8 year olds is removed. Third, the new system to replace the current half-day kindergarten program with a full-day Early Learning Program is added. Fourth, the new system to provide extended hour/year round Early Learning Program for 4-5 years olds is added. Fifth, the new after-school care to 6-8 year olds is added. Sixth, the re-engineered services for 0-3 year old children are added.

The hours were calculated as follows:

- The hours spent by current 0-5 children in child care were estimated by multiplying the percentage of the age cohort in child care by the number of children in that cohort by the number of hours an average child spent in child care. The data on percentage of children in child care by age and number of hours spent in child care by children by age were obtained from the National Longitudinal Survey of Children and Youth (NLSCY). Unfortunately data were only available for Ontario and the Toronto CMA which meant that calculations for the GTA and city of Toronto used the same data. Data for the number of children by age and jurisdiction were obtained from the Ontario Ministry of Finance population projection.
- The hours spent by current 6-8 year old children in after-school care were assumed to be two hours per day during the school year and 9 hours per day during the summer vacation period for an average of 3.75 hours in care. The percentage of these children in child care for Ontario was estimated through data collected on the number of children 6-12 in care, and distributing based on population. It is assumed that the utilization rate for this age cohort for 2008 is evident in 2012. The percentage of these children in child care for the GTA and Toronto were estimated from data collected from the city of Toronto. In the new system, the hours each child spends in child care is assumed to be the same as the hours spent in child care in the current system. The percentage of these children in child care for the GTA and Toronto was estimated from data collected from the city of Toronto.
- The number of hours spent by participants in the re-engineered 0-3 year old program is assumed to be the same as the current system.
- The number of extra hours that will be spent in the Early Learning Program by 4-5 year olds was calculated by multiplying the assumed extra hours per child by the 90% of children aged 4-5 who are assumed to benefit from the full-day ELP. The extra hours in the Early Learning Program per child in the new system was assumed to three hours per day, five days per week, and 40 weeks per year. Data for the number of children by age and jurisdiction were obtained from the Ontario Ministry of Finance population projection.
- The total number of hours spent by 4-5 old children in extended day/year programming was found by multiplying the assumed 52% of 4-5 year old children who would be enrolled by the hours each child would spend in early learning each year. It is assumed that on average throughout the year, four year olds spend 4.7 hours per day in care and that children 5 spend 3.75 hours per day in care. Data for the number of children by age and jurisdiction were obtained from the Ontario Ministry of Finance population projection.
- The total number of hours spent by 6-8 old children in after-school care in the new system was found by multiplying the assumed 24% of 6-8 year old children who would be enrolled by the hours each child would spend in early learning each year. It is assumed that 6-8 year olds spend 3.75 hours on average in care. Data for the number of children by age and jurisdiction were obtained from the Ontario Ministry of Finance population projection.

The staff costs per hour child care were calculated as follows:

- The calculation of hourly staff costs in the current system uses hourly wage data for the "Child Day-Care Services Industry" (NAICS 6244) from the Survey of Employment, Payrolls and Hours. These hourly wage data are turned into labour income by taking the benefits rate to wage rate from Doherty et al. (2000) and adjusting for changes in EI and CPP rates. Staff costs per hour of child care were found by using the maximum child-staff ratio by age of child. This did not, however, capture the full labour cost per hour of child care and therefore further adjustments were made to reflect the time staff work beyond the time spent caring for children and structural factors that prevented the maximum child-labour ratios from being reached.

- The calculation of hourly staff costs in the new system used data provided by the Atkinson Charitable Foundation. The staff cost per hour of child care was found by using the maximum child-labour ratio by age of child. This did not, however, capture the full staff cost per hour of child care and therefore further adjustments were made for time staff do not spend caring for children and structural factors that prevented the maximum child-labour ratios from being reached.

The non-staff costs per hour child care were calculated as follows:

- The calculation of hourly non-labour costs in the current system used a staff to non-staff expenditures ratio from the City of Toronto child care centres applied to staff cost per hour. Non-staff expenditures included administration, program, food, occupancy, insurance and training costs. To calculate total labour cost the wage share of non-staff workers working in the sector (census data) was added to the staff wage share.
- The calculation of hourly non-staff costs in the new system used data provided by the Atkinson Charitable Foundation. This included expenditures for supervision, administration, program supplies, nutrition and occupancy. An hourly staff cost to non-staff costs ratio was calculated and applied to the hourly staff cost. To calculate total labour cost the wage share of non-staff workers working in the sector (census data) was added to the staff wage share.

In addition there are cost savings from fewer children in informal care, which must be taken into account. Hourly cost savings from informal care are found by multiplying the 0.63 informal child care spaces that are replaced by one formal space [21] by Cleveland and Krashinsky's (1998) estimate of hourly costs of informal care of $3 in 1998, which translates to $3.7 in 2005 after using 3% nominal wage growth. The child-staff ratios were used to extrapolate the hourly cost savings from informal care from a 0-5 year old child to 4-8 year old child. This gives hourly cost savings in the current system of 2.82 for 0-3 year olds, 1.92 for 4-5 year olds and 1.16 for 6-8 year olds. Hourly cost savings in the new system are 3.40 for 0-3 year olds, 1.92 for 4-5 year olds and 1.16 for 6-8 year olds. The difference is due to variations in child-staff ratios and age-specific utilization rates. Temple and Reynolds (2007) use net costs (costs less cost savings) for their estimate of the benefit-cost ratio of the Abecedarian program.

The total cost of the early learning system was calculated by multiplying the total number of hours by the net cost of early learning per hour (hourly labour costs plus hourly non-labour costs less hourly cost savings from informal care) for each child age cohort. The total net cost of implementing the new early learning system was found by subtracting the total costs of the current system from the total costs of the new system.

Benefits to Children

The benefits to children by age from Ontario ELC are approximated through several steps. First, key results from the Carolina Abecedarian program are selected for the estimation of Ontario ELC costs and benefits. Second, the above results are adjusted to reflect the Ontario situation. This is done to make it possible to estimate benefits from quality ELC to an average Ontario child rather than a disadvantaged American child (these benefits are called the "adjusted Abecedarian benefits"). Third, adjusted Abecedarian benefits are converted to reflect Ontario ELC benefits by making an adjustment for differences in ELC quality. These quality adjustments are undertaken for the current and proposed early learning system. Fourth, Ontario ELC benefits are converted to hourly terms.

[21] Author's calculation based on Cleveland and Krashinsky 's (1998) predicted increase in formal child care spaces and decrease in informal spaces when universal ELC is offered.

Benefits from the Abecedarian Program

There are a large number of studies that have examined the benefits of quality ELC. These studies were examined earlier in this report. Studies that follow a randomized experimental approach are the gold standard of research and provide unbiased estimates as to the benefits of ELC. Of the two main experimental studies of ELC costs and benefits, the Carolina Abecedarian study is preferable to the High/Scope Perry pre-school study, since the Carolina Abecedarian study is more recent and analyzes full-day rather than part-day ELC. Five main results of the Carolina Abecedarian program are used to calculate Ontario ELC costs and benefits (see Table C.1).

Table C.1 - Carolina Abecedarian Results

	Participants	Controls
Grade retention rate (held back one or more grades)	31%	55%
Years in special education	1.0	1.5
Smoking rates	39%	55%
High school dropout rate	33%	49%
Math score (Woodcock Johnson)	93	82

Adjusted Abecedarian Benefits

The Carolina Abecedarian program deals with disadvantaged children, while Ontario ELC deals with all children. Since many articles have shown that disadvantaged children benefit more from quality ELC, the Carolina Abecedarian results are adjusted downwards. To determine by how much to adjust the results downwards, estimates from Loeb et al. (2007) on ELC score increases for disadvantaged and all children are used (see Table C.2). Dividing the average score increases for disadvantaged children (very low income) by the average score increase of all children gives an adjustment factor of 0.55. The adjustment factor is applied to the percentage achievement difference between Carolina Abecedarian participants and controls. The resulting Abecedarian adjustments are listed in Table C.3 on the next page.

The adjusted difference is then multiplied by Ontario data for the various results (retention, smoking, etc.)[22] and the resulting value of a change in the results in order to give benefits per Ontario participant (see Table C.4a). This gives a slight underestimate of the benefits from ELC since the control group includes both participants and non-participants.

Table C.2 - ELC Score Increase

	Math	Verbal	Average
Score increase – all	1.116	1.196	1.156
Score increase – very low income	2.015	2.191	2.103

Table C.3 - Adjustments to Reflect Average Versus Disadvantaged Cohorts

	Participants	Control	Difference	Adjusted Difference
Grade retention rate	31%	55%	-44%	-24%
Years in special education	1	1.5	-33%	-18%
Smoking rates	39%	55%	-29%	-16%
High school dropout rate	33%	49%	-33%	-18%
Math score (Woodcock Johnson)	93	82	13%	7%

[22] Source for grade retention rates: Guèvremont et al. (2007), source for years of special education: http://www.tdsb.on.ca/wwwdocuments/about_us/environmental_scan_2007/docs/3-OurStudents080731.pdf

Table C.4a - Ontario Benefits Based on Adjusting Estimated Abecedarian Benefits (Five-Year-Olds, 2005)				
	All Children	Participants	Values	Benefits
Grade retention rate (grades 1-8)	34%	26%	10,000	822
% funding for special education	12%	10%	10,000	1,783
Smoking rates	20%	17%	396,923	12,540
High school dropout rate	10%	8%	10,000	183

Table C.4b - Toronto - GTA Benefits Based on Adjusting Estimated Abecedarian Benefits (Five-Year-Olds, 2005)				
	All Children	Participants	Values	Benefits
Grade retention rate (grades 1-8)	34%	26%	9,728	800
% funding for special education	12%	10%	9,728	1,658
Smoking rates	16%	13%	396,923	10,175
High school dropout rate	8%	7%	9,728	139

Table C.4c - Toronto City Benefits Based on Adjusting Estimated Abecedarian Benefits (Five-Year-Olds, 2005)				
	All Children	Participants	Values	Benefits
Grade retention rate (grades 1-8)	34%	26%	9,728	800
% funding for special education	12%	10%	9,728	1,658
Smoking rates	16%	13%	396,923	10,175
High school dropout rate	7%	6%	9,728	128

The benefits for five-year-olds are listed in Table C.4a for illustration purposes. While the benefits for all age cohorts from zero to five are calculated, only the benefits to five-year-olds are listed in the table since it would be impractical to list benefits for each age cohort from zero to five. Note that due to discounting of future costs and benefits, the cost and benefits for zero to four-year-olds will be slightly lower than those for five-year-olds. It will take longer for the benefits to materialize since we assume that they occur at the same age for all participants (see Table C.7a).

Benefits from decreased smoking are by far the highest benefits in Table C.4a. The reduction in the need for special education is the second largest benefit, while the benefits from a reduction in grade retention rates are significantly lower. It should be noted that these estimates probably represent a conservative estimate of the total benefits since studies of the High/Scope Perry pre-school program found that there can be a reduction in criminal justice costs.

As shown in Table C.5a, high quality ELC results in the Ontario high school dropout rate falling from 10% to 8%. Assuming these additional graduates make the same postsecondary educational choices as current high school graduates, the percentage increase in postsecondary graduation rates can be calculated from the percentage decrease in those with less than high school (LHS) educational attainment. The additional postsecondary costs for ELC participants are calculated using projected distributions of secondary and postsecondary certificates, diplomas or degrees of children born between 2000 and 2005 (see Table C.5a). All costs/benefits are distributed along the participating child's lifetime according to assumptions to reflect when those costs would occur.

Table C.5a - Estimated Future Postsecondary Costs for Five-Year-Olds Ontario					
	Graduation Parchment	LHS % Decrease	Cost/Year	Education (Yrs)	Cost/Participant
High school	0.06	0.02	10000	-	-
Trades	0.09	0.02	11800	2	39
College	0.34	0.02	11800	2	146
Some university	0.08	0.02	16000	2	49
Bachelor	0.24	0.02	16000	4	283
Post-Bachelor	0.08	0.02	25000	6	218

Table C.5b - Estimated Future Postsecondary Costs for Five-Year-Olds Toronto – GTA					
	Graduation Parchment	LHS % Decrease	Cost/Year	Education (Yrs)	Cost/Participant
High school	0.05	0.01	9728	-	-
Trades	0.07	0.01	12500	2	25
College	0.30	0.01	12500	2	106
Some university	0.10	0.01	16000	2	46
Bachelor	0.31	0.01	16000	4	279
Post-Bachelor	0.10	0.01	25000	6	207

Table C.5c - Estimated Future Postsecondary Costs for Five-Year-Olds Toronto City					
	Graduation Parchment	LHS % Decrease	Cost/Year	Education (Yrs)	Cost/Participant
High school	0.06	0.01	9728	-	-
Trades	0.07	0.01	12500	2	23
College	0.30	0.01	12500	2	98
Some university	0.10	0.01	16000	2	42
Bachelor	0.31	0.01	16000	4	257
Post-Bachelor	0.10	0.01	25000	6	191

Table C.6a - Benefits of ELC to Five-Year-Olds Ontario - 2005	
	NPV (3% Real discount rate)
Earnings of participating children	$15,483
Total benefits to children	$19,785

Table C.6b - Benefits of ELC to Five-Year-Olds Toronto - GTA - 2005	
	NPV (3% Real discount rate)
Earnings of participating children	$9,846
Total benefits to children	$14,051

Table C.6c - Benefits of ELC to Five-Year-Olds Toronto City - 2005	
	NPV (3% Real discount rate)
Earnings of participating children	$10,457
Total benefits to children	$14,707

Growth theory underscores the importance of education (human capital accumulation) to long-term economic growth. A long-term growth model was used in order to estimate the long-term benefits that are provided by quality ELC. Specifically, the education gap between ELC participants and non-participants was used to estimate the impact of ELC participation on long-term economic growth following the approach used by Dickens et al. (2006). (See Appendix D for details.) The net present value (NPV) of enhanced long-term growth for a five-year-old Ontario child in 2005 is estimated as being $15,483 (at a 3% real discount rate).

Notably, the above estimate of the NPV from long-term economic growth is likely an underestimate. This is because the calculation is only for the children who directly participate in the programs. There is evidence, however, that subsequent generations will also benefit from the enhanced income that ELC participants earn. Barnett and Masse (2007) provide estimates of the generational income elasticity, which together with the mean age of fathers and mothers at childbirth can be used to estimate ELC benefits from higher earnings among future offspring of ELC participants. For the Ontario situation, these calculations would result in a NPV around 10% higher per five-year-old child in 2005. These higher earnings of future generations, however, will not be considered in the analysis that follows in order to focus solely on the children who participate in the program and their mothers. From Table C.6A, one can see that the future earnings of participants account for most of total benefits. Table C.7A lists the NPV of benefits by age of child. The four and five year cohorts account for most of the children in ELC. Benefits to older age cohorts were calculated by discounting future benefits by fewer years.

Table C.7a - 2005 Child Benefits by Birth Cohort Ontario

Cohort	Age of Child	NPV Child Benefits
2000	5	$19,785
2001	4	$19,495
2002	3	$19,211
2003	2	$18,932
2004	1	$18,656
2005	0	$18,808

Table C.7b - 2005 Child Benefits by Birth Cohort Toronto - GTA

Cohort	Age of Child	NPV Child Benefits
2000	5	$14,051
2001	4	$13,837
2002	3	$13,628
2003	2	$13,421
2004	1	$13,216
2005	0	$13,436

Table C.7c - 2005 Child Benefits by Birth Cohort Toronto City

Cohort	Age of Child	NPV Child Benefits
2000	5	$14,707
2001	4	$14,533
2002	3	$14,362
2003	2	$14,193
2004	1	$14,022
2005	0	$14,274

Adjusting Benefits for Quality

The adjusted benefits calculated above are converted to reflect current and proposed Ontario early learning by adjusting for quality differences. Two structural quality measures are used in this analysis: staff-child ratios and staff education. Staff-child ratios for the Carolina Abecedarian program, for Ontario ELC and for proposed Ontario early learning are listed in Table C.8 below. According to Galinsky (2006), most of the Carolina Abecedarian teachers had college degrees. For

Ontario ELC, data on the percentage of workers with ECE qualifications is used (see Table C.9a). All educators will have an ECE qualification in the proposed early learning system.

The method used for this analysis is to connect ELC benefits to structural quality measures through test score observations. First, the adjusted Abecedarian benefits are connected to test scores. Abecedarian program quality is the baseline quality measure and is assumed to yield quality benefits of 100%. The Abecedarian program is found to increase Woodcock Johnson math scores by 7.4 points. Therefore, each point increase in test scores yields 13.4% of the child benefits from the Abecedarian program. Second, test scores are connected to the main process quality measure of child care centres—the Early Childhood Environment Rating Scale (ECERS)—where the maximum score is seven and minimum score is one. Helburn (1995) connected these two quality measures by estimating that a point increase in ECERS will increase Woodcock Johnson test scores by 1.2 points. Third, process quality is linked to structural quality by using estimates from Doherty et al. (2000) that measures the impact of staff-child ratios and staff education on ECERS (see Table C.10).

Table C.8 - Child-Staff Ratio by Age of Child

	Carolina Abecedarian	Current system	New system
6m - <1 yr	3	3.3	3.3
1 year	3	4.0	4.5
2 years	3	6.1	6.1
3 years	6	8.0	8.0
4 years	6	8.8	10.0
5 years	6	9.3	12.0

Table C.9a - ELC Worker Education Ontario – 2005

	% of workforce
Caregiver ECE educated	46.4
Caregiver not ECE educated	53.6

Table C.9b - ELC Worker Education Toronto - GTA - 2005

	% of workforce
Caregiver ECE educated	48.0
Caregiver not ECE educated	52.0

Table C.9c - ELC Worker Education Toronto City - 2005

	% of workforce
Caregiver ECE educated	48.0
Caregiver not ECE educated	52.0

Table C.10 - Impact of Structural Quality Measures on ECERS

Room characteristics' impact on ECERS	
Staff-child ratio	0.18
Teacher education impact on ECERS	
Percentage of staff with ECE education	0.32

The results in Table C.10 show that higher staff-child ratios and a higher proportion of ECE-educated staff enhance quality. Since most Carolina Abecedarian staff had college degrees and the Abecedarian program was of high quality (and due to the difficulty of comparing Canadian and American degrees), the impact on ECERS from Carolina Abecedarian education is set equal 0.32, since all Carolina Abecedarian educators have ECE degrees**.** If anything, this assumption will decrease the benefits from Ontario ELC, since all ELC workers in the new system will have ECE training.

Overall, the impact of higher child-staff ratios (or lower staff-child ratios) in proposed Ontario ELC on child benefits is minimal (less than 1%). That is, child benefits from proposed Ontario ELC are about 97%-98% of benefits from the adjusted Abecedarian program results discussed in the previous section.

Hourly Benefits to Children from Ontario ELC

The Abecedarian program ran for 50 hours a week, 50 weeks a year for five years. This means that the total amount of time a Carolina Abecedarian participant could spend in the program was 12,500 hours. The NPV of Ontario ELC is found by multiplying the quality-corrected benefit NPVs of differently aged children by their percentage distribution in ELC. Dividing the NPV of Ontario ELC by 12,500 gives an hourly benefit per participant of $1.53 (this is done to make the effects of ELC comparable to the results from the Carolina Abecedarian program). Undiscounted child hourly benefits over time are illustrated in Figure C.1a. Most of the benefits first start to materialise after 15 years.

Figure C.1a: Hourly Benefits per Participating Child - Ontario

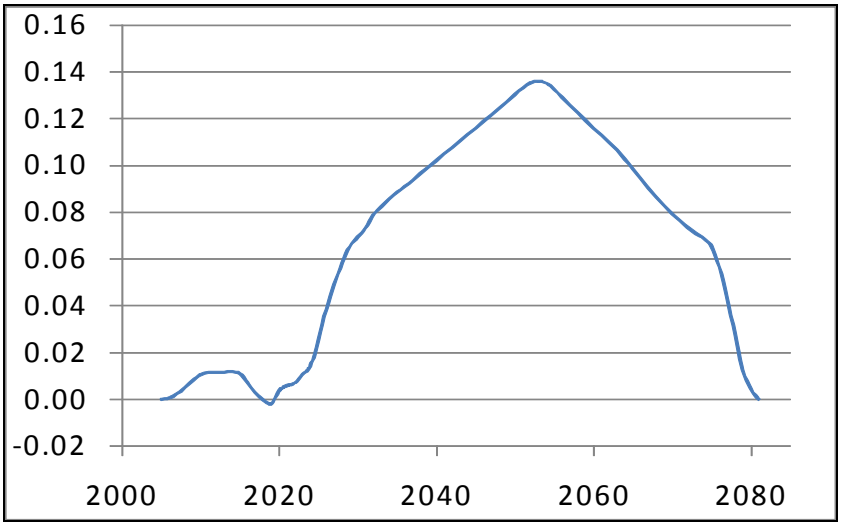


Figure C.1b: Hourly Benefits per Participating Child - GTA

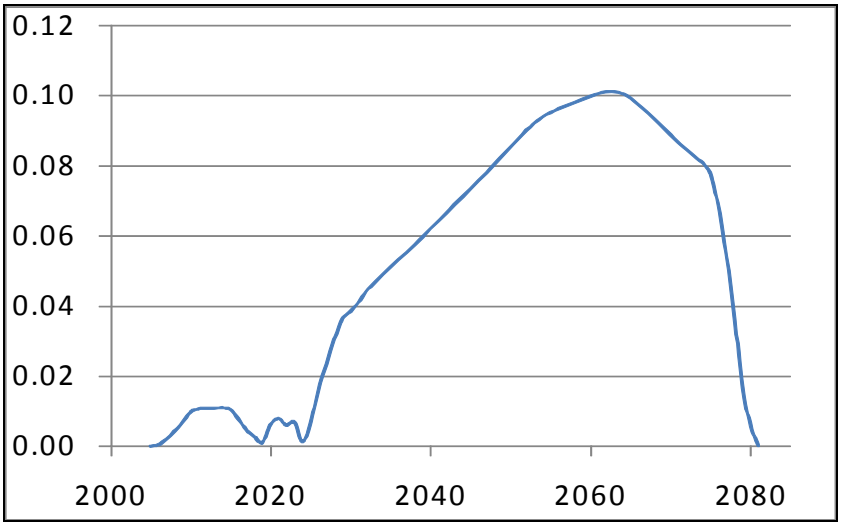
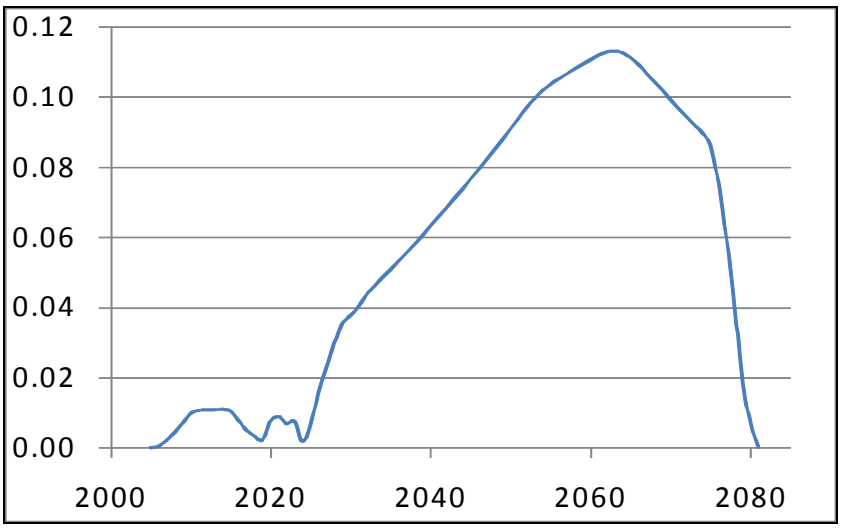


Figure C.1c: Hourly Benefits per Participating Child - Toronto



Benefits to mothers in workforce

The majority of mothers using extended hour/year round ELC choose to participate in the workforce. An additional formal ELC space will create an additional 0.22 full-time workers[23] (for every formal child care space created 0.63 informal child care spaces are eliminated). This section considers the maternal employment benefits from formal ELC.

There are two main benefits to full-time employed mothers using ELC: immediate wage gains from participating in the workforce and future wage gains accruing from greater work experience. Although some mothers are in an educational program, this is not explicitly considered in this part of the analysis. The following section deals with mothers in education.

To make estimating current and future wage gains as simple as possible, the earnings comparison will be between a mother spending a year at home with a child versus a mother of the same age spending a year in the workforce with a similarly aged child in ELC. We assume that the length of

[23] Author's calculation based on Cleveland and Krashinsky's (1998) predicted increase in formal ELC spaces and maternal employment when universal ELC is offered.

time the mother is out of the labour force makes no difference to hourly maternal benefits (earnings in Table C.11a for a full year leave are twice those in Table C.12a for a half year leave).

The immediate gain in wages for 2005 was derived using earnings data from the 2006 census. The wage gain was based on the median annual female wages for full-time work by age for 2005. Wage gains in the following years (2006-2080) are then estimated by assuming that the future wage of the mother at home corresponds to the wage of the mother at work at a one-year younger age or a one-year older age, whichever is lowest. In choosing this method, it is assumed that yearly earnings to mothers spending a year less in the workforce are always lower than earnings of mothers not taking a year off (this assumption is congruent with Joshi's [1990] analysis). It is assumed that real wages increase by 1% each year on average over the working lives of women. Immediate and future wage gains to mothers are then corrected for labour force participation and are proportioned out by birth rate frequency by mother's age. Table C.13a shows the NPVs of benefits to mothers.

Notably, these estimates are conservative since they do not take into account the pension benefits that would accrue over the working lives of women, similar to Joshi's assumptions. And the estimates do not include the possibility that women will use the availability of ELC to upgrade their training and therefore have a higher future income path. This latter issue is dealt with in the following section.

Table C.11a - Earnings to Mother of a Five-Year-Old Child from Working an Extra Year Ontario - 2005

Age of Mother	2005	2006-2080 NPV	2006-2080 (Undiscounted)
20	33664	35510	110598
25	36343	34595	105230
30	39235	33221	60887
35	42358	31314	52905
40	43054	31619	47585

Table C.11b - Earnings to Mother of a Five-Year-Old Child from Working an Extra Year Toronto - GTA - 2005

Age of Mother	2005	2006-2080 NPV	2006-2080 (Undiscounted)
20	35805	35008	114756
25	38515	33899	109186
30	41429	32319	62458
35	44564	30192	54281
40	45224	30307	48824

Table C.11c - Earnings to Mother of a Five-Year-Old Child from Working an Extra Year Toronto City - 2005

Age of Mother	2005	2006-2080 NPV	2006-2080 (Undiscounted)
20	26329	42105	114408
25	31370	39750	108856
30	37377	35870	66195
35	44535	30065	54011
40	45128	30239	48635

Table C.12a - Earnings To Mother Of A Five-Year Old Child From Working an Extra Half Year Ontario - 2005			
Age of Mother	2005	2006-2080 (NPV)	2006-2080 (Undiscounted)
20	16832	17755	55299
25	18171	17297	52615
30	19618	16611	30444
35	21179	15657	26453
40	21527	15810	23793

Table C.12b - Earnings To Mother Of A Five-Year Old Child From Working an Extra Half Year Toronto - GTA - 2005			
Age of Mother	2005	2006-2080 (NPV)	2006-2080 (Undiscounted)
20	17903	17504	57378
25	19257	16950	54593
30	20714	16160	31229
35	22282	15096	27141
40	22612	15154	24412

Table C.12c - Earnings To Mother Of A Five-Year Old Child From Working an Extra Half Year Toronto City - 2005			
Age of Mother	2005	2006-2080 (NPV)	2006-2080 (Undiscounted)
20	13164	21052	57204
25	15685	19875	54428
30	18689	17935	33097
35	22267	15032	27005
40	22564	15120	24318

Table C.13a - 2005 Maternal Benefits by Birth Cohort Ontario - 2005		
Cohort	Child Age	NPV Benefits
2000	5	$72,132
2001	4	$71,892
2002	3	$71,616
2003	2	$71,323
2004	1	$70,989
2005	0	$70,633

Table C.13b - 2005 Maternal Benefits by Birth Cohort Toronto - GTA - 2005		
Cohort	Child Age	NPV Benefits
2000	5	$73,456
2001	4	$73,252
2002	3	$73,012
2003	2	$72,752
2004	1	$72,455
2005	0	$72,136

Table C.13C - 2005 Maternal Benefits by Birth Cohort Toronto City - 2005		
Cohort	Child Age	NPV Benefits
2000	5	$72,926
2001	4	$72,627
2002	3	$72,320
2003	2	$71,951
2004	1	$71,527
2005	0	$71,071

Hourly earnings are calculated by dividing immediate and future wage gains by Carolina Abecedarian program yearly hours (2500). These hourly earnings are then multiplied by the number of full-time workers that result from an additional formal ELC space to find mothers' hourly benefits from ELC. The NPV of mothers' hourly benefits (for those in the workforce) from ELC is $6.52, of which $3.58 are immediate wage gains. Figure C.2a shows the undiscounted future hourly benefit profile to mothers giving birth in 2005.

Figure C.2a: Maternal Hourly Benefits - Ontario

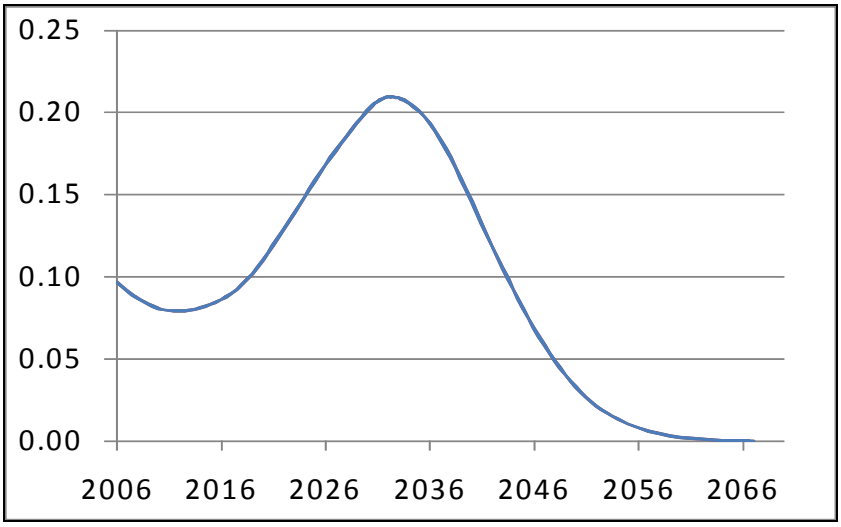


Figure C.2b: Maternal Hourly Benefits - GTA

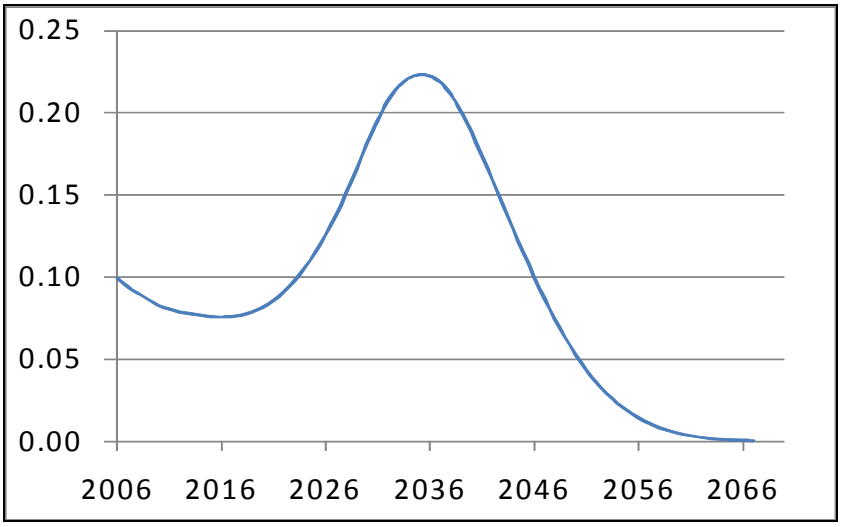
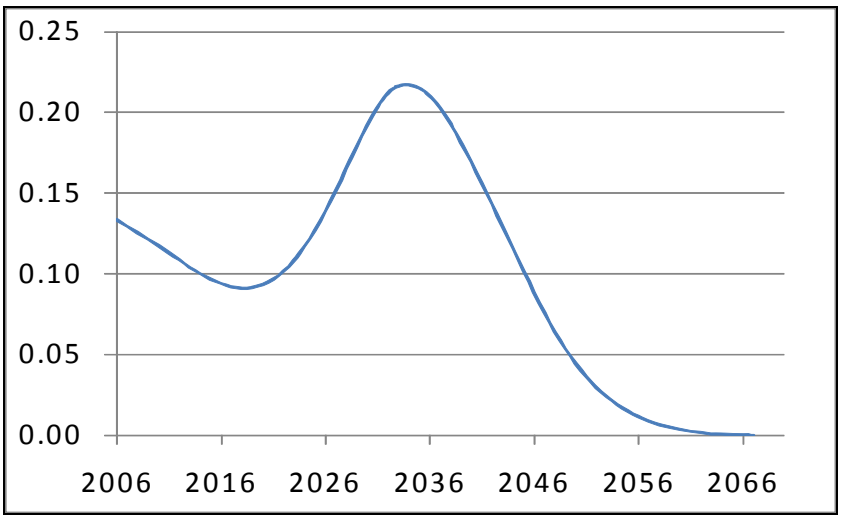


Figure C.2c: Maternal Hourly Benefits - Toronto



Benefits to mothers in education

In Fairholm (2009a) it was assumed that access to early learning had an effect on the timing of mothers' decision to restart work or education, but did not change the decision. In this report the impact of early learning on mothers' decisions to pursue education is explicitly considered. It is found that having children does have an effect, albeit minor, on parent's decisions to keep studying.

Shaienks and Gluszynski (2007) examine reasons for why Canadian students in post-secondary education decide to drop out. The dataset they examine is the Youth in Transitions Survey and compare cycle 1, when the survey participants are 18-20 years old, and cycle 4, when the survey participant are 24-26 years old. They find that of the 57% of students with student loans, 5% of dropouts decide to drop out due to pregnancy and caring for own child. Of the 43% of student who do not have a student loan, only 2% of dropouts drop out due to pregnancy and caring for own child. Multiplying these percentages together gives 3.7% of students who decide to drop out due to pregnancy and caring for own child. Multiplying this percentage by the post-secondary drop out rate of 15%, gives a number for the students who participated in post-secondary studies who decided to drop out due pregnancy and caring for own child, namely 0.56%.

Next step is to investigate the percent of participants who had children at age 18-20 and at age 24-26. These numbers are found by multiplying the percent of participants who were drop outs, graduates, continuers and graduate continuers by the percentage of parents in each of these four groupings. It is found that 4.76% of the participants were parents at age 18-20 and 13.28% of participants were parents at age 24-26. According the Shaienks and Gluszynski (2007) the vast majority of drop outs occurred soon after starting post-secondary studies. Therefore it is reasonable to assume that most dropouts occur around age 21 and that around 7.6% of 21-year olds had children. This means that the percentage of student parents who drop out due the pregnancy and caring for own child is 7.32% (0.56% divided by 7.6%). The postsecondary programs have various lengths, but the median length of a program is about three years. This means that the drop out rate of current student parents due to child care issues each year is around 2.44% (7.32% divided by 3).

The percentage of all parents of children aged 0-5 in education is estimated to be around 20%. Parents of 0-5 year old children are particularly vulnerable to dropping out. This figure is derived from three sources. Woodland et al's (2002) UK study find that 21% of parents of children aged 0-14 are studying. This means that the percentage of parents of 0-5 year olds is likely to be even higher in the UK. A key informant interviewed for this project thought that around 20% of parents in Toronto are studying. An examination of data from Statistics Canada's Survey of Labour Income Dynamics for households with one child aged 0-5 gives an estimate of the number of Ontario parents in education of 20.4%. Therefore this study will assume that 20% of Ontario, GTA and Toronto parents are in education. This gives the percentage of total parents/mothers, both working and in education, who drop out each year due to child care issues of 0.37% (20% times 2.44%).

The next question is how much of this yearly 0.37% of parents dropping out of education is preventable. Billari and Philipov (2004) investigate how children affect parents' tendency to pursue education. They find that in the central European countries the birth of a child causes parents to shorten their education, but that in the more family friendly Scandinavian countries the birth of a child actually extends the amount of time the parents are in education. Therefore it can be argued that in Scandinavia, especially Sweden, that the birth of children in the very least does not worsen that new student parent's educational attainment.

How does one compare the Swedish system to the Canadian system? How does one measure family friendly policies? Mandel and Semyonov (2005) construct a welfare state intervention index (WSII) to measure the effectiveness of family friendly policies. The WSII is constructed using data for Maternity Leave (number of fully paid weeks), Percent Children (0-6) in Publicly Funded Child care and Public Welfare Sector as Share of Total (Percent). The relative weighting of each of these items are 0.849 for Maternity Leave, 0.712 for Percent Children in Publicly Funded Child care and 0.875 for Public Welfare Sector as Share of Total. Sweden has a WSII of 100 and Canada has a WSII of 9. Using these weights, and current child care coverage in Sweden and Canada, it is estimated that a one percentage point increase in percent children in publicly funded child care will close the Sweden-Canada family friendly policy gap by 1.13 percentage points. This means a one percentage point increase in percent children in publicly funded child care will reduce the percentage of mothers dropping out of education due to child care issues by 0.005 percentage points.

To estimate the discounted value of the lifetime benefit of getting a post-secondary degree rather than a high-school degree, the growth model and methodology that was used to estimate the earnings growth of participants is reused with certain modifications (see Appendix D). Multiplying the benefits to parents from getting a postsecondary rather than high school degree by the decrease in parents dropping out of education and dividing these benefits by the total number of hours of early learning, gives a benefit to parents in education per early learning hour of $0.33 for Ontario, $0.25 for the Toronto GTA and $0.25 for the city of Toronto.

Appendix D: Growth Model

The growth model used to calculate the economic benefits of higher educational attainment for ELC participants is the standard Solow model with human capital. The model can be written:

$$(1)\ Y_t = A_t K_t^{\alpha} (H_t L_t)^{1-\alpha} H_t^{\gamma}$$

Where,

Y_t is GDP

A_t is productivity

K_t is (physical) capital

H_t is human capital

L_t is raw labour

α and γ are constants

This model is from Dickens et al. (2006), who outline three versions of the standard Solow model with human capital ($\gamma = -0.25$, $\gamma = 0$, $\gamma = 0.05$). For simplifying purposes, this analysis will focus solely on the middle version, which means the above model can be written:

$$(2)\ Y_t = A_t K_t^{\alpha} (H_t L_t)^{1-\alpha}$$

The model runs from 2006-2080. Data for Y_t and K_t can be found in the Centre for Spatial Economics provincial model for the period 2006-2036 for Ontario and the GTA (city of Toronto uses a proportion of GTA GDP and capital). The constant α is set equal to the Dickens et al. value of 0.347. L_t is extrapolated from population and labour-force participation rate (LFPR) forecasts for the period 2006-2080. H_t is extrapolated from population, LFPR, earnings by degree and degree distribution forecasts for the period 2006-2080. Unlike in Dickens et al., H_t is assumed to develop independently of Y_t and K_t. This is done in order to more accurately measure the development of human capital through rich Canadian census data for earnings, degrees and LFPR. Although the approach of Dickens et al. is closer to that of the original version of the Solow human capital model, the dataset they use is more inaccurate and is furthermore not readily estimable using Canadian data.

A_t can be estimated for the period 2006-2036 through equation 2 since the values for Y_t, K_t, H_t and L_t are known in that period. A_t is then assumed to grow at the 2006-2036 annual rate in the period 2036-2080. K_t can be extrapolated in the period 2036-2080 using the following capital growth equations (H_t does not enter as it evolves independently of Y_t and K_t):

$$(3)\ K_{t+1} - K_t = sY_t - \delta K_t$$

The constants s and δ stand for savings rate and depreciation rate respectively. Assuming steady state this equality can be set equal to zero giving:

$$(4)\ K_t = \frac{s}{\delta} Y_t \quad \text{or} \quad (5)\ K_{t-1} = \frac{s}{\delta} Y_{t-1}$$

Inserting equation 2 into equation 4 and rewriting gives:

$$(6)\ K_t = \left(\frac{s}{\delta}A_t\right)^{1/1-\alpha}(H_tL_t)$$

Combining equation 4, 5 and 6 gives:

$$(7)\ K_t = \left(\frac{A_t}{A_{t-1}}\right)^{1/1-\alpha}\left(\frac{H_tL_t}{H_{t-1}L_{t-1}}\right)K_{t-1}$$

Equation 7 is used to extrapolate K_t for the period 2036-2080. Equation 2 is then used to extrapolate Y_t for the period 2036-2080. This is the base model (BM).

The alternative model for participants in early learning (AMP) is estimated on the basis of one extra child attending ELC. A_t is the same as before. L_t and H_t differ slightly from before due to a slightly different degree distribution. K_t is calculated from equation 8 (see below) which multiplies the base model K_t by the proportional adjustment between the base model and the alternative model. Y_t is then calculated through equation 2. The growth impact per participant is found by subtracting base model Y_t from alternative model for participants Y_t.

$$(8)\ K_t^{AMP} = \frac{\left(\frac{H_tL_t}{H_{t-1}L_{t-1}}K_{t-1}\right)^{AMP}}{\left(\frac{H_tL_t}{H_{t-1}L_{t-1}}K_{t-1}\right)^{BM}}K_t^{BM}$$

The alternative model for mothers in education (AMM) is estimated on the basis of one extra mother graduating with a post-secondary degree instead of dropping out midway for the degree. A_t is the same as before. L_t and H_t differ slightly from before due to a slightly different degree distribution. K_t is calculated from equation 8 (see below) which multiplies the base model K_t by the proportional adjustment between the base model and the alternative model. Y_t is then calculated through equation 2. The growth impact per participant is found by subtracting base model Y_t from alternative model for mothers in education Y_t.

$$(9)\ K_t^{AMM} = \frac{\left(\frac{H_tL_t}{H_{t-1}L_{t-1}}K_{t-1}\right)^{AMM}}{\left(\frac{H_tL_t}{H_{t-1}L_{t-1}}K_{t-1}\right)^{BM}}K_t^{BM}$$