

Putting a value on early childhood education and care in Australia



Benefits to GDP of
increased female
workforce participation

\$6.0 bn
cumulative to 2050

Benefits to GDP for
children receiving a quality
education and care program

Up to

\$10.3 bn
cumulative to 2050

Benefits to GDP of
increased participation
of vulnerable children

\$13.3 bn
cumulative to 2050

Foreword

In 2011, PwC released *A Practical Vision for Early Childhood Education and Care*. That paper was informed by leading experts in education and early childhood from around the world, including Australia.

At the time we argued that Australia had a fragmented Early Childhood Education and Care (ECEC) system involving all three levels of government, community groups and the private sector. We reflected that there was no overall system design on a national basis, that there was significant variation between jurisdictions and that what was needed was a vision and road map for ECEC in Australia.

While this remains largely true, significant headway has been made over the last three years in implementing universal access to 15 hours of preschool as well as commencing the implementation of the National Quality Agenda in ECEC settings.

In 2014, future arrangements for ECEC are subject to significant uncertainties. Even though these uncertainties are challenging the capacity of the nation to define the pathway that will be taken for Australia's ECEC system, they provide a rare opportunity to shape future directions.

Too often we measure success or failure on too short a time horizon when we know that the gains that are likely to accrue from high quality ECEC will be realised over a longer time period.

We have access to good international evidence (including robust longitudinal studies) about the value of ECEC. This evidence has supported increased investment in the early years in Australia in recent years. Work is now well underway to continue to build an Australian evidence base for the early years.

What has been missing, however, is a more thorough analysis of the role and contribution that ECEC plays in the Australian economy, both:

- now, in enabling families to participate in the labour market, and
- into the future, through improved productivity of the children who have experienced quality ECEC, through improved earnings and overall national productivity when children reach their economically active years.

ECEC can have a range of policy outputs and outcomes. These include:

- supporting workforce participation
- benefiting all children who receive a quality education program
- achieving significant benefits for vulnerable children.

An approach that focuses solely on workforce participation fails to place children at the centre of our considerations and risks underestimating the contribution of ECEC to the Australian economy.

PwC has undertaken modelling of the impact of ECEC on the entire economy, accounting for complex economic relationships between industry sectors, consumers, governments, investors and the international economy.

The quality of ECEC services is essential to their effectiveness. Our work has demonstrated the potential scale of the returns of providing quality ECEC services and supporting the participation of children from vulnerable backgrounds, which combined exceed the marginal returns of increased workforce participation.

PwC brought together representatives from all Australian jurisdictions and experts from the field to help frame the inputs to our modelling. PwC takes full responsibility for the ideas expressed in this paper.



James van Smeerdijk
Partner

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Executive summary

International evidence in support of investment in the early years is sound. What has been missing from the public debate in Australia around the value of early childhood education and care (ECEC) is an Australian evidence base – that is, evidence of the value to the Australian economy of early childhood investment, particularly in quality ECEC.

Decisions governments will make in Australia in the coming period will have the potential to create a lasting impact on the contribution that ECEC takes in shaping future national productivity and prosperity.

In addition, long term productivity improvements required to combat the issues associated with an ageing population require a more thorough exploration of the contribution of a range of social services such as ECEC.

In this context, PwC has undertaken economy-wide modelling to help meet this need for further analysis. To this end we have modelled three impacts on the Australian economy:

- 1 impacts of an increase in female labour force participation
- 2 productivity impacts of participation in quality ECEC
- 3 impacts of increasing vulnerable children's participation in ECEC.

This range of impacts has been designed to look past measuring the traditionally accepted immediate impacts and benefits of ECEC of workforce participation to include the educational and productivity benefits that accrue as a result of children's participation.

About our approach

Our methodology involved:

- reviewing key literature including validated longitudinal, randomised-controlled trial research reports
- conducting a number of workshops with government representatives from all jurisdictions, including the Australian Government, as well as a number of industry peak bodies and a small number of service providers
- deriving from the international evidence base a set of key inputs that could be modelled in the Australian economy
- undertaking modelling using a Computable General Equilibrium (CGE) model that enables whole of economy and long run, dynamic impacts to be measured.

By modelling three impacts (labour market participation, long term productivity improvements and the impacts of increased participation of vulnerable children in ECEC) we have attempted to establish a whole of life-cycle value of the economy-wide return of investing in quality ECEC.

The economy wide impacts are captured using CGE modelling. Using publicly available information the CGE model contains a number of data sets and inputs, including long run forecasts of government expenditure, which form a baseline for the modelling. Inputs are carefully calibrated with reference to this baseline. Through these input 'shocks', the CGE model is then able to measure the difference between the current state and the effect size, or impact, of the change.

The international evidence regarding short-, medium- and long-term benefits of participation in quality ECEC is compelling. A priority is to build an Australian evidence base. It is in this spirit that PwC has developed this report. At the outset we acknowledge that caution needs to be taken in applying the international evidence base to the Australian context due to different social structures, policy settings and, in some instances, specific characteristics of the target cohorts of particular studies.

From key selected sources we refined and calibrated a set of inputs for the Australian context. In some cases we have moderated or reduced the scale of expected benefit or return to account for these differences.

As such, the modelling results represent reasonable estimates of the potential effect in the Australian context if outcomes consistent with the directions of international evidence were achieved in Australia.

Further detail on inputs is set out in the remaining sections of this report. Full technical details of our assumptions, caveats and inputs can be found in Appendix A.

The international evidence regarding short-, medium- and long-term benefits of participation in quality ECEC is compelling.

Workforce participation

Improved access to ECEC supports the goal of greater parental workforce participation (particularly for women).

We have also modelled the impact of increasing the number of children attending child care and the expected impact that will have on their employment when they join the workforce, while accounting for the immediate costs involved in having extra children participating in ECEC.

Long run productivity impacts from participation in quality ECEC

There is now strong evidence of the sustained benefits of participation in quality education and care.

Writing on health inequalities, Michael Marmot argued that to shift the social gradient, actions must be universal but with a scale and intensity that is proportionate to the level of disadvantage. In the ECEC context a universal approach is required with additional support where necessary to ensure that all children reach their potential. Identifying the potential benefit of this universal approach is critical to determining the value of ECEC.¹

The *Effective Provision of Pre-School, Primary and Secondary Education Study (EPPSE)* from the United Kingdom found different returns from participation in low, medium and high quality ECEC.

These benefits have been demonstrated through improved literacy and numeracy outcomes that sustain into primary and secondary years.²

Improved literacy and numeracy is documented to be correlated with higher earnings.³

¹ Michael Marmot, 2010, Fair Society, Health Lives, Strategic Review of Health Inequalities in England post 2010.

² Key findings, background on the project and related information on the Effective Provision of Pre-school, Primary and School Education Project are available at <http://www.ioe.ac.uk/research/153.html>

³ Alan B. Krueger, 2002 Economic considerations and class size, National Bureau of Economic Research Working Paper Series, p 25.

In the Australian context a range of efforts to improve the quality of ECEC have been implemented in recent years under the banner of the National Quality Agenda. These include:

- a new set of nationally consistent quality standards
- a transparent quality rating system with five rating levels:
 - excellent
 - exceeding National Quality Standard
 - meeting National Quality Standard
 - working towards National Quality Standard
 - significant improvement required.
- enhanced regulatory arrangements through consistent educator-to-child ratios nationwide and new qualification requirements
- the development of a consistent early childhood curriculum framework, the Early Years Learning Framework.

We have modelled the productivity impact of participation in ECEC as follows:

Base case:	the current proportion of services that are working towards (39%), meeting (35%) or exceeding (26%) the National Quality Standard
Improved quality:	governments continue to commit to full implementation of the National Quality Agenda. We assume under this scenario that, through quality improvement efforts and sustained implementation of the National Quality Standard, a total of up to 44% of services are rated as exceeding and up to 56% of services are rated as meeting the National Quality Standard

Increasing participation in ECEC by children currently not attending from a disadvantaged or vulnerable background

Participation in high quality ECEC is particularly beneficial for children from disadvantaged backgrounds. For the purposes of this analysis, we have defined disadvantaged, or vulnerable, children⁴ as those in the lowest income families (with a family income less than \$1000 per week or single parent income less than \$600 per week) who do not currently participate in ECEC as a proxy for the total number of disadvantaged or vulnerable children.

There is significant international evidence on the return on investment of vulnerable children's participation in ECEC. The return on investment can be measured in savings to taxpayers through decreased government expenditure on remedial education, criminal justice and youth offending and health services.

Care needs to be taken in applying these returns on investment results to the Australian context or extrapolating these findings economy wide. We have modelled the lower bound of international results identified and acknowledge that in the Australian context, results would be expected to be lower than the results of our modelling.

In Australia 160,000 children aged 0-5 who are in the lowest income bracket currently do not attend any form of child care (both formal and informal). Of these we assumed 103,000 are unlikely to attend formal child care.

We have modelled the benefit that would be realised if these children, and subsequent cohorts of vulnerable children to 2050, attended child care.

In doing this we have estimated:

- the cost of child care at an average of \$7,300 per child, per year (increasing by 2 per cent per annum up to 2050)
- a public benefit-cost ratio scenario of \$2.69:1, which is at the lower bound of international benefit cost ratio results.

⁴ The literature consulted in the preparation of this paper often uses the terms 'disadvantage' and 'vulnerable' interchangeably. This report also takes this approach.

Summary of results

Our results are provided in more detail in section 4. A snapshot of our results is set out in Figure 1. These figures represent the net economy-wide impact that is estimated to accrue as a result of the modelling of the three key scenarios.

Each of the impacts have been analysed and estimated separately. This has been done to unpack the results and to highlight that each impact has merit. The benefits can also be combined to present an aggregate assessment of benefits. If all three scenarios were to eventuate, the total combined benefits for all three impacts would be an estimated \$7.0 to 9.3 billion increase in Australia's gross domestic product (GDP) in net present value (NPV) terms.

This range is driven by the two scenarios of productivity outcomes that could be achieved from improving ECEC quality – the low scenario represents an increase in productivity growth of 0.003 per cent, the high scenario represents an increase in productivity growth of 0.013 per cent. Both scenarios assume the same impacts for increased female workforce participation and increased participation of vulnerable children.

The net benefits to the economy accrue continually through time and gather pace in the out years (Figure 2). Real GDP is immediately impacted by an increase in workforce participation from the parents of children in ECEC adding to the labour effort. In the medium to long-term parents, those children enter the labour market as more productive workers and are also joined each year by the new cohort of parents with children entering ECEC.

Figure 1 Summary of results – total GDP impacts by 2050

Benefits of increased female workforce participation

\$6.0 bn

cumulative to 2050, **or**

\$3.7 bn

in NPV terms

The net estimated benefit to the Australian economy by 2050 of a 0.09 percentage point increase in labour force participation via an increase in access to ECEC equivalent to a 5 per cent decrease in the net price of ECEC.

Benefits for children receiving a quality education and care program

Up to

\$10.3 bn

cumulative to 2050, **or**

\$3.0 bn

in NPV terms*

The net estimated benefit to the Australian economy by 2050 of children who participate in quality education and care defined through attending a service rated as meeting or exceeding the National Quality Standard.

Benefits of increased participation of vulnerable children

\$13.3 bn

cumulative to 2050, **or**

\$2.7 bn

in NPV terms

The net estimated benefit to the Australian economy by 2050 if children whose parents are in the lowest income bracket and who are not likely to attend ECEC were to attend an ECEC program.

* Note GDP impacts are in 2012-13 dollars. NPV terms use a 4.7% real discount rate.

While there will be costs to government in providing more ECEC services, and much of this is upfront, there are also a number of financial benefits. Benefits to the government relate to:

- changes to taxes collected from an expanding ECEC sector and the additional participation and productivity impacts
- a reduction in expenditure on unemployment and other government transfers for parents and children once they enter the labour market
- a decrease in expenditure associated with remedial education, justice and health services as a result of improved education and life outcomes for vulnerable children.

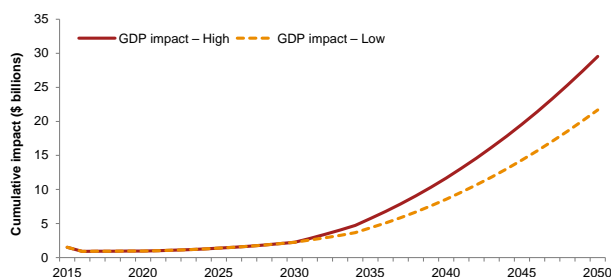
Costs relate to:

- increased child care utilisation by currently non-working mothers
- marginal costs of increasing quality through regulatory activity
- increased access to ECEC by the vulnerable or disadvantaged, who are currently not accessing any form of child care.

In capturing both the benefits and the costs the net fiscal benefit for the three impacts combined is estimated to be an accrued cost saving of between \$1.6 billion (under the low scenario) and \$1.9 billion (under the high scenario) in NPV terms. Figure 3 demonstrates the annual flows to government. Under both scenarios, the net fiscal returns to government quickly become positive after an initial set up period.

This highlights the long term nature of the returns to society and that, while the costs to the taxpayer may appear large upfront, they are outweighed by the fiscal savings and revenue gains in the long run.

Figure 2 Combined economy wide impacts of improving quality of and access to ECEC



Implications and next steps

The purpose of our analysis was to provide estimates of the potential value of ECEC to the Australian economy based on a number of plausible scenarios.

Our work draws on evidence from a range of sources. As more local, longitudinal evidence becomes available, more robust findings can be generated that are directly drawn from an Australian evidence base. In addition, future work could undertake a meta-analysis or a comprehensive synthesis of the research in this area in order to deepen and expand this analysis.

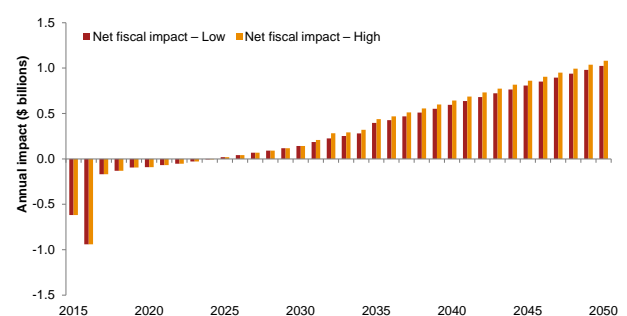
Our analysis has not included a full cost benefit analysis of the direct costs and benefits. There may be merit in further exploring a full cost benefit analysis to derive findings with a greater degree of accuracy and specificity.

This report has focussed more on 'why' access to quality ECEC should be improved or maintained, rather than 'how' this might be achieved. The 'how' could also be an area for future work.

What we have demonstrated through this work is that the scale of the benefits of access to, and participation in, ECEC are not insignificant in a discussion on long term productivity that will require all social services and programs to generate clear and robust productivity and efficiency returns.

The results that we have developed represent estimates of the likely return on investment.

Figure 3 Combined fiscal impact of improving quality of and access to ECEC, in 2012-13 dollars



In summary, our findings demonstrate that there are potential benefits across the board for providing quality ECEC. These include:

- growing Australia's GDP
- improving workforce participation choices for parents and in particular women
- helping realise the full potential of Australian children
- reducing the impacts of disadvantage.

Our modelling results show that all of these benefits can be achieved with a net saving to government.

Our 2011 report, *A Practical Vision for Early Childhood Education and Care*, set out a range of recommendations about the future of ECEC delivery.

This current report has confirmed the currency of a number of these recommendations, including:

- ***Confirm governments' commitment to measures that drive quality improvement*** –the **quality** of the program in which children participate has an impact on long term productivity gains. Participation in higher quality programs is likely to support higher productivity gains.
- ***Ensure funding is flexible and driven by the needs of families and children*** – increasing the **participation** of children from vulnerable and disadvantaged backgrounds depends on ensuring that cost is not a barrier to access within the context of universal access to ECEC.
- ***Monitoring and engagement*** –there is a need for more regular, collaborative and transparent monitoring of supply and demand of ECEC at the macro and local levels

Structure of report

The report is structured as follows:

- Section 1 outlines the purpose of the paper and why PwC undertook this work
- Section 2 provides an overview of the approach that we undertook and key evidence analysed and incorporated into the inputs for the modelling
- Section 3 provides a snapshot of the current ECEC context in Australia
- Section 4 provides further detailed results
- Section 5 explores the potential implications of our findings and areas for future work
- Appendix A provides full technical details of the assumptions, caveats and inputs.

Abbreviations

Abbreviation	Description
<i>ABS</i>	Australian Bureau of Statistics
<i>ACECQA</i>	Australian Children's Education and Care Quality Authority
<i>BCR</i>	Benefit-Cost Ratio
<i>CGE</i>	Computable General Equilibrium
<i>ECEC</i>	Early Childhood Education and Care
<i>EPPSE</i>	Effective Provision of Pre-School, Primary and Secondary Education
<i>FDC</i>	Family Day Care
<i>GDP</i>	Gross Domestic Product
<i>HPPS</i>	High/Scope Perry Preschool Study
<i>LDC</i>	Long Day Care
<i>NP NQA</i>	National Partnership Agreement on the National Quality Agenda
<i>NPV</i>	Net Present Value
<i>NQF</i>	National Quality Framework
<i>NQS</i>	National Quality Standard
<i>OSHC</i>	Outside School Hours Care
<i>SES</i>	Socio-Economic Status
<i>UK</i>	United Kingdom

1 The purpose of this paper



The purpose of this paper is to contribute to the Australian evidence base and to continue to inform the national discussion on ECEC.

In particular this paper provides estimates of the possible impact and value of three scenarios to the Australian economy:

- increased female labour force participation
- increased productivity from children's participation in quality ECEC
- increased participation of children from vulnerable or disadvantaged backgrounds in ECEC.

Productivity is a measure of output (eg Gross Domestic Product) relative to inputs (eg hours worked or capital employed).⁵ Since the early 2000s Australia's productivity performance has been deteriorating.

The ageing of the Australian population will have significant productivity impacts for the Australian economy as the 21st century continues to unfold. The implications of the ageing population in policy, economic and social terms have been the subject of significant debate and discussion over recent decades.

In response, a range of measures has been proposed to address these challenges, including:

- increasing workforce participation of older workers. The Australian Government lifting the Age Pension qualifying age to gradually reach a qualifying age of 70 years by 1 July 2035 is a clear strategy to address this.⁶
- increasing the productivity of high cost services such as health care services. The recent Grattan Institute 'Controlling costly care: a billion-dollar hospital opportunity' that argued for a more consistent and streamlined public hospital funding to free up \$1 billion for more and better health care.⁷

As productivity is a measure of the efficiency of all Australians in the workforce, small changes to the productivity rate can reap large economic gains.

As highlighted by the Grattan Institute,⁸ one way to improve Australian productivity growth is to improve education.

The contribution of ECEC has, in the Australian context, been traditionally considered and measured in terms of its short run impacts, particularly in terms of supporting parental labour force participation.

The longer term productivity returns of access to, and participation in, high quality ECEC programs has not been clearly accounted for in the debate about future policy settings for this important component of the productivity and human capital agenda.

This is largely understandable as, in the Australian context, ECEC is characterised by a lack of longitudinal evidence of its contribution to the economy and children's development and outcomes.

Recent early childhood reforms in Australia have, however, been supported by a strong international evidence base about the importance of the early years (particularly birth to age 5) as a critical time in human development, as early life experiences set neurological and biological pathways that can have life-long impacts on health, learning and behaviour.⁹

⁵ Productivity can be measured in a number of ways. For example labour productivity is measured using a ratio of volume of output produced to the volume of labour employed – PwC, Productivity Scorecard, December 2013, Available at: www.pwc.com.au/consulting/publications/productivity-scorecard-series.htm

⁶ Department of Social Security, 2014 Budget, Senior and Age Pension, Budget Fact Sheet.

⁷ Duckett, S.J., Breadon, P., Weidmann, B. and Nicola, I., 2014, Controlling costly care: a billion-dollar hospital opportunity, Grattan Institute, Melbourne.

⁸ Saul Eslake and Marcus Walsh, *Australia's productivity challenge*, Grattan Institute, February 2011.

⁹ Baxter, J. & Hand, K. (2013), Access to early childhood education in Australia, Research Report No. 24 (April 2013), Australian Institute of Family Studies.

There is a compelling international evidence base on the contribution that ECEC makes. Key themes from this evidence of particular relevance to this report include:

- the availability of child care and its price has an impact on workforce participation
- the quality of the ECEC care matters for all children
- vulnerable children particularly benefit from participation in quality early childhood programs.

An Australian evidence base is emerging, with a number of significant longitudinal studies currently underway.

While this Australian ECEC evidence base develops, it is critical that we continue to explore and understand the impacts of ECEC, particularly in the context of significant and important deliberations currently underway. It is in this context that PwC has undertaken this analysis.

This paper presents modelling results and findings for three key scenarios:

- increased female labour force participation
- increased productivity from children's participation in quality ECEC
- increased participation of children from vulnerable or disadvantaged backgrounds in ECEC.



2 About our approach

Our approach

PwC has undertaken Computable General Equilibrium (CGE) modelling of a number of impacts that we have distilled from the international evidence (making allowances for the different Australian conditions and context) in order to demonstrate the size of the possible long term productivity impacts of availability and participation in high quality education and care.

Our approach included:

- examining a range of robust and validated international studies to distil key themes and findings
- exploring, testing and confirming these themes with key stakeholders at the state, territory and national level
- appropriately accounting for the effect size of inputs that were modelled to account for the different conditions in the Australian context
- undertaking CGE modelling to identify the economy wide impacts of key inputs that have been developed, informed by the key findings from the international evidence base.

As a result, the outputs from our modelling are intended to represent cautious and modest estimates of the potential effect size in the Australian context if outcomes consistent with the directions of international evidence were achieved in Australia.

Our aim was to test the immediate and longer term impacts on the Australian economy of:

- how provision of **access** to quality ECEC supports parental workforce participation goals
- provision of **quality** ECEC (at meeting or exceeding the National Quality Standard).



What is CGE modelling?

Computable General Equilibrium (CGE) models replicate the key relationships in an economy, providing year-by-year estimates of capital and labour allocation among competing industries (and occupations), prices, consumption, total output and income. CGE models can also replicate population dynamics, through the integration of cohort-based demographic modelling, with economic modelling. Their key advantages are that they ensure that any projections are internally consistent, and also allow the examination of policy experiments that take account of the main feedback loops in an economy.

Adapted from Productivity Commission, *An Ageing Australia: Preparing for the Future*, Commission Research Paper, Canberra, 2013, pp 28-9.

By modelling increased labour force participation, long term productivity improvements from children's participation in quality ECEC, and the impacts of increased participation of disadvantaged or vulnerable children in ECEC, we have attempted to establish a value of the economy-wide return of investing in quality ECEC.

The impacts are intentionally high-level to give an indicative estimate of the value of improving access to quality ECEC. In the case of increasing female labour force participation, it does not assume a specific policy mechanism because there is a variety of policies that may achieve the outcome.

This analysis does not include a detailed, bottom up build-up of the costs of providing quality ECEC. We have, however, drawn on contextual information to establish an estimate of costs to provide some indication as to whether benefits outweigh costs. Future work could include a comprehensive cost benefit analysis.

This analysis reviewed a range of robust and validated studies, including longitudinal randomised-control trials. This analysis has not included a comprehensive review of all the available literature. Future work could undertake a meta-analysis or synthesise the entire body of research in this area in order to deepen and expand this analysis.

A snapshot of some of the evidence

Key themes emerging from our examination of the evidence base included:

- the availability of child care and its price impacts on workforce participation (refer to Table 1)
- the quality of the ECEC matters for all children (refer to Table 2)
- vulnerable children particularly benefit from participation in quality early childhood programs (refer to Table 3).

The following tables set out some of the key sources and inputs that we modelled in the Australian context. We have calibrated the inputs based on the evidence. Full details are provided in Appendix A.



Table 1 Workforce participation – selected themes

<p>Proposition: <i>The availability of child care has an impact on workforce participation</i></p>		
<p>A snapshot of some of the evidence</p>	<p>Quebec, Canada</p> <p>The Quebec Government introduced universal access to low-fee full time child care in 1997 (\$5 per day).</p> <p>Key findings</p> <p>By 2008:</p> <ul style="list-style-type: none"> • 69,700 more mothers held jobs (which raised women's employment by 3.79% and total Quebec employment by 1.78%) • the number of single-parent families on Quebec welfare rolls declined from 99,000 to 45,000 • the relative poverty rate of single-mother families declined from 36% to 22% (median real after-tax income increased by 81%) • GDP increased by 1.7% (or \$5.1 billion) • significant positive impact on government fiscal balances (more income/other taxes, lower transfers) had occurred. • the tax-transfer return from the child care program ranged from \$500 million (direct) to \$2.4 billion (global).¹⁰ 	<p>Price elasticity of demand for child care</p> <p>The consensus around the price elasticity of demand for child care in the early 2000s in Australia was that labour market supply was not responsive to the cost of child care.</p> <p>In 2012 Xiaodong Gong and Robert Breunig found that the labour supply behaviour of "partnered women with young children responds (negatively) to child care price" in Australia.</p> <p>In particular they found:</p> <ul style="list-style-type: none"> • a one per cent increase in price leads to a decrease in hours worked of 0.1 per cent (equivalent to decrease in the employment rate of 0.06 per cent) • poorer families are more affected by price increases as child care forms a large proportion of the family budget.¹¹
<p>Key messages</p>	<p><i>Subsidised child care increases labour force participation; very low cost significantly increases labour force participation; higher prices reduce labour market participation</i></p>	
<p>Australian Context</p>	<ul style="list-style-type: none"> • Child Care Benefit and Child Care Rebate offset the costs to parents of child care • Child Care Benefit and Child Care Rebate form a complicated set of funding arrangements • Significant debate on possible changes to ECEC funding including the Productivity Commission's interim report. 	

¹⁰ Pierre Fortin, Luc Goudbout and Suzie St-Cerny, *Impact of Quebec's Universal Low Fee Childcare Program on Female Labour Force Participation, Domestic Income and Government Budgets*, Working Paper 2012.02, 2012.

¹¹ Xiaodong Gong and Robert Breunig, *Estimating Net Childcare Price Elasticities of Partnered Women with Pre-School Children Using a Discrete Structural Labour Supply-Child Care Model*, Treasury Working Paper, 2012.

Table 2 Productivity impacts of participation in ECEC – selected themes

<p>Proposition: <i>The quality of the ECEC matters for all children</i></p>	
<p><i>A snapshot of some of the evidence</i></p>	<p>The Effective Provision of Pre-School, Primary and Secondary Education (EPPSE) (UK)</p> <p>National longitudinal sample of young children's development (intellectual and social/behavioural) across the preschool, primary and secondary years.</p> <p>EPPSE findings demonstrate the positive effects of provision on children's intellectual and social/behavioural development. High quality provision shows the greatest benefits.</p> <p><i>Key findings</i></p> <ul style="list-style-type: none"> • Having preschool experience, compared to none, enhances intellectual and social ability up to age 7 • Duration of attendance is important, as an earlier start (before age 3) is linked to better intellectual development at ages 6 and 7 and to improved independence, concentration and sociability at entry to primary school at age 6 • Disadvantaged children benefited significantly from good quality pre-school experiences • Good quality ECEC can be found across all types of early years settings; however quality was higher overall in settings integrating care and education and in nursery schools • Settings that have staff with higher qualifications have higher quality scores and their children make more progress • Quality indicators include warm interactive relationships with children, having a trained teacher as manager and a good proportion of trained teachers on the staff.¹²
<p><i>Key messages</i></p>	<p><i>Participation in quality ECEC yields long term educational outcomes that will improve productivity</i></p>
<p><i>Australian Context</i></p>	<ul style="list-style-type: none"> • National Quality Standards are progressively being implemented • Increased qualification requirements have commenced • Consistent staff-to-child ratios are being implemented nationwide • New staff-to-child ratios for children aged 3-5 commence in 2016.

¹² Kathy Sylva, Edward Melhuish, Pam Sammons, Iram Siraj-Blatchford, Brenda Taggart and Karen Elliott, *The Effective Provision of Pre-school Education (EPPE) Project: Finding from the Pre-school Period*. Research Brief, 2003.

Table 3 Participation of vulnerable children in ECEC – selected themes

Proposition: <i>Vulnerable children particularly benefit from participation in quality early childhood programs</i>		
<i>A snapshot of some of the evidence</i>	High/Scope Perry Preschool Study (HPPS) Longitudinal study (began in 1962) of 123 high-risk African-American children (3 and 4 year olds), low SES status and low IQ scores (ie between 70 and 85). Children attended preschool (Mon-Fri) for 2.5 hours per day for 2 years. Key findings Social responsibility: <ul style="list-style-type: none"> • Lower juvenile delinquency • Higher high school graduation rates (17% more completed 12th-Grade or higher) • Higher mean grade point averages and test scores from ages 7 to 14. Socioeconomic success: <ul style="list-style-type: none"> • Significantly more program group members were employed with effects sustained into midlife (defined as age 40)¹³ • Individual monthly and household earnings were higher • Less reliance on public assistance. Cost-benefit analysis: <ul style="list-style-type: none"> • CBA indicated savings to the public of \$7.16 for every dollar spent. When adjusted for inflation and 3% discount rate, the investment in early childhood resulted in a taxpayer return of \$88,433 per child (1998).¹⁴ 	The Abecedarian Studies Longitudinal investigations to test the efficacy of high quality early childhood services to improve the later academic achievement of children from at-risk and under-resourced families. Key findings <ul style="list-style-type: none"> • IQ scores – participation maintains child's position in a 'normal' IQ range • Special education – those who did not receive intervention were more than twice as likely to be placed in special education for one or more years by the time they reached age 15 • Scholastic achievement – higher math achievement; higher receptive vocabulary • Higher education – 70% of participants enrolled in higher education or have a skilled job (compared to 40% in control group) • Benefits to parents – teenage mothers whose children participated in the programs continued on to get post-secondary education, compared to about 30% of teen mothers whose infants did not receive the program.¹⁵
	Key messages <i>Participation in high quality education and care has positive outcomes for vulnerable children that will have a return for the broader economy</i>	
<i>Australian Context</i>	<ul style="list-style-type: none"> • There are few examples in the Australian context of ECEC programs at the high level of quality and intensity of studies such as the Perry Preschool and Abecedarian projects¹⁶ • Vulnerable cohorts are under-represented in ECEC and there are reports of systemic barriers. 	

¹³ L. J. Schweinhart, J. Montie, Z. Xiang, W. S. Barnett, C. R. Belfield & M. Nores, *Lifetime effects: The HighScope Perry Preschool study through age 40. Summary, Conclusions, and Frequently Asked Questions*, 2005.

¹⁴ Greg Parks, 'The High/Scope Perry Preschool Project', *Juvenile Justice Bulletin*, The Office of Juvenile Justice and Delinquency Prevention, October 2000, page 2.

¹⁵ F. Campbell, C. Ramey, E. Pungello, J. Sparling, S. Miller-Johnson, 'Early Childhood Education: Young Adult Outcomes from the Abecedarian Project', *Applied Developmental Science*, Vol 6 No. 1, 2002, pages 42-57.

¹⁶ In the Australian context we acknowledge the work of Warren and Haisken-DeNew who have shown links between ECEC participation and later educational performance in D Warren, and J. Haisken-DeNew, *Early Bird Catches the Worm: The Causal Impact of Pre-school Participation and Teacher Qualifications in Year 3 NAPLAN Cognitive Tests*, 2013

3 The current state of ECEC in Australia

About the sector

In September 2013 there were 15,907 ECEC services in Australia providing care to 1,111,100 children.¹⁷

The majority of these children are in long day care services (LDC) (637,590 children), followed by outside school hours care (OSHC) (345,160 children) and family day care (FDC) (155,430 children).¹⁸

- LDC services offer care and education for children from birth to school age. They usually operate for approximately 11 hours per day (usually from 7:00am to 6:00pm) for 48 weeks per year. The LDC sector has experienced significant growth in recent years, with the number of LDC services increasing by 39 per cent from 2004 to 2010.¹⁹
- OSHC is provided to children of school age both before and after school hours and during holiday periods. The number of places in OSHC has increased by 25 per cent from 2004 to 2009 and is expected to rise a further 40 per cent in the next two decades.²⁰
- FDC is provided by educators, usually within a residence or their own home, and usually managed through coordinated networks that link together multiple FDC educators.

Many LDCs offer preschool or kindergarten programs. In addition stand-alone preschools or kindergartens offer sessional programs to children in the year prior to full time schooling. In a number of jurisdictions kindergarten programs are offered in school settings, including in Western Australia and Tasmania.

ECEC services, other than FDC, including LDC, preschool services and OSHC services that are delivered at a centre are often referred to collectively as 'centre-based services'.

The ECEC sector in Australia is a mixed market with services provided by government, community organisations and private organisations. Services are operated both on a for-profit and a not-for-profit basis.

The Australian Government and state and territory governments have "different but complementary roles in supporting ECEC services. Both levels of government contribute funding to services, provide information and advice to parents and service providers".²¹

Many preschool or kindergarten programs are funded and delivered by state and local governments.

¹⁷ Department of Education, *Child Care and Early Learning Summary, September Quarter 2013, 2014*, p. 3

¹⁸ Ibid p. 8.

¹⁹ Productivity Commission, *Early Childhood Development Workforce*, 2011, p. 17.

²⁰ Ibid.

²¹ Productivity Commission, *Report on Government Services 2013*, Volume 3, Early Childhood Education and Care, 3.2.

Challenges

In 2014, a number of the challenges identified in our 2011 *A Practical Vision for Early Childhood Education and Care* remain. These challenges include:

- accessibility of services
- quality
- cost.

Accessibility of services

Under the umbrella of ‘accessibility of services’ is a complex interplay of personal choices and preferences, cost, service quality, location and availability of services at the time and duration that matches individual families’ needs.

Many Australian cities are experiencing a significant period of transformative growth. This is particularly relevant for the ECEC sector. The growth in the population of children under four years old is increasing demand for ECEC services and is resulting in a need for new ECEC infrastructure to support this growth.

At the same time, rural and remote communities face a range of challenges in providing services and programs for children and families.

Quality

Significant headway has been made in implementing the National Quality Agenda in ECEC settings.

The Australian Children’s Education and Care Quality Authority reports that as at 31 March 2014:

- 5,085 or 35% of services have received a quality rating
- 61% of all rated services are Exceeding or Meeting National Quality Standard (NQS).²²

Despite these results, significant work remains to continue to assess the remaining 65% of services, and to increase the proportion of services meeting or exceeding the NQS.

The implementation of the National Quality Framework (NQF) includes improved and nationally consistent qualification requirements and the move from a 1:15 to a 1:11 staff-to-child ratio for children from 3 to 6 years of age by 2016. These changes will contribute to cost pressures faced by Government.

Cost

ECEC costs to government, particularly the Australian Government, have continued to increase significantly in recent years. From 2010-11 to 2012-13 Australian Government expenditure on early childhood education and care (child care) services increased from \$4.1 billion to \$5.4 billion.²³

The cost of child care is also one of the major expenses for Australian households. If society is to fully realise the benefits associated with participation in ECEC services, the objective of funding models should be to achieve an equitable balance of public and private investment, while ensuring that all children are able to participate regardless of their family’s financial circumstances.

Uncertainties

Against this backdrop, Australia-wide, the ECEC sector is currently facing a number of uncertainties relating to the Australian Government’s funding and policy directions. These are summarised in Figure 4 and discussed briefly below.

Future of the National Partnership on Universal Access to Early Childhood Education

The National Partnership on Universal Access to Early Childhood Education was intended to support the provision of 15 hours of kindergarten per week for 40 weeks of the year (or 600 hours per year) for all children in the year before school. The agreement ceases at the end of 2014. While a review is currently underway, uncertainty continues about the future funding of this reform.

²² Australian Children’s Education and Care Quality Authority, *NQF Snapshot Q1 2014*, 2014, p. 3.

²³ Productivity Commission, *Report on Government Services*, Early Childhood Education and Care, 2014, page 2 of Table 3A.4

2014 Review of the National Partnership Agreement on the National Quality Agenda for ECEC

The 2014 Review of the National Partnership Agreement on the National Quality Agenda (NP NQA) for Early Childhood Education and Care is currently underway.

That review is considering:

- the extent to which the objectives of the National Partnership are being achieved
- the efficiency and effectiveness of various regulatory models adopted by jurisdictions
- whether the range of services covered by the NQF should be expanded, for example to include Budget Based Funded services that are currently excluded from the NQF
- whether arrangements should be tailored to different settings for example OSHC
- future arrangements for funding the regulation of the NQF under the NP NQA.²⁴

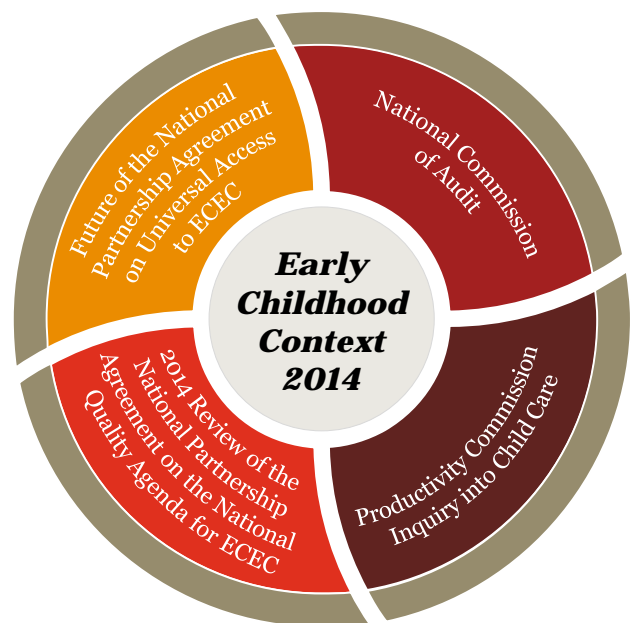
Productivity Commission Inquiry into Child Care

In September 2013 the Australian Government asked the Productivity Commission to undertake a public inquiry into future options for child care and early childhood learning, with a focus on developing a system that supports workforce participation and addresses children's learning and development needs. The Productivity Commission interim report was released in July 2014 to be followed with a final report by 31 October 2014.

Uncertainties around future Australian Government policy and funding directions

On 1 May 2014 the Australian Government released the Commission of Audit report. The Commission of Audit recommended replacing the child care rebate and child care benefit with a single, simpler, means tested payment to families to help meet the costs of child care.

Figure 4 **Uncertainties in the Australian Early Childhood Context 2014**



²⁴ Consultation Paper, *Review of the National Partnership Agreement on the National Quality Agenda for Early Childhood Education and Care*, 2014. Available at: www.woolcott.com.au/NQFReview/ Accessed 2 September 2014.

4 Our results in detail

This section sets out the results of our analysis. The methodology underlying this analysis is described in Appendix A.

Increased workforce participation

We have modelled that an increase in access to ECEC enables more women to join the workforce and that their children, through receiving ECEC, are more likely to be employed when they are of working age.²⁵ As a hypothesised scenario, we have assumed that access to ECEC increases such that the net price of child care declines by 5 per cent.

The 'shocks' modelled under this scenario are:

- an increase in employment from mothers joining the workforce, as there is an increase in access to ECEC²⁶
- a future increase in employment from the increase in children who received ECEC, because they are more likely to be employed as a result of better educational performance associated with participation in quality ECEC
- the increase in cost to provide ECEC for these children.



How to read the figures in this chapter

Most of the results graphs in this chapter show the cumulative impact – that is the figure in a given year is equal to the impact in that year in addition to the impact from all previous years. Figures are presented in real, 2012-13 dollars.

Dollar figures are changes relative to the base case. A positive (or negative) result is an increase (or decrease) relative to the base case.

For the fiscal results, increases in revenue or decreases in costs are positive, while increases in costs or decreases in revenues are negative. The combined effects of the fiscal impacts are presented as the net fiscal position.

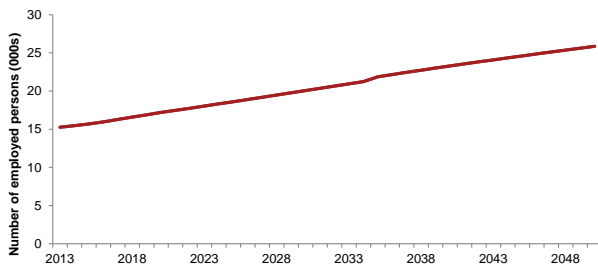
²⁵ Our analysis has been limited to increasing the number of mothers who may join the workforce. We acknowledge that this analysis could be extended to fathers or other carers who may also join the workforce as a result of increased access to ECEC. However, the available research that this hypothetical analysis is based on (Gong and Breunig, 2012 – see Appendix A for further detail) is limited to the increased employment rates of partnered (married) women with pre-school aged children. For this reason, this analysis has looked at the increasing the number of women in the workforce as a result of increased ECEC access.

²⁶ The Productivity Commission, in its 2006 report on the Potential Benefits of the National Reform Agenda, cited the High/scope Perry Preschool and the Abecedarian projects when noting that disadvantaged children receiving ECEC are between 14 per cent and 18 per cent more likely to be employed. Noting the differences between the US, and in particular the High/scope Perry Preschool cohort, and the general Australian ECEC context, we have taken the lower end of this range and discounted by 75 per cent, to 3.5 per cent. The Productivity Commission report referred to here is: Productivity Commission, *Potential benefits of the national economic reform agenda*, Report to the Council of Australian Governments, Canberra, 2006, page 239.

The scale of the first and second ‘shocks’ are shown in Figure 5. Currently there are approximately 11.4 million employed persons in Australia and this is forecast to grow to about 17.6 million people by 2050. Combined, the two shocks will add an extra 15,000 to 25,000 persons on top of that number. While in the context of the total number of persons employed this increase appears small, this shock is still a significant one.

Figure 5 also represents the number of children who would now have access to ECEC services, as we have made a simplifying assumption that the ratio of women to children is 1:1. Noting that the average Australian family has 1.9 children,²⁷ this is a conservative estimate of the number of children that could receive child care and benefits later in their lives.

Figure 5 Employment shock – increase in number of employed persons



The cost of providing ECEC to these children is estimated to total \$406 million (in 2012-13 dollars) by 2050. This is the marginal cost estimate of providing ECEC places to the children of women joining the workforce. As noted elsewhere in this report, this is not a full cost benefit analysis, as there are other costs that may be incurred which, for simplicity, have not been considered here.

This cost, and the results of the increased employment which provides an increase in tax collection and decrease in unemployment payments, is shown in the following graph.

The increase in the number of people employed means governments collect more in tax and also pay less in transfers such as unemployment benefits. These benefits offset the costs of the increase in access to ECEC – see Figure 6. Therefore, there is a net gain to the government’s bottom line. This is shown in the net fiscal position being positive – where there is an estimated cumulative \$1.0 billion saving to the taxpayer (\$0.6 billion in NPV terms) by 2050 if access to ECEC was increased such that the net price of child care declined by 5 per cent.

Figure 6 Fiscal results of increased workforce participation impact

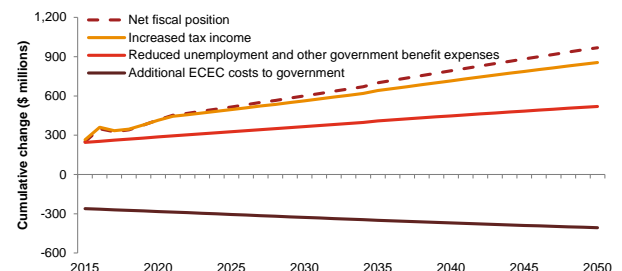
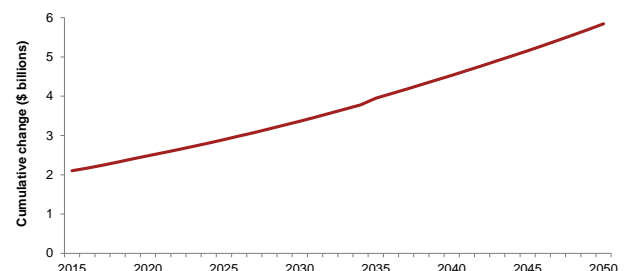


Figure 7 shows that the initial increase in women in the workforce increases Australia’s GDP by about \$2.0 billion. In 2035, 20 years after the first cohort of children received greater access to ECEC, GDP increases slightly more as well. This contributes to an economy wide impact of \$6.0 billion in GDP by 2050, or \$3.7 billion in NPV terms.

Figure 7 Results of increased workforce participation impact on GDP



²⁷ Australian Bureau of Statistics, 2011 Census QuickStats, all people – usual residents, Australia, March 2013. Available at: http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/0

Long run productivity impacts from participation in quality ECEC

Evidence from the United Kingdom suggests that medium and high quality ECEC providers produce better literacy and numeracy outcomes for children relative to low quality ECEC services – see Table 2. Research shows this can lead to improved earnings.

This scenario assumes there are long run productivity impacts from increasing the quality of ECEC in Australia. Currently, there are a portion of ECEC providers assessed under the NQA that are working towards the NQS.

We assume that the different relative child impacts of low, medium and high quality in the context of the United Kingdom research are reasonable proxies for the different relative child impacts of working towards, meeting and exceeding NQS in the Australian context. We have done this as the variations in quality identified by the EPPSE study relate to variables that include staff qualifications and effective pedagogy, both features of the NQA. If this assumption holds, and if some of the Australian ECEC providers that are working towards the NQS could improve their quality such that they met the standard, and if some of the providers meeting the standard could exceed the standard, then we assume there will be improved outcomes for children.

The ‘shocks’ modelled in this scenario are:

- An increase in workforce productivity when the children receiving quality ECEC join the workforce. There are three scenarios for this shock which are driven by the range in possible improvements in literacy and numeracy outcomes and an assumed range in the proportion of ECEC providers that may improve the quality of their services. These are:
 - A high productivity impact, where the effect size²⁸ is:
 - 0.14 for medium quality services, and the assumed proportion of low quality ECEC services that improve to medium quality is 100 per cent
 - 0.15 for high quality services, and the assumed proportion of medium quality ECEC services that improve to high quality is 50 per cent.This has a productivity uplift of 0.013 per cent.
 - A low productivity impact, where:
 - the effect size is 0.07 for medium quality services, and the assumed proportion of low quality ECEC services that improve to medium quality is 50 per cent
 - no medium quality ECEC services improve to high quality.This has a productivity uplift of 0.003 per cent.
 - A medium productivity impact which is a midpoint of the above range and has a productivity uplift of 0.008 per cent.
- A cost to improve the quality of ECEC.

²⁸ An effect size is a common expression of the magnitude of study outcomes for many types of outcome variables. It is measured as the difference between the mean of the control group and the mean of the test group, relative to the standard deviation. John Hattie, *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*, Routledge, London, 2009, p 7.

Historically, Australia's productivity growth is between 0.5 and 3.0 per cent per annum.²⁹ It is expected that productivity growth going forwards is around 1.5 per cent. The uplift in productivity modelled in this scenario – where we have a range of three productivity growth rates as per the scenarios described – are small relative to these numbers; 0.013 per cent is less than one 1/100th of the expected productivity rate going forward. While these increases in productivity are small relative to the total productivity growth rate, they have a large impact when applied across the whole economy.

The cumulative cost to improve the quality of ECEC is estimated to be about \$1.5 billion by 2050. This estimate is based on the information in the 2009 *Regulation Impact Statement for Early Childhood Education and Care Quality Reforms Decision RIS* (the decision RIS).³⁰ This report shows the incremental cost of introducing the NQS is about \$45 million on average per annum between 2015 and 2019.³¹ As noted elsewhere in this report, this analysis is not a full cost benefit analysis and there may be some costs that have not been included in this estimate. For example, raising the standard of some ECEC providers from meeting NQS to exceeding NQS may be higher than this proxy allows for.

The impact of the cost and the fiscal results are shown in the Figure 8, Figure 9 and Figure 10 for each of the three scenarios.

As expected for this impact, there is a net cost to the government until the first cohort of children benefiting from this policy enters the workforce. Under the high scenario, fiscal savings accrue from 2032. The impact modelled does not provide for any new child care places, but rather makes them higher quality with increased costs in line with those identified in the decision RIS. However, once the children are of working age, the increase in the labour force's productivity generates a benefit back to the government through higher income tax collections.

In Figure 8, the net fiscal impact is about \$0.2 billion in cumulative terms by 2050, or -\$0.2 billion in NPV terms. In Figure 9 and Figure 10 however, the productivity benefits are not large enough to create additional taxation to offset the costs of increasing ECEC quality within the timeframe of the analysis.

Figure 8 Fiscal impact for improving quality of ECEC – high scenario

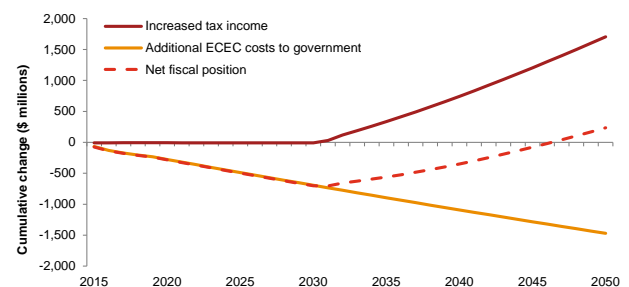


Figure 9 Fiscal impact for improving quality of ECEC – medium scenario

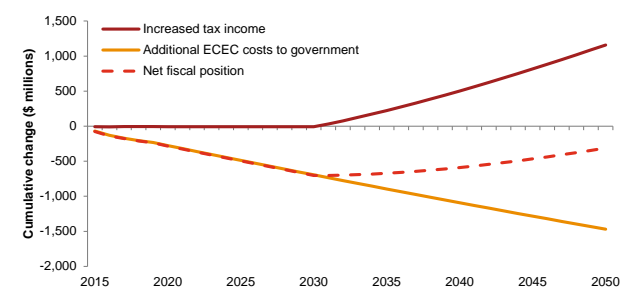
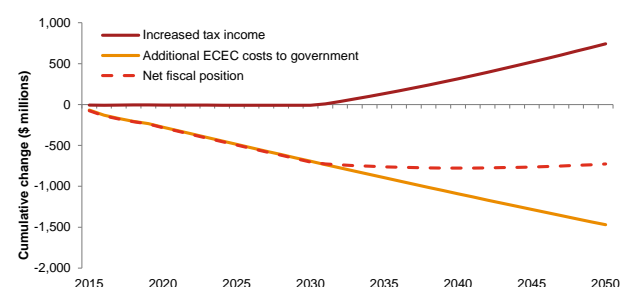


Figure 10 Fiscal impact for improving quality of ECEC – low scenario



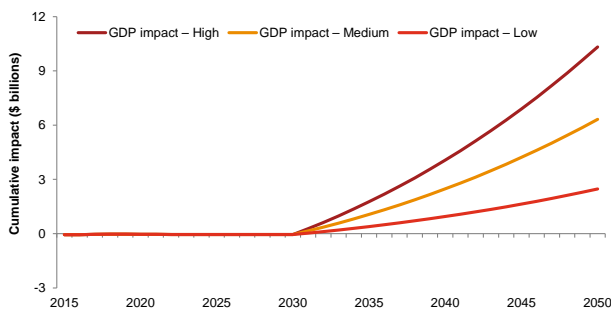
²⁹ Saul Eslake and Marcus Walsh, *Australia's productivity challenge*, Grattan Institute, February 2011, p. 14.

³⁰ Council of Australian Governments, *Regulation Impact Statement for Early Childhood Education and Care Quality Reforms: COAG Decision RIS*, December 2009.

³¹ Council of Australian Governments, *Regulation Impact Statement for Early Childhood Education and Care Quality Reforms: COAG Decision RIS*, December 2009, p. 42.

Figure 11 shows the impact on the Australian economy under each of the scenarios where productivity improves by between 0.003 per cent and 0.013 per cent in 2031. Under the high scenario (a 0.013 per cent improvement), GDP increases by \$10.3 billion in cumulative terms by 2050, or \$3.0 billion in NPV terms. Under the low scenario (a 0.003 per cent improvement) GDP increases by \$2.5 billion in cumulative terms by 2050 or \$0.7 billion in NPV terms.

Figure 11 Results of improving quality of ECEC impact on GDP



Increasing participation in ECEC of children currently not attending from a disadvantaged or vulnerable background

This scenario assumes there are benefits to providing ECEC to disadvantaged or vulnerable children.³² It draws on the international research of children from disadvantaged backgrounds who received ECEC— see Table 3.

This research found lasting benefits, both to the individuals receiving the care and also to the public from reduced education, justice and health spending on the individuals.

For the purposes of this analysis, we have used the number of children in the lowest income families who do not currently participate in ECEC as a proxy for the total number of disadvantaged or vulnerable children.

The ‘shocks’ modelled in this scenario are:

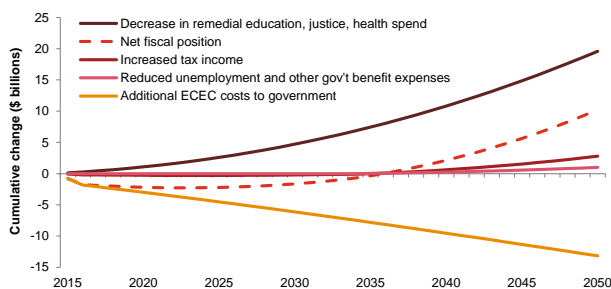
- The cost of providing ECEC to children who are not usually in care and whose parent(s) are in the lowest income brackets
- The benefits to the taxpayer of providing ECEC to vulnerable children. The scenario assumed in this analysis is that there is \$2.69 in benefits to the government for every dollar of cost. We have modelled the lower bound of international results identified and acknowledge that in the Australian context results would be expected to be lower than the results of our modelling. These compare to the benefit cost ratio to the taxpayer in international studies of:
 - High/Scope Perry Preschool – 7.16:1
 - Child-Parent Centers – 6.81:1
 - Abecedarian Project – 2.69:1
- The increased employment outcomes to individuals receiving ECEC.

³² The literature consulted in the preparation of this paper often uses the terms ‘disadvantaged’ and ‘vulnerable’ interchangeably for one another. This report also takes this approach.

Figure 12 shows the fiscal impact of the BCR 2.69:1 scenario including the impacts on:

- additional ECEC costs which increase due to the costs to providing ECEC to vulnerable children³³
- decreased remedial education, justice and health expenditure by governments, as the vulnerable children have improved education and life outcomes
- changes to tax collected, which rises due to increased employment from the expanding ECEC services and also due to increased employment when the vulnerable children are of working age, as more are employed
- reduced expenditure on unemployment and other government benefits, which create savings for the government from 2035 onwards as fewer of these children will draw on these benefits once they are of working age.

Figure 12 Fiscal impact for providing access to ECEC to vulnerable children (BCR of 2.69:1)

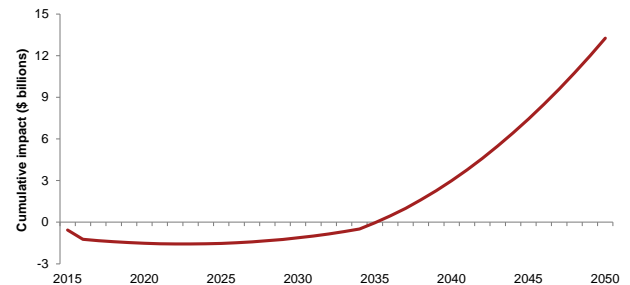


These impacts combine into a net fiscal position which is positive, that is, there is a net saving to the government under this scenario. These savings begin to accrue from 2024.

The estimated impact on the Australian economy as a result of providing ECEC to vulnerable children is shown in Figure 13.

From 2035 onwards, the GDP impact lifts as there is an increase in the number of employed persons, due to improved employment outcomes for the vulnerable children receiving ECEC. In cumulative terms, GDP is \$13.3 billion higher under this scenario or \$2.7 billion in NPV terms.

Figure 13 Results of access to ECEC for vulnerable children on GDP (BCR of 2.69:1)



³³ The additional ECEC costs to government are based on the average cost of child care. As is stated elsewhere in this report, this paper does not attempt to undertake a full cost benefit analysis and the costs presented here are indicative. For example, it is possible that the average cost of ECEC may understate the true cost to providing access to vulnerable children. We acknowledge that we have used this cost as a proxy in the absence of information on the true costs.

Combined results

As a summary, Figure 14 shows the individual GDP results of the three impacts.

While these impacts have been modelled separately, the benefits can be combined to form an aggregate assessment of benefits. If all three scenarios were to eventuate, the total combined benefits for all three impacts would be an estimated \$7.0 billion to \$9.3 billion increase in Australia's GDP in NPV terms. The cumulative impact is shown in Figure 15

This range is driven by the two scenarios of productivity outcomes that could be achieved from improving ECEC quality – the low scenario represents an increase in productivity growth of 0.003 per cent, the high scenario represents an increase in productivity growth of 0.013 per cent. Both scenarios assume the same impacts for increased female workforce participation and increased participation of vulnerable children.

Figure 14 Summary of results – total GDP impacts by 2050

Benefits of increased female workforce participation

\$6.0 bn

cumulative to 2050, **or**

\$3.7 bn

in NPV terms

The net estimated benefit to the Australian economy by 2050 of a 0.09 percentage point increase in labour force participation via an increase in access to ECEC equivalent to a 5 per cent decrease in the net price of ECEC.

Benefits for children receiving a quality education and care program

Up to

\$10.3 bn

cumulative to 2050, **or**

\$3.0 bn

in NPV terms*

The net estimated benefit to the Australian economy by 2050 of children who participate in quality education and care defined through attending a service rated as meeting or exceeding the National Quality Standard.

Benefits of increased participation of vulnerable children

\$13.3 bn

cumulative to 2050, **or**

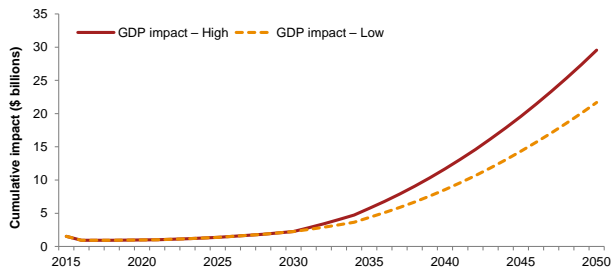
\$2.7 bn

in NPV terms

The net estimated benefit to the Australian economy by 2050 if children whose parents are in the lowest income bracket and who are not likely to attend ECEC were to attend an ECEC program.

* Note GDP impacts are in 2012-13 dollars. NPV terms use a 4.7% real discount rate.

Figure 15 Combined economy wide impacts of improving quality of and access to ECEC

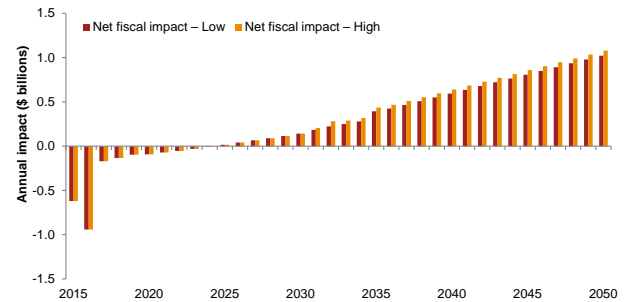


The net fiscal change for these impacts is estimated to be between a saving of \$1.6 billion (under the low scenario) and \$1.9 billion (under the high scenario) in NPV terms. This highlights the long term nature of the returns to society and that, while the costs to the taxpayer may appear large upfront, they are outweighed by the fiscal savings and revenue gains in the long run.

Figure 16 shows the annual flows to government. Under both scenarios, the net fiscal returns to government quickly become positive after an initial set up period.

This highlights the long term nature of the returns to society and that, while the costs to the taxpayer may appear large upfront, they are outweighed by the fiscal savings and revenue gains in the long run.

Figure 16 Combined fiscal impact of improving quality of and access to ECEC, in 2012-13 dollars



5 *Implications and next steps – Future work*

The purpose of our analysis was to provide estimates of the potential value of ECEC to the Australian economy based on a number of plausible scenarios.

Our work draws on evidence from a range of sources. As more local, longitudinal evidence becomes available, more robust findings can be generated that are directly drawn from an Australian evidence base. In addition, future work could undertake a meta-analysis or a comprehensive synthesis of the research in this area in order to deepen and expand this analysis.

Our analysis has not included a full cost benefit analysis. There may be further merit in exploring a full cost benefit analysis to derive findings with a greater degree of accuracy and specificity.

This report has focussed more on ‘why’ access to quality ECEC should be improved or maintained, rather than ‘how’ this might be achieved. The ‘how’ could also be an area for future work.

What we have demonstrated through this work is that the scale of the benefits of access to, and participation in, ECEC are not insignificant in a discussion on long term productivity that will require all social services and programs to generate clear and robust productivity and efficiency returns.

The results that we have developed represent reasonable estimates of the likely return on investment if outcomes consistent with the directions of international evidence were achieved in Australia.

In summary our findings demonstrate that there are potential benefits across the board for providing quality ECEC. These include:

- growing Australia’s GDP
- improving workforce participation choices for parents and in particular women
- helping realise the full potential of Australian children
- reducing the impacts of disadvantage.

Our modelling results show that all of these benefits can be achieved with a net saving to government.

Our 2011 report, *A Practical Vision for Early Childhood Education and Care* set out a range of recommendations about the future of ECEC delivery.

This current report has confirmed the currency of a number of these recommendations, including:

- ***Confirm governments’ commitment to measures that drive quality improvement*** – the quality of the program in which children participate has an impact on long term productivity gains. Participation in higher quality programs is likely to support higher productivity gains.
- ***Ensure funding is flexible and driven by the needs of families and children*** – increasing the participation of children from vulnerable and disadvantaged families depends on ensuring that cost is not a barrier to access within the context of universal access to ECEC.
- ***Monitoring and engagement*** – there is a need for more regular, collaborative and transparent monitoring of supply and demand of ECEC at both the macro and local levels.

Appendix A Methodology and technical notes

This section provides an overview of the methodology and documents the key assumptions made in the modelling.

Overview of the three impacts

Workforce participation

This scenario analyses the immediate impacts on the Australian economy of an increase in female labour force participation that may result from increasing access to affordable, quality long day care for parents. It assumes an increase in access to ECEC enables more women to join the workforce and that their children, through receiving ECEC, are more likely to be employed when they are of working age.

Our analysis has been limited to increasing the number of mothers who may join the workforce. We acknowledge that this analysis could be extended to fathers, or other carers who may also join the workforce as a result of increased access to ECEC. However, the available research that this hypothetical analysis is based on³⁴ is limited to the increased employment rates of partnered (married) women with pre-school aged children. For this reason, this analysis has looked at increasing the number of women in the workforce as a result of increased ECEC access.

We have also modelled the impact of increasing the number of children attending child care and the expected impact that will have on their employment when they join the workforce, while accounting for the immediate costs involved in having extra children participating in ECEC.

The scenario assumes a hypothetical scenario, where access to ECEC increases such that the net price of child care declined by 5 per cent.

Long run productivity impacts from participation in quality ECEC

This scenario assumes there are long run productivity impacts from increasing the quality of ECEC in Australia. Currently, there is a portion of ECEC providers assessed under the NQA that are working towards the NQS. Evidence from the United Kingdom (see Table 2 in the main body of the report) suggests that medium and high quality ECEC providers improve the literacy and numeracy outcomes for children relative to low quality ECEC services. Research shows this can lead to improved earnings. If some of the Australian ECEC providers that are working towards the NQS could improve their quality, such that they met the standard, and if some of the providers meeting the standard could exceed the standard, then we assume there will be improved outcomes for children.

We have modelled the productivity impact of this quality improvement to early childhood education and care.

Increasing participation in ECEC of children currently not attending from a disadvantaged or vulnerable background

Participation in high quality ECEC is particularly beneficial for children from disadvantaged backgrounds.

There is significant international evidence, particularly from the United States (see Table 3 in the main body of the report), on the return on investment from vulnerable children's participation in ECEC, especially in providing savings to taxpayers.

Care needs to be taken in applying these returns on investment to the Australian context, or extrapolating these findings economy wide. The characteristics of the services provided in a number of the United States studies such as the High/Scope Perry and the Abecedarian studies tend to be more intense and targeted, relative to the Australian ECEC offering. We expect there would be more modest returns on investment in the Australian context.

³⁴ Xiodong Gong and Robert Bruenig, *Estimating net child care price elasticities of partnered women with pre-school children using a discrete structural labour supply-child care model*, Treasury Working Paper, 2012-01, November 2012.

This scenario takes this point of view and assumes children from disadvantaged backgrounds who receive ECEC derive lasting benefits, both to themselves and also to the public from reduced education, justice and health spending on the individuals.

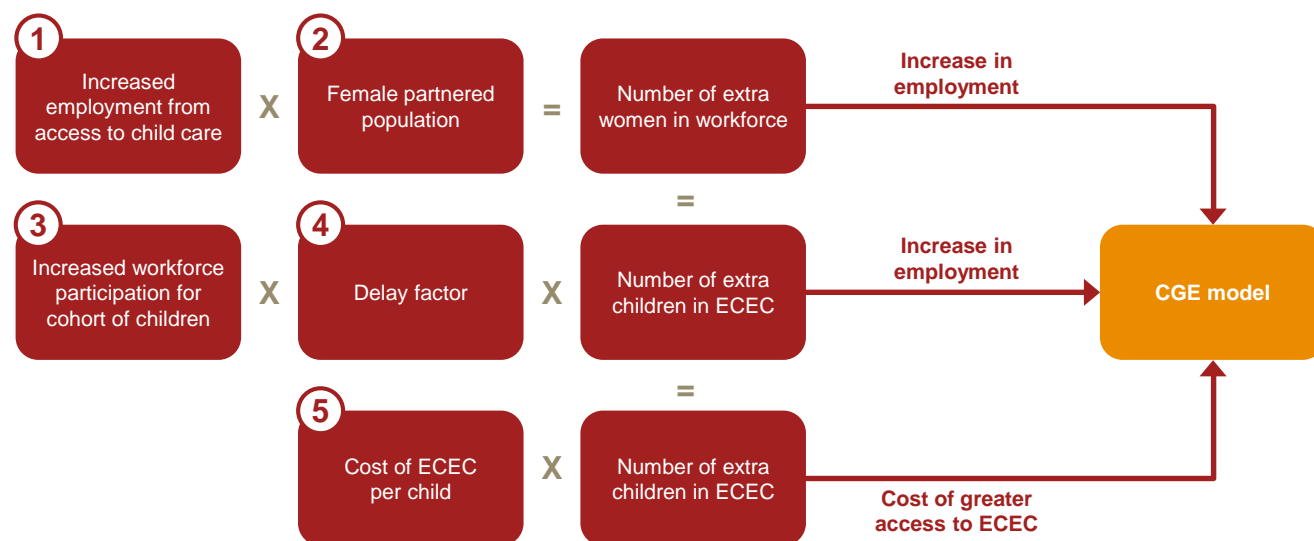
We have modelled the public and private benefits that would be realised if these children, and subsequent cohorts of children to 2050, attended child care.

Methodology

Each of the impacts was modelled as policy ‘shocks’ in a CGE model. The first step is to derive the ‘shock’. The following section sets out the methodology for calculating the ‘shocks’ of each impact in greater detail. A description of the CGE model follows.

Methodology for workforce participation

The following Figure describes the methodology at a high level. These points are described in further detail below.



1. Increased employment from access to child care

Australian research found that the elasticity of demand for child care was such that a 1 per cent increase in the net price of child care (that is after accounting for subsidies) would lead to a 0.06 per cent decrease in the employment rate for partnered women.³⁵

We assume that, in general and keeping all else constant, increasing the supply of (or access to) child care would lead to a decrease in price. We then assume that if access to child care increased such that the net price decreased by 5 per cent, then the employment rate of partnered women would increase by 0.3 per cent.

2. Female partnered population

Australian Bureau of Statistics (ABS) data shows that there are about 5.4 million married women aged over 15 – that is of working age.³⁶ If an extra 0.3 per cent of these women were employed, that would equate to an extra 16,000 women joining the workforce.

³⁵ Xidong Gong and Robert Bruenig, *Estimating net child care price elasticities of partnered women with pre-school children using a discrete structural labour supply-child care model*, Treasury Working Paper, 2012-01, November 2012.

³⁶ Australian Bureau of Statistics, *Category 6291.0 – Labour Force, Australia*, Table 01. Labour force status by Social marital status, Age and Sex, Series ID A92146F, November 2013.

With the Australian workforce numbering approximately 12 million people, this is equivalent to raising the participation rate by 0.09 percentage points.

It is this **increase in the level of employment** that is used as a 'shock' in the CGE model.

3. Increased workforce participation for cohort of children

To account for the long term impact upon children who will receive child care as a result of the increased access, we assume that there are benefits to children from receiving ECEC. The Productivity Commission, in its 2006 report on the Potential Benefits of the National Reform Agenda, cited the High/Scope Perry Preschool and the Abecedarian projects when noting that disadvantaged children receiving ECEC are between 14 per cent and 18 per cent more likely to be employed.³⁷ Noting the vast differences between the US, and in particular the High/Scope Perry Preschool cohort, and the general Australian ECEC context, we have taken the lower end of this range and discounted by 75 per cent, to 3.5 per cent.

This percentage is applied as an improvement to the likely proportion of children who would be employed. The number of children who are likely to benefit from this scenario is assumed to be equal to the number of women who would join the workforce. Noting that the average Australian family has 1.9 children,³⁸ this is a conservative estimate of the number of children who could receive child care and benefits later in their lives.

4. Delay factor

The increased employment outcome is not realised until the children are of working age. This analysis assumes this takes place between ages 15 (the ABS uses the definition of the working age population as starting from age 15) and 25 (as the age when many students complete university education). The midpoint of this range – 20 years – is the figure assumed in this analysis.

The delay, the number of children attending child care, and the likely increase in their employment outcomes, creates an estimate of the extra number of people likely to join the workforce in future as a result of the greater access to ECEC. This estimate of the **increased level of employment** is used as a 'shock' in the CGE model.

5. Cost of ECEC per child

The cost of child care used in this analysis is estimated from the total costs of child care and the total number of children in formal care. Australia's 'child care services' sector had a total industry revenue of \$6.3 billion in 2011-12.³⁹ When considering the 864,300 children in formal care,⁴⁰ this is an average cost of \$7,300 per child per annum. This estimate is similar to the Productivity Commission's 2010 estimate of FDC (\$6,538 per child per annum) and LDC (\$8,469 per child per annum).⁴¹

This is assumed to grow at 8.0 per cent for 2013 using the inflation reported for the cost of child care between December 2012 and December 2013 and at 2.0 per cent per annum from then on using the average annual inflation rate for the decade to December 2013.⁴²

It is assumed that child care would be provided for two years. The **total costs of this increase in the level of ECEC access** are included as a 'shock' to the CGE model's government expenditure on ECEC.

³⁷ Productivity Commission, *Potential benefits of the national economic reform agenda*, Report to the Council of Australian Governments, Canberra, 2006, p 239.

³⁸ Australian Bureau of Statistics, *2011 Census QuickStats, all people – usual residents, Australia*, March 2013. Available at: http://www.censusdata.abs.gov.au/census_services/getproduct/census/2011/quickstat/0

³⁹ IBISWorld, *Early learning: Enterprises are rebranding, moving towards more educational services*, Child care services in Australia, IBISWorld Industry Report Q8710.

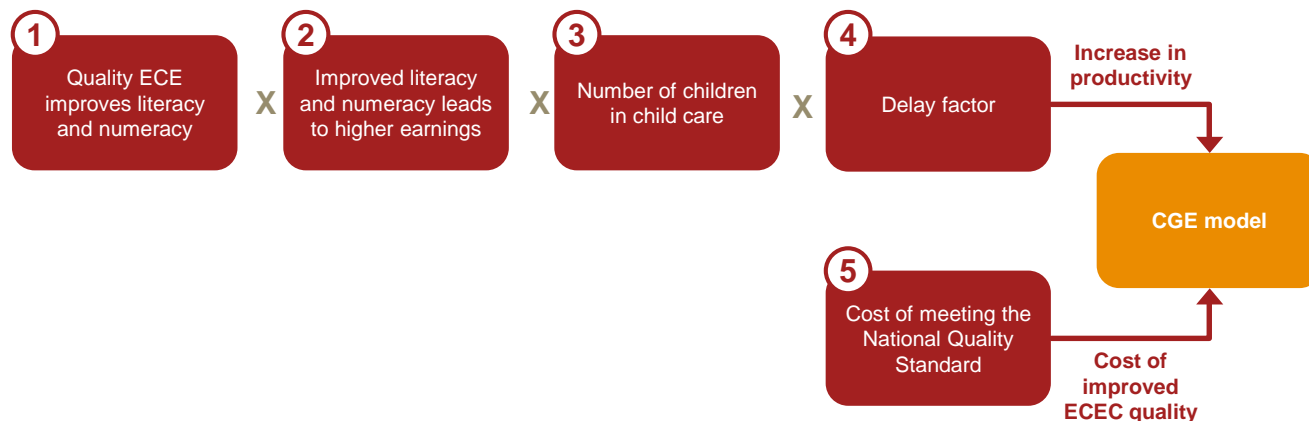
⁴⁰ Australian Bureau of Statistics, *Category 4402.0 – Childhood Education and Care, Australia*, June 2011, May 2012.

⁴¹ Productivity Commission, *Early Childhood Development Workforce*, Research Report, Melbourne, 2011, p. E.21.

⁴² Australian Bureau of Statistics, *Category 6401.0 – Consumer Price Index, Australia*, Table 11 CPI: Group, Sub-group and Expenditure Class, Index Numbers by Capital City. Series number A2331606F, March 2014.

Methodology for long run productivity impacts from participation in quality ECEC

The following Figure describes the methodology at a high level. These points are described in further detail below.



1. Quality ECEC improves literacy and numeracy

The EPPSE study from the UK found statistically significant differences in returns from participation in low, medium or high quality early childhood education relative to a home group of no participation. Children attending medium and high quality ECEC services were found to have higher test scores in reading and mathematics by year 5.⁴³ Relative to the low quality ECEC services, medium quality services had an effect size⁴⁴ of between 0.07 in mathematics and 0.14 in reading. Relative to the low quality ECEC services, high quality services had effect sizes between 0.11 and 0.15.

2. Improved literacy and numeracy leads to higher earnings

Research shows the benefits of improved literacy and numeracy outcomes in the primary years of education can lead to higher earnings.⁴⁵

Krueger (2002) stated that a one standard deviation increase in a test score for literacy or numeracy could lead to an eight per cent increase in earnings. An increase in earnings is assumed to be equivalent to an increase in productivity.

3. Number of children in child care

In 2011, there were 561,000 children, aged 5 or under, who were in either LDC or FDC.⁴⁶ These categories of child care are subject to the NQS, which commenced implementation in 2010.

As of May 2014, of the providers that fall under the NQS, 39 per cent were 'working towards' the standard while 35 per cent were 'meeting' the standard and 26 per cent were 'exceeding' the standard.⁴⁷

Acknowledging that the context of the UK EPPSE study differs from the Australian environment, for the purposes of this analysis, we have assumed that 'working towards' is equivalent to a low quality ECEC service; that 'meeting' is equal to a medium quality service; and that 'exceeding' equates to a high quality ECEC service.

⁴³ Pam Sammons, Kathy Sylva, Edward Melhuish, Iram Siraj-Blatchford, Brenda Taggart, Yvonne Grabbe and Sofka Barreau, *Influences on children's attainment and progress in key stage 2: Cognitive outcomes in year 5, 2007*, p 15.

⁴⁴ An effect size is a common expression of the magnitude of study outcomes for many types of outcome variables. It is measured as the difference between the mean of the control group and the mean of the test group, relative to the standard deviation. John Hattie, *Visible learning: A synthesis of over 800 meta-analyses relating to achievement*, Routledge, London, 2009, p 7.

⁴⁵ Alan B. Krueger, 'Economic considerations and class size', *National Bureau of Economic Research Working Paper Series*, 2002, page 25.

⁴⁶ Australian Bureau of Statistics, *Category 4402 - Childhood Education and Care, Australia, June 2011*, Table 1 Children aged 0-12 years; Type of care usually attended by age of child.

⁴⁷ Australian Children's Education and Care Quality Authority, *National Quality Framework Snapshot Q1 2014*, May 2014, Table 8.

This assumption then allows us to consider the benefits of improving the quality of the ECEC providers in Australia so that more are medium or high quality rather than low quality - that is, in the context of this analysis, more are meeting or exceeding the NQS rather than working towards the NQS.

The analysis assumes that, through quality improvement efforts and sustained implementation of the NQS, a total of up to 44 per cent of services are rated as exceeding and up to 56 per cent of services are rated as meeting the NQS.

4. Delay factor

The increased productivity is not realised until the children are of working age. As with the first impact, this analysis assumes this takes place between ages 15 (the Australian Bureau of Statistics uses the definition of the working age population as starting from age 15) and 25 (as the age when many students complete university education). The midpoint of this range – 20 years – is the figure assumed in this analysis.

The delay, the number of children in child care, the proportion of ECEC providers that will improve their quality, the potential increase in individuals' earnings and the likely improvement in their literacy and numeracy outcomes combine to create an estimate of the expected increase in workforce productivity when the cohort joins the workforce in future. This estimate of the **increased productivity** is used as a 'shock' in the CGE model.

There are three scenarios for this shock, which are driven by the range in possible improvements in literacy and numeracy outcomes and a range in the proportion of ECEC providers that may improve the quality of their services. The three scenarios include:

- a high productivity impact, where the effect size is 0.14 for medium quality services, and the assumed proportion of low quality ECEC services that improve to medium quality is 100 per cent and where the effect size is 0.15 for high quality services and the assumed proportion of medium quality ECEC services that improve to high quality is 50 per cent. This has a productivity uplift of 0.013 per cent.
- a low productivity impact, where the effect size is 0.07 for medium quality services and the assumed proportion of low quality ECEC services that improve to medium quality is 50 per cent, where no medium quality ECEC services improve to high quality. This has a productivity uplift of 0.003 per cent.
- a medium productivity impact which is a midpoint of the above range and has a productivity uplift of 0.008 per cent.

5. Cost of meeting the National Quality Standard

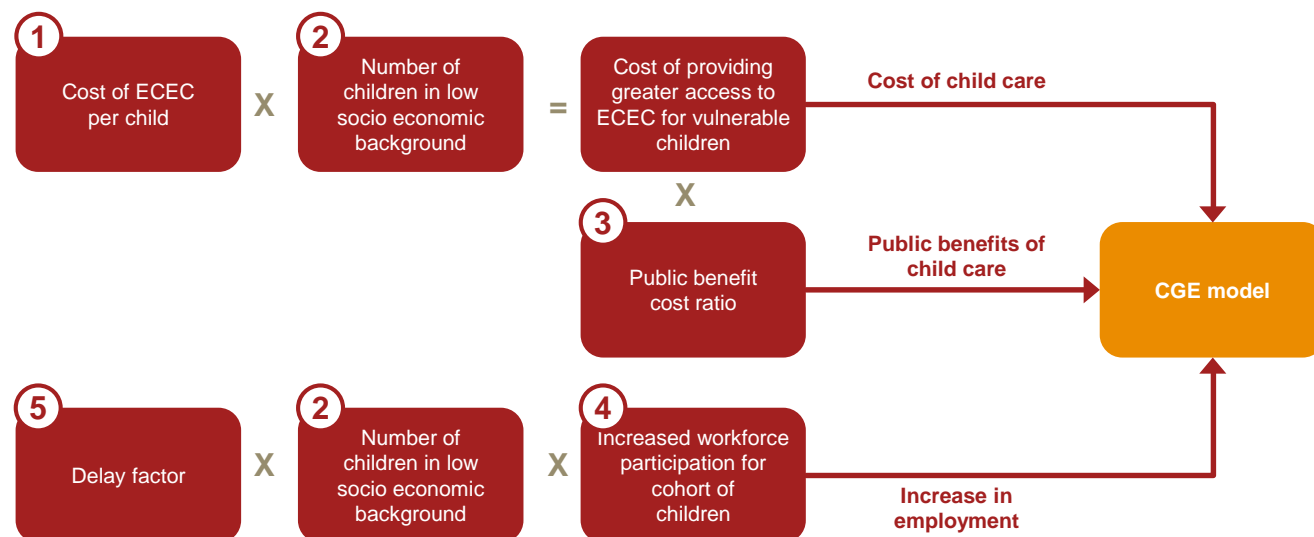
The cost of improving the quality of ECEC has been estimated using the information in the 2009 Decision RIS.⁴⁸ This report shows the incremental cost of introducing the NQS is about \$45 million on average per annum between 2015 and 2019.⁴⁹ We assume this information is a reasonable proxy for the cost of improving quality.

⁴⁸ Council of Australian Governments, *Regulation Impact Statement for Early Childhood Education and Care Quality Reforms: COAG Decision RIS*, December 2009.

⁴⁹ Council of Australian Governments, *Regulation Impact Statement for Early Childhood Education and Care Quality Reforms: COAG Decision RIS*, December 2009, page 42.

Methodology for increasing participation in ECEC of children currently not attending from a disadvantaged or vulnerable background

The following Figure describes the methodology at a high level. These points are described in further detail below.



1. Cost of ECEC per child

As with the increased workforce participation impact, the cost of child care used in this analysis is an average rate of \$7,300 per child per annum (refer to the increased workforce participation impact methodology above for an explanation of this estimate). This is assumed to grow at 8.0 per cent for 2013 using the inflation reported for the cost of child care between December 2012 and December 2013 and at 2.0 per cent per annum from then on using the average annual inflation rate for the decade to December 2013.⁵⁰

2. Number of children in low socio economic background

In 2011, there were 712,500 children aged under 5 who did not usually attend care – this comprised 40.8 per cent of all children aged under 12 who were not attending care.⁵¹ ABS data also shows that there were 391,800 children aged under 12 who were either in a couple family or a single parent family with the lowest income bracket and who did not

usually attend care.⁵² Using this data, we estimate that 160,000 of the 712,500 children aged under 5 could be in the lowest parental income brackets.

We noted that within the 712,500 children who do not usually attend care, a larger proportion of this number is comprised of under 1 year olds and those aged 5. The number of children not attending declines to a low number at age 2 and then increases in ages 3 to 5. We assume that this is because more children attend care at ages 1 and 2 than at less than 1 year. We assume this is also because at ages 3 to 5, more children are in pre-school. Therefore to avoid counting the children who may attend child care at some later point, we used the number of children not attending care at age 2 as the reference point and weighted the number of children at other ages under 5 relative to this. The estimated number of children not attending and unlikely to attend, and who are in a low socio economic background, is therefore estimated to be 103,000 in 2012.

⁵⁰ Australian Bureau of Statistics, *Category 6401.0 – Consumer Price Index, Australia*, Table 11 CPI: Group, Sub-group and Expenditure Class, Index Numbers by Capital City. Series number A2331606F, March 2014.

⁵¹ Australian Bureau of Statistics, *Category 4402.0 – Childhood Education and Care, Australia*, June 2011, April 2012, Table 1.

⁵² Where the lowest income bracket was less than \$1000 per week for a couple family and less than \$600 for a one parent family. Australian Bureau of Statistics, *Category 4402.0 – Childhood Education and Care, Australia*, June 2011, April 2012, Table 6 and Table 7.

The first year of the CGE modelling is 2015, so we used the ABS' forecast Australian population growth rate⁵³ to extrapolate the 2012 estimate forwards – this estimate is 108,000 children in 2015. From 2016 onwards, the number of children aged under 1 who are unlikely to attend and who are from a low socio economic background (about 18,000 in 2016) are also added so that the number of children affected by the impact increases each year.

Assuming that child care would be provided for two years for this cohort, the **total costs of the increase in the level ECEC access for vulnerable children** is included as a 'shock' to the CGE model's government expenditure on ECEC.

3. Public benefit cost ratio

Some overseas studies undertaken in detail have found there are net benefits to the public of providing vulnerable children ECEC. In particular the following studies found BCRs to the taxpayer of:⁵⁴

- High/Scope Perry Preschool – 7.16:1
- Child-Parent Centers – 6.81:1
- Abecedarian Project – 2.69:1

These studies focussed on education for young children from disadvantaged backgrounds in the USA.

Savings to the public derive from reduced expenditures on education, the justice system, and health care.

We acknowledge that for a number of reasons, the contexts of these studies are different from current day Australia. However, on the principal that providing ECEC to children from low socio economic backgrounds reduces future education, justice and health care spending, we have assumed that there is a net benefit to the public of providing greater ECEC services to vulnerable children.

The assumed public BCR we use is \$2.69 in public benefits for every dollar spent. This is the lower bound of international results identified and we acknowledge that in the Australian context results would be expected to be lower than the results of modelling using this BCR.

We assumed the benefits were shared over the individual's first half of their life. As the timeframe of the modelling is 2015 to 2050, we assume the benefits of the 2015 cohort are equally spread over a 36 year period. Given the ages at which the public benefits are reported in overseas studies (eg the High/Scope Perry Preschool study reported benefits at age 40),⁵⁵ this is not an unreasonable assumption. The benefits of the 2015 cohort are captured within the period of the model. However for cohorts from 2016 onwards, only a portion of their benefits are captured as they are also assumed to be evenly divided over 36 years and some of these years are beyond the period of the modelling.

These **benefits are used as a 'shock' to government expenditure on education, health, and justice** in the CGE model.

4. Increased workforce participation for cohort of children

As with the impact for increased workforce participation we assume there are benefits for vulnerable children, such as they may be more likely to join the workforce. For simplicity, we have taken the same approach as that used in the impact for increased workforce participation.

As with the first impact we assume that disadvantaged children receiving ECEC are between 3.5 per cent more likely to be in the workforce.

This percentage is applied as an improvement to the likely proportion of children who would be employed in the baseline of the CGE model.

5. Delay factor

The increased likelihood of employment is not realised until the children are of working age. As with the first impact, this analysis assumes this takes place 20 years after receiving child care.

Together with the number of vulnerable children who will benefit from access to ECEC, the increased workforce participation and the delay, this creates a **'shock' of an increased level of employment** which is modelled in the CGE model.

⁵³ Australian Bureau of Statistics, *Category 3222.0 - Population Projections, Australia, 2012 (base) to 2101*, November 2013, Table B9.

⁵⁴ Judy A. Temple and Arthur J. Reynolds, 'Benefits and costs of investments in preschool education: Evidence from the Child-Parent Centers and related programs', *Economics of Education Review*, 26, 2007, Table 3, page 132.

⁵⁵ http://www.highscope.org/file/Research/PerryProject/specialsummary_rev2011_02_2.pdf Accessed 11 August 2014

Computable General Equilibrium modelling

CGE modelling is a sophisticated, multi-variate computer based model which measures the effect an investment or initiative has on the national, state/territory and/or regional economies.

CGE models recognise that complex interactions occur and endeavour to replicate how the economy will behave given these complex interactions.

PwC uses the models developed by the Centre of Policy Studies, at Victoria University, updated with the most recent official data. These models are preferred because they have been peer reviewed, meaning the inputs and assumptions are fully and publicly documented. This ensures that the modelling is credible to government economic bodies including all state and Australian Government treasuries. The Monash suite of models have been widely used in Australia by both governments and the private sector.

This economic modelling has been undertaken using the Monash Multi-Regional Forecasting CGE model. The model distinguishes up to eight Australian regions (six states and two territories) and, depending on the application, up to 144 commodities/industries. The model recognises, among other things:⁵⁶

- domestic producers classified by industry and domestic region
- investors classified by industry and domestic region
- up to eight region-specific household sectors
- an aggregate foreign purchaser of the domestic economy's exports
- up to eight state and territory governments
- the Federal government.

⁵⁶ Centre of Policy Studies, *MMRF*. Further information available at: <http://www.copsmodels.com/mmrf.htm> Accessed 8 July 2014.

Appendix B Acknowledgements

PwC takes full responsibility for the ideas expressed in this paper. PwC would like to thank staff from the following organisations who provided advice at various points in the preparation of the paper. Note the views contained in the paper should not be interpreted as being endorsed by either the individuals who participated or by their organisations.

- Department of Education and Communities (NSW)
- Department of Education (Commonwealth)
- Department of Education (NT)
- Department of Education (Tasmania)
- Department of Education (WA)
- Department of Education and Child Development (SA)
- Department of Education and Early Childhood Development (VIC)
- Department of Education and Training and Employment (QLD)
- Department of Premier and Cabinet (VIC)
- Early Childhood Australia
- Early Childhood Management Services (ECMS)
- Education and Training Directorate (ACT)
- Goodstart Early Learning

In addition, PwC would particularly like to acknowledge the advice provided by:

- Professor Frank Oberklaid, Director, Centre for Community Child Health
- Professor Collette Tayler, Chair of Early Childhood Education and Care, University of Melbourne
- Professor Charles E. Pascal, University of Toronto
- Dr Gordon Cleveland, University of Toronto at Scarborough and Senior Fellow, Graduate School of Education, Melbourne

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