# J    What is needed in a cost-benefit analysis?

This appendix sets out what would be involved in undertaking a full cost-benefit analysis of the Commission's recommended funding and other changes to the early childhood education and care (ECEC) system. The Commission has quantified some of the costs and benefits of its recommended reforms in chapter 16, but has not sought to quantify others, in part as even the estimates provided are highly uncertain. This difficulty with quantification stems from the inherent uncertainty in behavioural and market responses to policy incentives, and to the paucity of relevant evidence on, and the contingent nature of, some of the longer term outcomes from ECEC use. Despite the difficulties in quantification, setting out how the full set of benefits and costs could be identified and measured is a useful exercise. In part, this appendix is a warning about drawing conclusions from simplified approaches if the limitations and caveats of these approaches are not understood. In part, it also seeks to explain in more general terms how the Commission approaches estimating the effects of the policy change. A detailed description of the micro-simulation model used for estimating the impacts to policy changes recommended in this inquiry is given in the technical supplement to this report.

The first section sets out a way to think about how the impacts of policy change arise over time, and how the Commission's recommended changes in ECEC policy will lead to change over the immediate, intermediate and longer terms. The following three sections look at each of these components of the cost-benefit analysis in more detail, focusing on how the impacts can be measured. The final section concludes with a brief summary.

## J.1    Components of a cost-benefit analysis for a change in ECEC policy

### The key components of a cost-benefit analysis

A cost-benefit framework provides a way to 'add-up' the impacts of a change in policy across people and over time. It is a universal framework that can accommodate any cost and benefit to any identified group of people, or even individuals.[1] The core feature of

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[1]   While cost-benefit analysis was developed to estimate the financial returns to a firm on long-lived investments, it can easily include others and has been widely applied to the analysis of a range of economic outcomes and, if measurement is possible, environmental and social outcomes.

cost-benefit analysis is that it tracks changes over time. While developed to analyse investments that cost a lot up front and pay off later, the framework is ideal for any policy change where the full range of significant impacts take time to emerge. This requires:

- identifying and measuring the direct changes that result from the implementation of the policy (sometimes referred to as the 'shock')

- tracing through the consequences of the policy changes (the 'outcomes') over time as the 'first round' direct effects set in train further changes, some of which can take a long time to observe

- reporting these outcomes for all the variables of interest ('impacts') as a time series of changes that occur as a result of the initial change in policy. These impacts should include all outcomes that matter for community-wide wellbeing, including for people not directly affected by the policy change, such as taxpayers.

The outcomes will be contingent on what is happening in the broader environment, which can change over time in ways unrelated to the policy change in question. Hence, projecting the impacts of a policy requires making (evidence and theory-based) assumptions about the mechanisms of change and about the situations in which these changes are occurring. As the impacts are the changes resulting from the policy, they are measured relative to the 'counterfactual' — what would have happened in the absence of the policy. Estimating the impacts relative to the counterfactual is the most difficult part of most cost-benefit analyses, as much because it can be as hard to predict what would happen in the absence of the policy change as it is due to the difficulties of estimating what changes the policy will bring about. In making these assessments, the analyst has to rely on evidence from past experiences of change, some of which are more relevant than others.

Compared to the problem of measuring outcomes, the challenge of converting these estimates, which could be in terms of metrics such as lives saved, or changes in unemployment rates, is more manageable. In some cases, such as consumption of automobiles, the outcomes will have a market price and the value to the consumers can be expressed in terms of the dollars they have spent. In other cases, a dollar value needs to be assigned that reflects the comparable value of the outcome to the community. Although putting dollars on some environmental and social outcomes can be controversial, there are a range of methods for estimating the community's willingness to pay for these outcomes (Baker and Ruting 2014). Some outcomes, such as cultural heritage and connection, however, defy valuation as for some people in the community these are priceless outcomes.

To make sense of a time series of net benefits (benefits less costs at each point in time), cost-benefit analysis estimates the net present value. This process applies a discount rate to impacts that occur further out in time — reflecting the idea that a dollar in the future is worth less than a dollar today. The selection of the discount rate can be controversial (see for example, Harrison (2010)), as a high discount rate means that impacts that occur a long time in the future matter less to determining whether the policy has an overall net benefit, than if a low discount rate is used.

PricewaterhouseCoopers (PwC) (sub. DR684) illustrate the effect of applying a discount rate, as they report the net present value (although the discount rate is not clear) as well as the undiscounted cumulative impact of a policy change in 2013 out to 2050. Reflecting the effect of the discount rate, the undiscounted cumulative effects are substantially larger than the net present value. For example, the cumulative effect on gross domestic product (GDP) of workforce participation of a 5 per cent reduction in ECEC net costs is estimated in their study to be $6.0 billion, but $3.7 billion in net present value terms. Illustrating the effect of investments that take a longer time to deliver returns, the cumulative net benefit for a policy that gets children from the lowest income brackets into ECEC services (who would not otherwise attend) is estimated to be $13.3 billion, but only $2.7 billion in net present value terms. While the cumulative estimates are useful to grab headlines, it is the net present value numbers that are more relevant for policy.

In practice, many assessments of policy focus on the longer-term impacts — whether they are positive, large and permanent at some time in the future — rather than assiduously adding up the net effect for each year. This can be for simplicity or because a high discount rate can make policy changes that have long-term pay-offs, but involve short-term costs, look marginal. Yet, because they form an important part of an evolving policy framework for the economy and society, such reforms can contribute to a much greater net benefit than is able to be estimated.[2] While looking at a snap-shot in time some years hence has merit, attention to the short-term cost of policy change is also needed as — even if the long-term gain is considerable — minimising the costs of adjustment will be important to ensure that the policy change delivers a net benefit.

Figure J.1 summarises these broad steps in undertaking a cost-benefit analysis.

The discussion below focuses on the first of these steps, and approaches that can be taken to estimating the impacts of a change in ECEC policy.

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2  For example, there may have been some privatisations that, when looked at by themselves, did not result in a positive net present value, but getting government out of market production resulted in a more flexible and vibrant economy.

## Figure J.1    **Key steps in a cost benefit analysis**
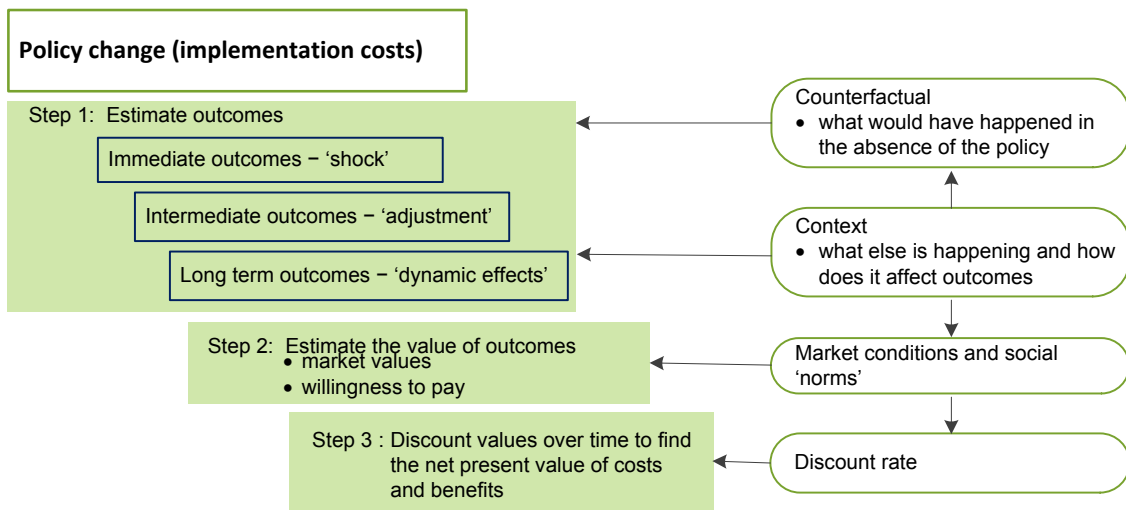


## Identifying the outcomes of a change in ECEC policy

Estimating the outcomes requires identifying what they are likely to be to develop a relational mapping over time. For convenience, these are labelled immediate, intermediate and long term, but in reality the timing can overlap and some of the outcomes across these categories are jointly determined. So the division below should be seen as a way to analyse the outcomes logically rather than reflecting when they occur. The changes are in response to changes in the subsidies families receive for using ECEC services.

### *The immediate (first round) outcomes — changes in the use of ECEC services*

The change in the use of ECEC services depends on how both demand for and supply of ECEC services respond to the changes in the subsidies provided for ECEC services and other policies that result in changes in the out-of-pocket cost, availability and quality of care.

- Changes in demand for ECEC services by families will also depend on parental employment opportunities and wages as well as family views on the child development value of ECEC services.

- On the providers' side, the scope to expand or contract existing services, and to open or close services, will affect supply responsiveness to changes in demand.

- Decisions by providers on the price and quality of services and the families' response to changes in what providers offer can take some time to play out, but as long as the market functions well, price and quality combinations that families most prefer should be delivered.

The eventual 'equilibrium' in the ECEC market is, however, contingent on the broader economy and in particular the extent to which it provides job opportunities for mothers. The Commission's modelling assumes that these opportunities are available which is a longer term outcome than if (comparative static) general equilibrium modelling that takes second and subsequent round effects of an increase in labour supply into account.[3]

### The intermediate outcomes — changes in child development and workforce participation of parents

Changes in ECEC policy have consequences for both child development and workforce participation (including hours of work).

- Workforce participation (joining the workforce and hours worked) is jointly determined with the use of ECEC services. Changes in workforce participation should largely match changes in the use of formal ECEC services, allowing for travel time, unless there has also been a change in the use of informal ECEC services.

- Child development outcomes will depend on the hours of care, the quality of care, and the vulnerability of the children who experience changes in their use of ECEC services.

- Changes in the supply of labour has direct and immediate impacts on the level of market production and hence GDP.

- Changes in wage income and profits associated with changes in labour supply have implications for government revenue (through the taxes levied on income). Government expenditures are also affected, notably childcare assistance, Family Tax Benefit (FTB), and the Parenting Payment.

  - Changes in family income can also have effects on the demand for ECEC (and other) services so, to the extent that ECEC services are a 'normal' good, families may want to consume more than they otherwise would.

- Changes in workforce participation impacts the level of household production. As a mother's participation in the paid workforce increases, hours of childcare provided by the mother decline, as may some other household activities and volunteer work. In addition to ECEC services, some household work may be replaced by families

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[3] This depends in large part on the closure of the model. If capital markets are responsive, industries will be able to expand to accommodate an increase in labour supply, but the resulting wages are still likely to fall relative to the counterfactual to bring this adjustment about.

employing others to do that work, such as a cleaner. As a result, part of non-market production moves into market production.[4]

## Longer-term outcomes — the effect of changes in human capital investment

To the extent that intermediate workforce participation and child development outcomes build human capital there is a longer-term impact on the economy. There can also be social impacts from changes in employment and from changes in the number of children who grow up in poverty.

- Wages growth is lower for parents who take long periods of time out of the paid workforce, and for part-time workers more generally. The shorter the period workers spend out of the paid workforce and the closer to full-time hours they work when they return, the lower is the wage growth penalty. This translates to higher human capital, and hence, GDP over time.

- The impact of the changes in child development are similar, but will be more sensitive to the environment that children face as they grow up and enter the workforce, notably the quality of their formal education after early childhood education, and the job opportunities that are available. As the long-term impacts are contingent on a range of external events that can amplify or dampen these impacts, they are inherently more uncertain than the intermediate impacts.

- If workforce participation and/or use of ECEC services affects the underlying sources of disadvantage, these can have further fiscal impacts. They arises from changes in demand for government programs that aim to address the consequences of disadvantage. The impact of such outcomes is measured in terms of changes in 'regrettable' expenditure.[5] Community welfare rises with a fall in such expenditure (although GDP may be unchanged) because public expenditure is redirected to things that have value to the community[6] or because taxes are reduced.

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[4] Computable general equilibrium (CGE) models rarely include the non-market sector, and the most interesting substitution effects for childcare are between market and non-market production rather than between different industries or consumer goods and services. There could be a wage effect in industries that predominantly employ women (via an increasing labour supply driving down wages), and a rise in demand for industries that sell services that working mothers consume disproportionately (such as cleaning services and prepared food). These substitution options need to be built into existing CGE models to get a better understanding of the welfare effects of the reallocation of activities across the market and household sector.

[5] The OECD define 'social regrettables' as expenditure that does not directly contribute to wellbeing, but are nevertheless deemed to be necessary, such as national security, and incarceration of criminals (OECD 2013).

[6] The category of regrettable expenditure is something that has value because it addresses a problem (or reduces its impact on the community), but in the absence of the problem would not be a desired expenditure. Hence removing the problem has value to the community as this expenditure is no longer needed.

## Measuring the counterfactual

Recommended policy changes should be compared to what is expected should the current ECEC arrangements continue. Notably, this counterfactual (or 'business as usual scenario') is expected to include more families 'hitting' the Child Care Rebate (CCR) cap or arranging their workforce participation (and informal care arrangements) to ensure that they stay below this cap. This means the counterfactual, against which the impacts of the recommended policy changes are assessed, is not static but changes over time. Hence, as noted above, estimating the counterfactual is challenging.
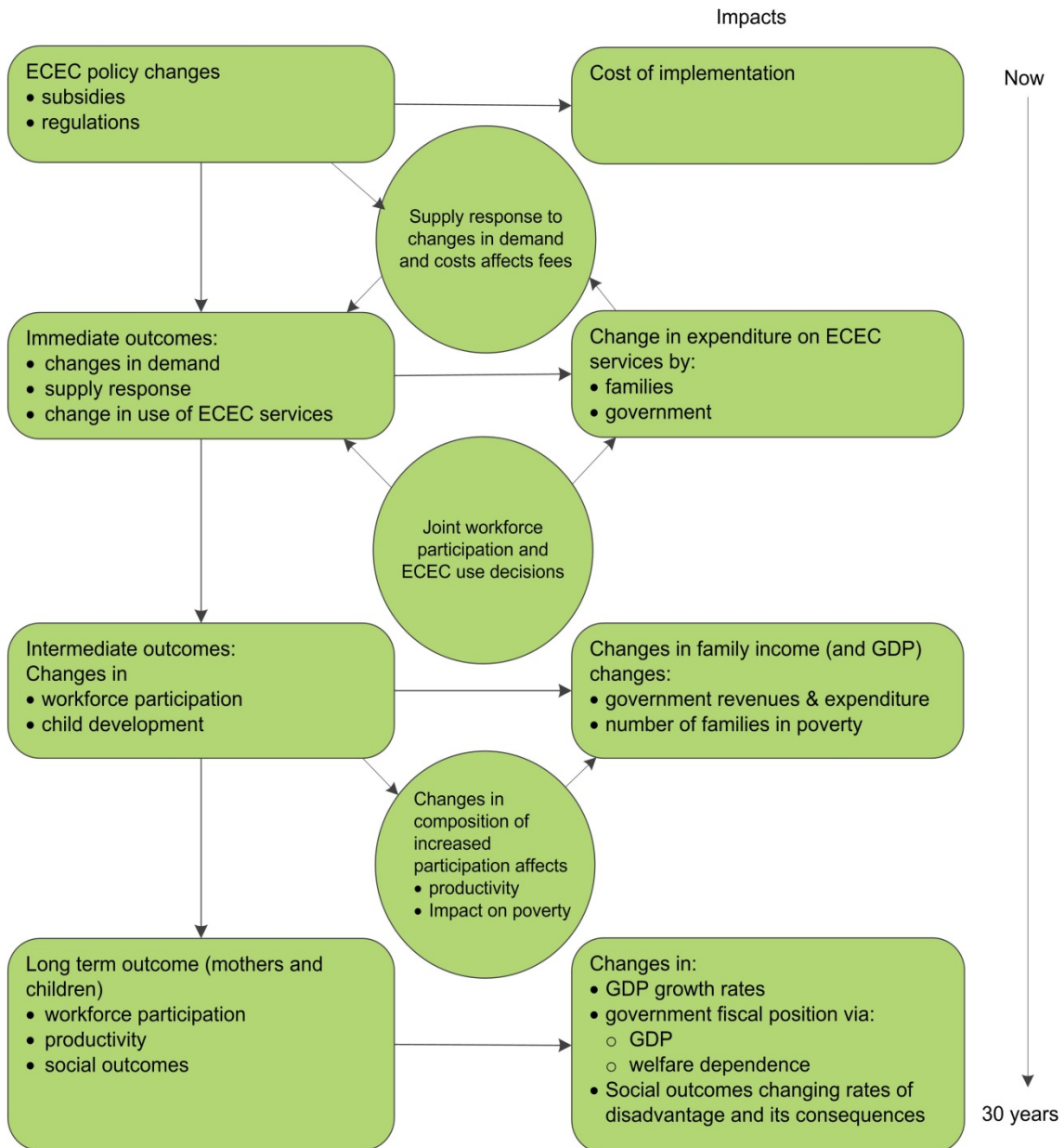
The need to measure impacts relative to the counterfactual is true for implementation costs as well as other impacts. These include the cost of making the changes (transition costs) as well as any change in ECEC expenditure relative to what it would otherwise have been.

## Bringing these together

These main elements are summarised in figure J.2. On the left hand side are the main mechanisms by which ECEC policy changes translate to outcomes for government and the community. On the right hand side are the impacts of policy changes that might be observed and measured. The circles in the middle are the most important of the 'feedback loops'. The timeline in this figure is indicative, as some impacts will continue over time and some will take time to occur.

The remainder of this appendix details the ways in which the 'immediate', 'intermediate' and 'long-term' impacts can be estimated. ECEC policy changes will continue to have effects throughout the whole period, not least in terms of the expenditure on ECEC services. The only impact that is really short-term is the upfront cost of implementing the policy change — any difference in expenditure remains an on-going cost (or benefit if it is a cost saving relative to the counterfactual.

Figure J.2    **A cost-benefit framework for assessing the impacts of ECEC policy changes**

Impacts

| ECEC policy changes | | Cost of implementation | Now |
| • subsidies | | | |
| • regulations | | | |

Supply response to changes in demand and costs affects fees

Immediate outcomes:
• changes in demand
• supply response
• change in use of ECEC services

Change in expenditure on ECEC services by:
• families
• government

Joint workforce participation and ECEC use decisions

Intermediate outcomes:
Changes in
• workforce participation
• child development

Changes in family income (and GDP) changes:
• government revenues & expenditure
• number of families in poverty

Changes in composition of increased participation affects
• productivity
• Impact on poverty

Long term outcome (mothers and children)
• workforce participation
• productivity
• social outcomes

Changes in:
• GDP growth rates
• government fiscal position via:
  ○ GDP
  ○ welfare dependence
• Social outcomes changing rates of disadvantage and its consequences

30 years

# J.2    Modelling the immediate effects of a policy change

The impacts of any policy change depend on the behavioural change induced. Behavioural changes might be intended, notably increasing the use of ECEC services to promote child development and workforce participation. But they can also be unintended, such as changing the demand for informal care (provided, for example, by grandparents) and the time spent on household work and volunteering. Hence, in assessing the impacts of a

policy change, tracking changes in these areas can be as important as assessing changes in the use of ECEC services, child development and workforce participation.

## Modelling the impact of policy change on the demand for ECEC services

The main driver of changes in the demand for ECEC services for many families is the impact on their out-of-pocket costs when they use these services. This works through changing the net wage (see below) which determines the change in workforce participation and, with this, the change in demand for ECEC services. The out-of-pocket cost depends on the subsidy rate (which depends on family income) and deemed cost and on the actual fees charged by the ECEC provider.[7] Hence, the final out-of-pocket cost a family faces depends on the supply response to the change in demand as well as their family income.

Families tend to respond to the net rather than the gross price of ECEC services (chapter 6). They appear to be fairly rational in assessing and basing their choices about childcare use on their out-of-pocket cost, which is determined by the price of the ECEC services they have access to and the subsidy they receive. In modelling the impact of the recommended policy change on the demand for ECEC services, what matters is the difference between the out-of-pocket cost families pay under the old policy compared to the new system. Under the options assessed in chapter 16, this will not be the same for all families — some will face lower, and others will face higher, out-of-pocket costs per hour of ECEC used.

The effect of the change in out-of-pocket costs on workforce participation (measured in terms of the change in hours of paid work) depends on the net change in family income from a change in participation. The change in family income (net wage) can be estimated by the hourly wage multiplied by the change in hours of work, less changes in taxes and transfers, less the out-of-pocket cost of ECEC services. For the person who takes on caring responsibilities for children (which is typically the mother in Australia but can include fathers), it is their reservation wage — the net wage they need to receive to be induced to work — that matters. A person's reservation wage is lower if they enjoy work, expect their work experience to positively affect their future wage growth, and view their involvement in the workforce and ECEC services as positive for their children (which, in turn, is also a function of the quality of the ECEC they can access). The reservation wage is higher for people who do not see long-term gains from working while their children are young, put a higher value on their time parenting and their leisure time, and have concerns that ECEC may have negative implications for their children (chapter 5). The reservation wage also differs between mothers. For example, recent survey results suggested that for some mothers it was close to, or below, zero as they chose to work despite the ECEC out-of-pocket cost, taxes and benefit losses exceeding their wage income (CareforKids 2014).

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[7]  If the provider charges fees below the benchmark price then the family will receive a higher effective subsidy rate.

Where the policy change results in the net wage for a mother rising above her reservation wage, she has an incentive to participate in the workforce. Similarly, where the change means a mother's net wage falls below her reservation wage, she will leave the workforce. For mothers already working (net wage exceeds the reservation wage), they may be willing to work more hours if their net wage rises, or fewer hours if it falls. This responsiveness to changes in the net wage is known as the price elasticity of labour supply. This elasticity is a key parameter in estimating the response to a change in out-of-pocket costs.

The relationship between out-of-pocket costs, the net wage, and hours worked is not straightforward. As hours of work increase, the rate of income tax (and levies) usually rises, and as family income rises, FTB and the Parenting Payment will fall for those who currently qualify. This effect, along with the out-of-pocket cost of ECEC services, determines the effective marginal tax rate (EMTR) for mothers contemplating a change in hours of work. As noted in chapter 6 and appendix E, under the current ECEC system, some mothers will face an EMTR of over 100 per cent if they work more than two to three days a week. This is due, in part, to the current cap on the CCR, a feature that the Commission's recommended system does not replicate. Nevertheless, EMTRs will continue to be relatively high for some mothers, which is a feature of all means tested welfare and progressive tax systems. As explained in appendix E, to reduce the incidence of EMTR 'cliffs' for mothers, the threshold and taper rates for the ECEC subsidy should not directly align with thresholds for access to FTB (or the Parenting Payment). Because of FTB and the Parenting Payments, family income is likely to play a role in determining the net wage of many mothers.[8]

An added complication for assessing the effect of changes in ECEC subsidies is the extent to which families have access to and use informal care to support their workforce participation. Little is known about how families and those providing informal care will respond to changes in out-of-pocket cost costs. The introduction of the 50 per cent CCR led to a major increase in the demand for ECEC services. Given that workforce participation did not rise commensurately, it is likely that some of this increase in use came from families reducing their reliance on informal care providers, such as grandparents, rather than increasing their workforce participation. Provision of informal care also comes at an opportunity cost, whether this is in the form of less leisure time, volunteering, or workforce participation (such as where a grandparent retires early to care for their grandchildren while the parents of the children work). With little data on the willingness amongst families to substitute between informal and formal care, this behavioural response cannot be estimated. If most families use informal care by preference where it is available (for example, because it is often 'free' or valued for other reasons as can be the case with grandparents) then their workforce participation response may be very small.

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[8] Higher Education Loan Program debt also adds to the effective marginal tax rate that mothers can face, as they become liable to repaying debt after reaching a given income threshold.

Figure J.3 sets out the considerations required for estimating workforce participation and the likely response in the use of ECEC services. The assumption is that mothers decide on their workforce participation based on whether the policy change increases or decreases their net wage relative to their reservation wage. That is, mothers choose to work more or less based on the hours of paid work that maximises their welfare (utility) under the new ECEC system relative to the old ECEC system. As paid work and ECEC services are available in 'chunks' of time, at the individual family level the changes in hours can be fairly large. For example, mothers wanting to join the workforce may face a minimum hours of work requirement, and if the policy change means their utility is now higher from working these hours they will do so. Unless there is a lot of clustering of incentives (and employment opportunities), in aggregate the changes in paid work and ECEC use are more continuous in response to a policy change.
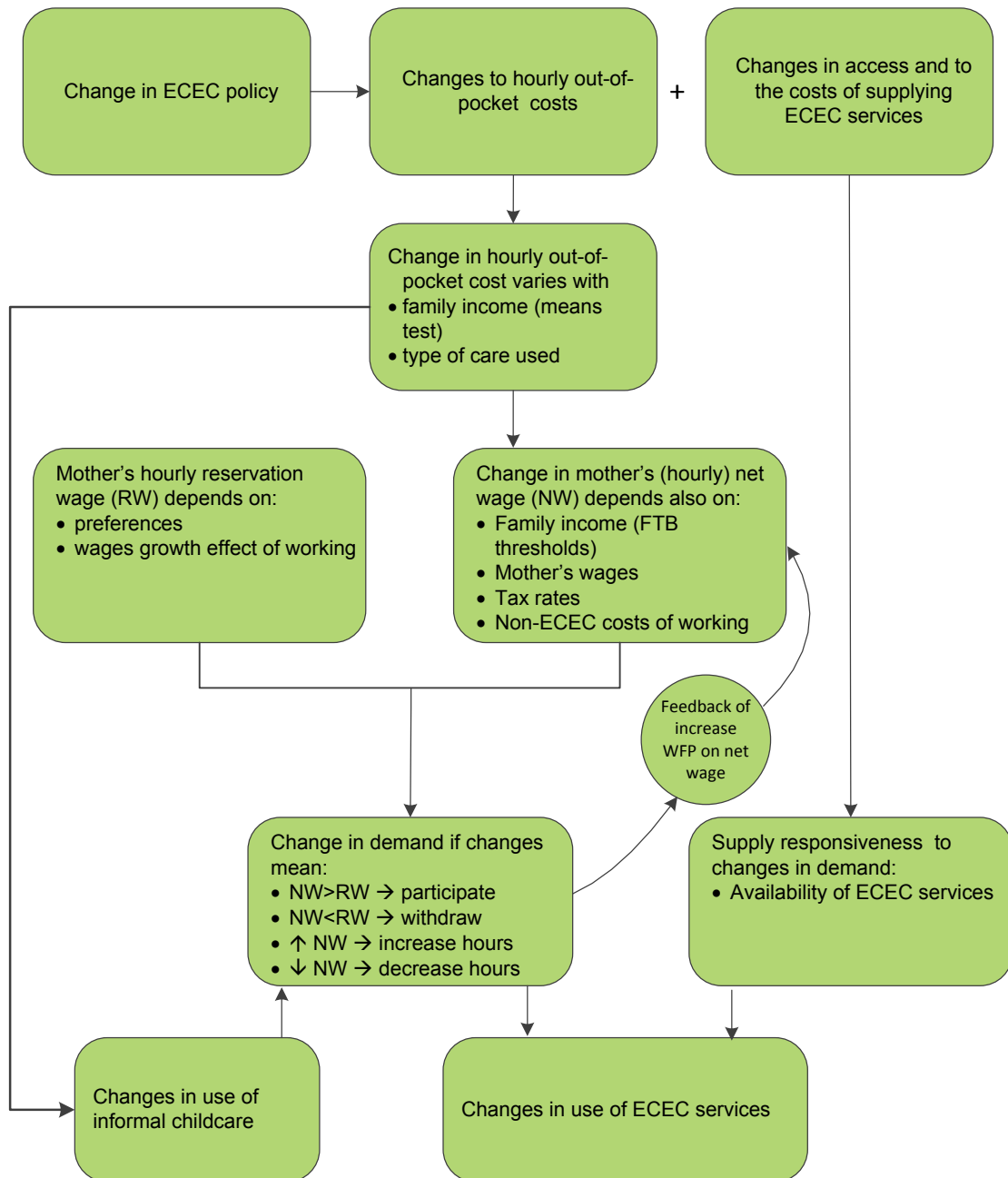
## Mothers' workforce participation response

Several OECD studies have modelled impacts on workforce[9] participation rates (including full-time and part-time participation rates) of women aged 25 to 54 years, for a range of policy changes including family policies, such as public spending on childcare services for children aged under 3 years.

Jaumotte (2003) found that the workforce participation rate of women aged 25 to 54 years between 1985 and 1999 appears to be stimulated by public spending on childcare (formal day care and pre-primary school). Similar results were found in two models that had part-time and full-time workforce participation as the dependent variables (Jaumotte 2003).

Thevenon (2013) modelled the impacts on the workforce participation rate of women aged 25 to 54 years of various factors including work-life balance policies over the period 1980 to 2007. He found that working full-time was unambiguously stimulated by public spending on childcare services for children aged under 3 years. However, public spending on childcare was estimated to have a negative influence on part-time work in some models. He concluded that increased public spending on childcare did not necessarily lead to more part-time employment as it may facilitate movement into full-time work or improve the quality of childcare without affecting hours worked per week.

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[9] There is a difference between workforce participation and labour force participation rates due to unemployment. These distinctions can be important when there are high rates of unemployment and when these are sensitive to the policy in question so that workforce and labour force participation changes need not be fully aligned. However, for most mothers of young children workforce and labour force participation are aligned as unemployment rates are low and fairly steady, reflecting mainly job churn. For this reason the term workforce participation is used throughout.

**Factors in modelling the change in demand for and supply of ECEC services**[a]



Change in ECEC policy → Changes to hourly out-of-pocket costs + Changes in access and to the costs of supplying ECEC services

Change in hourly out-of-pocket cost varies with
• family income (means test)
• type of care used

Mother's hourly reservation wage (RW) depends on:
• preferences
• wages growth effect of working

Change in mother's (hourly) net wage (NW) depends also on:
• Family income (FTB thresholds)
• Mother's wages
• Tax rates
• Non-ECEC costs of working

Feedback of increase WFP on net wage

Change in demand if changes mean:
• NW>RW → participate
• NW<RW → withdraw
• ↑ NW → increase hours
• ↓ NW → decrease hours

Supply responsiveness to changes in demand:
• Availability of ECEC services

Changes in use of informal childcare

Changes in use of ECEC services

**a** NW is net wage, RW is reservation wage and WFP is workforce participation.

While these studies looked at the 'macroeconomic' effect of a policy change (or differences), others have examined the effect of the price of ECEC services on mothers' decisions about workforce participation. As noted in chapter 6 relatively few Australian studies have estimated the sensitivity of demand (elasticity) for ECEC services or workforce participation to changes in the cost of childcare. (In comparison, there are many more studies that have estimated the participation responsiveness of mothers (or single

parents) to changes in their wages.) Most estimates have suggested that mothers' workforce participation decisions are not highly responsive to changes in ECEC prices (either gross or net). Mothers with younger children, multiple children, a lower education level, a lower wage, and a lower family income, are more likely to increase (reduce) their workforce participation and hours worked in response to a fall (increase) in ECEC prices than mothers without each of these characteristics.

An approximation of the population response to a change in ECEC out-of-pocket costs can be made by applying an estimate of aggregate elasticity of supply of labour by mothers in respect to childcare costs. PwC(sub. DR684) used this approach to estimate the effect of a 5 per cent fall in the cost of ECEC services on the workforce participation of mothers. They applied Gong and Breunig's (2012) elasticity estimate of -0.6, to project that this 5 per cent reduction in the net ECEC cost would induce an increase in labour supply of 15 000 (an increase of 0.13 per cent).[10] This approach provides a useful indicative response for general changes in fees.[11] However, the modelling problem is more complex when changes in fees differ across families. To estimate the impact of these type of policy changes a micro-simulation approach is needed.

## Micro-simulation modelling is needed to estimate the response in supply of labour and demand for ECEC services

As both the resulting net wage and the reservation wage differ between families (as well as the 'shock' to out-of-pocket costs which drives the immediate change in the net wage), a model that can trace out the impacts on different types of families is required. The Commission used a behavioural micro-simulation model to estimate the likely workforce participation and ECEC demand response to the recommended policy changes.

Behavioural micro-simulation models apply the proposed policy change to each family based on their unique circumstances, then add up the changes in each family's behaviour to estimate the population level changes.[12] Where the majority of the population can be categorised into a number of different family types, each of whose circumstances and estimated response are sufficiently similar, this can simplify the modelling required. In most micro-simulation models the change for each 'stereotype' family is estimated. The

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[10] In the PwC estimates, this increase appeared to be sustained although the fee relief applied only for 2 years. The population base appeared to be mothers of children under 15 years who were not in the workforce. At June 2012 this was 607 000, so a 5 per cent decline in net fees would induce a 3 per cent (5*0.6) rise in use of ECEC services, and presumably workforce participation. This was 18 210, which is in the ballpark of the PwC estimates.

[11] PwC assumed that the impact on workforce participation grew to 25 000 by 2050, due to population growth. But this implies an ongoing funding of the 5 per cent lower ECEC 'net cost' to families. Their estimates of fiscal costs appear to have only accounted for the cost of 2 years of funding, and only for those new to the ECEC service (families already using the service would also get the 5 per cent funding which would add to the fiscal cost of the change).

[12] The original formulation of micro-simulation models did not incorporate behaviour so were effectively a very detailed accounting exercise.

population level change is then estimated based on the relative share that each 'stereotype family' makes up of the total population. The main difference between micro-simulation models is the number of family types the model can accommodate, as well as the sophistication of the theory applied to estimate the changes in behaviour in response to a policy change. The Commission's model is based on the Australian Bureau of Statistics (ABS) Survey of Income and Housing, which sets the number of 'stereotype' households (a little under 3000). Population estimates are obtained by adding up the household changes, where each household type has a population weight, reflecting the share in the population of similar households.

Micro-simulation models do not usually incorporate a supply side response. This has to be imposed as a constraint on the choices that families can make and the expected impact that the supply response has on fees and hence out-of-pocket costs faced.

A limitation of behavioural micro-simulation models that use a utility maximisation approach is that, unless constrained, they assume that parents can easily change the hours of care they use by a small amount. However, decisions about both work and purchase of childcare services are often 'lumpy' — most ECEC providers require parents to purchase a full day service even if a few hours are required (this is less of an issue for outside school hours care). The Commission's micro-simulation model only allows families to work, and use ECEC services, in discrete 'lumps' of time, (for example, 10 hours a day to reflect the current LDC full day sessions). The Commission's recommended changes to encourage more sessional supply of ECEC services for periods shorter than a full day, would make this assumption more realistic as long as providers respond (chapter 10).

A description of the micro-simulation model used to estimate the effect of changes in ECEC assistance is provided in a technical supplement to this report.

## Estimating the impact of policy changes on the supply of ECEC services

In Australia, supply of ECEC services has been highly responsive to demand, however, fees have also risen considerably (chapter 9). A key question that the Commission is not able to answer is the effect the recommended changes to the ECEC system will have on the costs of supply, the competitive constraints on fees, and ultimately the quality, availability and price of ECEC services. This is in part due to the lack of industry data that would allow a thorough examination of the ECEC market (appendix H), and because the sector continues to evolve from its community not-for-profit origins (chapter 9) A number of the Commission's recommended changes aim to:

- reduce some of the pressures on costs (notably through reforming the National Quality Framework and streamlining funding administration)

- improve competition (mainly through reducing operating requirements that could form barriers to entry and exit, and addressing planning impediments)

- improve availability (through including 'approved' in-home care/nanny services and removing regulatory barriers to greater variation in operating hours).

These proposals should all work to lower costs for any given service quality. However, with labour making over 60 per cent of the cost of supply, the overall impact on service cost is unlikely to be large. Moving to a benchmark price as the basis for the subsidy rather than the actual fee paid should also put downward pressure on fees for services that currently offer a 'premium' service, at least to the extent that families would not choose these features if they faced the full additional cost. The relatively competitive nature of the market should constrain ECEC fees to the actual cost of providing the service (including a return on capital) in the medium term.

In the absence of detailed cost information, it is difficult to predict the supply response to shifts in the demand for ECEC services. Centre-based supply tends to be fairly lumpy and the costs of establishing a new service can be considerable (in the order of $2 to $7 million for a purpose built long day care centre, but lower for conversions). This is particularly so for younger children and some providers report that around 60 places are considered to be required to deliver economies of scale (chapter 9). Services for school-aged children are also fairly lumpy with around 30 places needed to fully utilise minimum staffing, although the capital costs of entry (and exit) should be lower than for LDC. By contrast, home-based services, whether in the carer's home (FDC) or the child's own home (in-home care/nannies) should involve a low entry (and exit) cost than centre-based care.

With some families likely to be facing higher out-of-pocket costs (and some facing lower) under the Commission's proposals, the change in demand facing services in different locations would vary. The shift to a benchmark price based on the age of the child for LDCs would also change the dynamics for these providers. In addition, allowing greater flexibility of hours might see more providers offer shorter sessions to better match supply to demand. So some change in the composition of the supply of ECEC services is likely. But these adjustments would take some time to play out.

For the Commission's modelling reported in chapter 16, supply of ECEC services is assumed to be perfectly elastic. That is, while there will be changes in the composition of supply, it is assumed that overall supply would adjust to accommodate demand with no effect on the fees charged relative to those charged under the current policy. While this assumption may be reasonable in the medium term, there will be some locations where this might not be the case. To the extent that this results in higher fees (reflecting higher costs for expanding supply) the micro-simulation modelling will overstate the workforce participation and use of ECEC services response.

## Estimating the cost of ECEC subsidies

The micro-simulation model estimates the first round changes in the use of ECEC services by different families. Adding up the hours of services and the hourly subsidies paid gives an estimate of the government expenditure on ECEC services for 'mainstream' services (used by families who receive the recommended Early Care and Learning Subsidy (ECLS)).

The Australian Government has several policy parameters at hand to manage the cost of ECLS. These are the subsidy rates which can be changed by altering the maximum and base subsidy rates and/or the upper and lower income thresholds, and/or the shape of the taper in between). Over time the index rate chosen for the income thresholds will also affect the cost of the system. Changing these parameters would have an immediate effect on the cost of ECLS, which will increase over time as families respond to the change in out-of-pocket costs and change their use of ECEC services.

The Commission's micro-simulation model does not include the funding that goes to children with additional needs and the preschool funding that make up the rest of the cost of the ECEC system. Unlike mainstream programs — where funding depends on demand — the funding of these other programs would largely be capped. Hence, modelling the cost of these programs is relatively simple.

To estimate the immediate effects of changing the ECEC funding arrangements, Table J.1 summarises the main information required — at a population scale, which is the sum of the individual family decisions. Work-related costs, other than ECEC services, are captured in the modelling as part of a set of 'other' factors that influence utility and hence decisions about workforce participation. While it would be better to model these non ECEC work-related costs explicitly, the data to support their inclusions (and variation with hours worked) is not available.

**Table J.1  The immediate costs and benefits of ECEC policy changes: what needs to be known?**

| Components | What changes? | These changes depend on changes in… | Main factors affecting the response |
|---|---|---|---|
| Australian Government expenditure on ECEC services | • Direct subsidies to parents<br>• Tax expenditures for parents/employers<br>• Block funding to providers<br>• Tax expenditures for providers<br>• Administrative costs | • Number of children in care<br>• Hours of care per child<br>• Subsidy per child per hour<br>• Block funding arrangements | Objectives of policy<br>• Child development<br>• Workforce participation |
| Family out-of-pocket costs | Total expenditure by families on ECEC less any subsidies received | • Hourly cost of care<br>• Hours of care used<br>• Hours paid<br>• Subsidies per child | • Competitive nature of the market<br>• Quality of service<br>• Cost of inputs (labour, capital, etc.) |
| Gross income earned | Total individual income after tax of parents | • Participation in hours<br>• Hourly wage | • Preference for work<br>• Skills & education |
| Income taxes paid | Individual income tax | • Annualised gross income | • Marginal tax rates and thresholds |
| Government transfers to households | Entitlement to:<br>• Family Tax Benefit (FTB)<br>• Other welfare payments | • Annual gross household income (FTB Part A)<br>• Second worker income, and household income(FTB Part B)<br>• Second worker income, household income and assets (most welfare payments) | • FTB subsidies and taper rates<br>• Other welfare payments and taper rates |
| Additional expenses | Household expenses due to additional costs in earning income | • Travel costs to access employment<br>• Other work associated expenses<br>• Replacement costs for household services | • Distance from employment<br>• Number of shifts worked<br>• Household income and preferences |

## J.3 Modelling the intermediate impacts of a policy change

To understand the intermediate effects on family and aggregate income, the fiscal effects for government, family poverty, and household production, it is important to track which types of families are working increased hours and which types are working fewer hours. This affects the impact of the policy changes on:

- labour productivity, and hence GDP, and in turn this affects tax revenue

- family income, as changes in paid work change family income and in turn their welfare payments (including FTB, Parenting Payment and other welfare payments), both of which affect disposable family income.

In turn these affect the:

- government's net fiscal position

- share of families living below the poverty line (and the share no longer reliant on income support payments).

The change in workforce participation also affects household production. There are also effects of attending ECEC services on child development. While the development outcomes are an intermediate impact that can deliver social benefits, it is the longer term impacts where child development can have the greatest impact. But to estimate these impacts requires first measuring the changes in development that result from changes in ECEC attendance, before linking these child development outcomes to things like employment and health. Relating changes in ECEC use to a developmental measure such as the Australian Early Development Census (AEDC) will be one way to monitor this type of child development outcome.

### Estimating the impact of ECEC policy change on GDP — labour supply and productivity

To properly estimate the effect of the Commission's recommended policy changes on GDP requires modelling both the effect on the supply of labour and the demand for labour. In the intermediate period, the effect on the supply of labour is mainly due to the changes in the workforce participation of mothers. What evidence there is suggests that the overall response of fathers' workforce participation rates to changes in out-of-pocket ECEC costs is comparatively small, although over time this might change if mothers' participation results in changes in social norms around home and paid work. There may be substitution between formal and informal ECEC services that affects the workforce participation of people who were providing informal ECEC but this too, is likely to be small. Hence the main labour supply effect is the change in mothers' labour supply — participation and hours worked.

The impact on GDP of the recommended policy change depends critically on the economy's capacity to absorb additional labour. As the policy intent is to encourage mothers into greater participation in the workforce, their level of education and previous work experience also have an important effect. Where the additional labour cannot be absorbed without a significant fall in wages (inelastic labour demand), the effect on GDP is lower than where additional labour can be absorbed at the going wages (highly elastic labour demand). There is also a change in labour demand as changes in the use of ECEC services translates through to demand for formal ECEC workers.

The impact of these labour demand and supply 'shocks' can be modelled using a computable general equilibrium model (CGE). In addition, in the short run, any changes in the 'quality' of labour due to a changing composition of the workforce need to be tracked. Longer run models also should take account of the impacts of changes in the accumulation of human capital. Finally, assumptions need to be made about how the economy adjusts to these shocks.

If capital markets are flexible and able to attract investment to make good use of any net increase in labour supply then the economy will tend to expand in line with the rise in the supply of labour.[13] However, if capital is not easy to access, and/or there are rigidities in the economy, then the only way for labour to be absorbed is for wages to fall, so the net effect on GDP is much smaller.[14]

An additional complication is the response of government to changes in ECEC expenditure. Any change in government expenditure needs to be reflected either in the level of tax revenue that needs to be collected, or in a change in the government budget deficit. The assumptions about the government response will affect the adjustment of the economy. For example, if the Australian Government elects to maintain the existing budget balance, an expansion in expenditure on ECEC will need to be offset by a rise in taxes or a reduction in another area of expenditure. Like the assumptions about the access to the capital market, the approach taken to determining the fiscal balance can affect the modelling results. Given the complex nature of, and considerable uncertainty in, most of these responses any estimate of the impact on GDP is inherently approximate at best.

Most modelling of the impacts of increased female workforce participation assumes that the demand for labour is perfectly elastic, so the impact on GDP is simply the additional hours times the average wage rate for these workers (for example, Daley 2012; Ernst & Young 2013; PwC 2004). While over time this assumption may be reasonable, especially in open economies with growth-oriented policies, adjustment to a labour supply shock

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[13] If capital is borrowed from overseas, then GDP growth will exceed that of national income, as part of the rise in GDP will be paid to the foreign owners of capital.

[14] This assumption guides the 'closure' of a CGE model. Also crucial is whether the modelling keeps the government's fiscal balance, or tax parameters, constant. PwC (sub. DR684) used the Monash Multi-Regional Forecasting model to estimate the effects on GDP from the labour supply shock and the productivity shock. It is unclear what closure was used in their model, but it is likely that a long run flexible capital markets closure was used.

usually takes some time. As mothers will tend to only increase their use of ECEC services for work-related purposes where they can find a job, this implies that the labour supply shock is itself contingent on the ability of the economy to absorb more labour. Hence, the impacts on GDP of a policy change that induces workforce participation should be considered as rising over time.

The model used in this inquiry to estimate the impacts on GDP adopts the same approach, although it does take into account the productivity impacts of a change in the composition of labour supplied by prime-aged women.[15] The output of the Commission's micro-simulation model provides the inputs in terms of labour supply 'shocks' for the GDP model, that is, the change in female labour supply by age cohort.

## The aggregate labour supply change

The Commission's micro-simulation model takes into account the family circumstances (family income, mother's education, number and age of children) in estimating the likely labour force response for each family type. The total labour supply change depends on the aggregate net change in hours worked which is the weighted sum of changes for each family type. In this way, the effects of different family compositions across the different age cohorts can be taken into account. For example, older mothers are less likely to have pre-school aged children and are more likely to work. The total change in hours worked is simply the weighted sum of all the individual changes and is used to estimate the change in the labour supply.

## The aggregate productivity change

As not all hours of work are equal in their contribution to the broader economy — some workers are more productive than others — the impact on the economy from a change in hours of work should include any changes in the productivity of the workforce (that is, the change in the effective labour supply). This requires estimating the likely change in productivity either within age cohorts (if there is a change in the skill profile as some reduce and some increase hours) or across age cohorts (if the average skills vary across the age cohorts).

One way to track the estimated change in productivity is to use the education profiles of different age groups of women (table J.2).

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[15] PwC (sub. DR684) assumed that there was no difference in the productivity of women who were induced to enter the workforce by the changes in net costs of ECEC services.

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### Table J.2    Educational attainment of women by age cohort[a]

| Age cohort | Year 11 or below | Year 12 | Diploma/Certificate | Degree or higher |
|---|---|---|---|---|
| | % of age cohort | % of age cohort | % of age cohort | % of age cohort |
| 25-34 | 14.7 | 15.2 | 29.8 | 40.4 |
| 35-44 | 23.7 | 17.2 | 26.4 | 32.8 |
| 15-44 | 24.1 | 22.8 | 25.2 | 27.9 |

**a** Based on numbers of women whose educational attainment is known. Data for 15-24 year olds is omitted as many have yet to complete their education

*Source*: Productivity Commission estimates based on unpublished data from the ABS (*Programme for the International Assessment of Adult Competencies, Australia 2011-12,* Cat. no. 4228.0); ABS (2013); Programme for the International Assessment of Adult Competencies: Australia 2011-12.

The level of education forms a proxy for the labour productivity, which is reflected in the hourly wages earned. For example, a Commission Staff Working Paper (Forbes, Barker and Turner 2010) using longitudinal data from the Household Income and Labour Dynamics in Australia (HILDA) survey, controlling for individual fixed effects, found that the level of education had a significant influence on hourly wages earned in Australia. Compared to a person with a year 11 education or less, on average:

- a man with a year 12 education earnt around 13 per cent more, and a woman with year 12 education earnt around 10 per cent more

- a man with a diploma or certificate earnt around 14 per cent more, and a woman with a diploma or certificate earned around 11 per cent more

- a man or a woman with a university education earnt around 40 per cent more.

More recently, based on ABS Adult Literacy and Lifeskills Survey and the Programme for the International Assessment of Adult Competencies data from 2011-12, Shomos and Forbes (2014) estimated the effect of education, literacy and numeracy on wages. They found that the marginal effect of educational attainment was positive and similar for men and women for those who attained year 12 (relative to those who did not). The effect of education was slightly higher for workers with a diploma or certificate, and substantially higher for those with a degree. The gap between men and women also widened with the level of education (table J.3).

## Table J.3    Educational attainment marginal effects for wages models[a,b]

2011-12, 25–64 year olds, per cent

| | Men | | Women | |
|---|---|---|---|---|
| *Explanatory variable* | *Model 1* | *Model 2* | *Model 1* | *Model 2* |
| Degree or higher | 71.3** | 54.1** | 63.8** | 46.6** |
| Diploma or Certificate | 19.0** | 14.5** | 16.3** | 11.5** |
| Year 12 | 17.3** | 10.1* | 14.6** | 10.0** |
| Literacy and numeracy | | 9.8** | | 11.3** |

** Significant at 1 per cent, * 5 per cent   [a] Marginal effects are estimates of the increase in wages (per cent) associated with a change in the explanatory variable.  [b] Estimates for educational attainment are relative to having Year 11 or lower education.

*Source*: Shomos and Forbes (2014).

Labour force participation rates also vary systematically with the level of education. Laplagne, Glover and Shomos (2007), when analysing HILDA data, found that having a degree or higher qualification had the largest impact on labour force participation (relative to not completing year 12) — boosting female participation by 20 percentage points and male participation by 9 percentage points. Attaining year 12 was associated with around a 9 percentage point higher participation rate for women (compared with those who had attained year 11 or lower), and around 6 percentage points higher participation rate for men. These differences in the rates of participation are accounted for in the Commission's micro-simulation model.

As women tend to be paid less than men, particularly at the higher end of the education scale (Cobb-Clark and Barron 2010), the initial productivity shock based on wages may be understated. This will occur if higher educated women contribute more to productivity relative to their wage than men.[16] Some have argued that the gender wage gap (which is currently estimated at around 17 per cent) reflects this. However, it may also be due to women choosing lower paid jobs that offer more family-friendly employment, where the wage (and by association productivity) may be lower (Gordon 2012).

If changes in workforce participation are uniform across women of different productivity levels then there is no productivity shock. Hence, it is important to estimate whether the change in the ECEC system results in a change in the relative rates of participation of women with different education levels. The Commission's micro-simulation model is used to estimate this change.

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[16] A comprehensive analysis of the impact on average productivity of workers would also require tracking the requirements of the job undertaken by those workers changing their hours. Many women take jobs that do not fully utilise their skills as these jobs may offer them the flexibility to combine work with family commitments. However, some studies have found that part-time workers, and mothers in particular, are more productive than equivalent full-time workers (Ernst & Young 2013).

## The fiscal impact

Government is interested in the effects of any policy change on its net fiscal position. In the intermediate term, this depends on changes in:

- tax revenue arising from the change in labour supply and productivity

- welfare spending arising from the changes in family income

- government expenditure on the ECEC system.

The easiest way to estimate the fiscal impact is to use the estimated the changes in GDP to derive the effect on tax revenue, then to add in the changes in government's ECEC expenditure for each year. While this approach can give a rough approximation, the heterogeneity of families' labour force response, income, and access to transfers requires tracking families. For example, if the increase in labour supply comes mainly from high wage women working more hours, then the tax revenue will be higher than if the policy induces lower wage women to work part-time whose income may remain below the taxable level. Conversely, high wage women may be in families that do not receive FTB, so there is no reduction in welfare payments when they work more hours, while low wage women's families may lose some FTB when they gain paid work (or work longer hours).

### Changes in tax revenue and family payments

The Commission's micro-simulation model estimates the first round effects on the hours worked and, as it maps the change in income for each worker, it can calculate the change in taxes paid by these workers. The effect on family income of the change in the second income earned is calculated as it affects the ECEC subsidy rate and family payments.[17] The total effect on tax revenue and expenditure on FTB and the Parenting Payment is added up across all the families to provide an estimate of the total of each payment.

There is a second round effect on the Australian Government's fiscal balance as families' consumption will affect goods and services tax (GST) revenue. To the extent that untaxed household production and consumption is replaced by market produced and, hence, taxed consumption goods and services, the impact on GST revenue will be proportionately higher than the labour supply shock. This effect is not taken into consideration in the modelling for this inquiry report.

In addition to the fiscal effects of workforce participation changes, a number of the Commission's proposals would affect tax revenues. The recommendation to remove the Fringe Benefits Tax (FBT) concessions to not-for-profit providers is expected to result in higher tax revenue (through lower tax expenditures). Similarly, removing the FBT exemption for employer-provided childcare would reduce the potential for loss of tax revenue through this mechanism. While this is currently not widely used, the size of this

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[17] There is a feedback loop between hours worked and the subsidy rate and family payment changes that is internalised in the decision making about how much to work in response to the policy change.

concession could grow in the future as the CCR cap begins to affect a larger number of families. The modelling does not take into account the fiscal impacts of these recommendations, in part, because these tax expenditures are not currently measured and, in part, as the longer-term impact of removing the employer-provided FBT exemption is not relevant for the 2013-14 year in which the concession is hardly used (see below for a discussion of the counterfactual).

The final impact on the Australian Government's fiscal position should take into account all the labour market adjustments over time as well as the effect of income on GST, and the changes that will affect tax expenditures. As discussed above, these changes are complex and uncertain, hence the fiscal impact estimates must be treated as indicative only.

## Changes in the cost to the Australian Government for the ECEC system over time

The other intermediate fiscal impact comes from the change in program costs. These depend on the change in the use of ECEC services under the new system compared with these outcomes under the current system. Properly estimating the change in the ECEC cost requires projecting out what would happen under the current system. This need not be proportional to the current impacts, so simply adjusting for the effect of inflation and population growth is insufficient. For example, a feature of the current system is the cap per child on the CCR subsidy, and caps in occasional care and in-home care. The cost of the system depends critically on what happens to these caps. There is also a feedback effect on the other elements of fiscal cost if the caps are reached by more families and so affect more decisions about workforce participation (and, hence, income tax revenue and welfare payments).

The modelling for this inquiry report does not address this problem of changes in the cost and fiscal impact of the current system over time (to do so needs a dynamic counterfactual). Rather the two systems are modelled for a base year where the caps on CCR affect relatively few families.

## Other fiscal impacts due to flow-on effects on the demand for other services

Improving access to suitable ECEC services for children with additional needs can add to government's costs and/or bring offsetting savings in expenditure in other social services. Use of ECEC services can prevent, or be a substitute for, other services, including high cost interventions that might otherwise be required. But it can also lead to higher expenditure if the need for specialist intervention is recognised. This should bring benefits in the future at the expense of a higher cost today, although the net cost to government may still be higher. Some of these costs and savings will accrue to state and territory governments as they provide the majority of direct services to disadvantaged children and families. Estimating these flow-on costs and savings is complex and most studies that have attempted to estimate these types of net benefits have taken a longer-term view (see below). Nevertheless, in estimating the intermediate flow-on effects, consideration should

be given as to whether the recommended system is likely to create significant changes in demand for other services.

## Social impacts

Not all changes that result from moving to the recommended ECEC system can be reduced to a monetary value. For example, the value to parents of having one parent dedicated to raising their children is something that cannot be quantified as it is highly individual and can reflect the parent and family's culture and values. Similarly, some mothers can be empowered by participating in paid work, which can change the dynamics of their relationships with others in ways they value. Such outcomes should be recognised and included in the cost-benefit 'ledger', even if it is not clear how they should be 'valued'. There are two areas that are worth some attention where measurement of the outcomes might be possible, even if there is no consensus on their value.

### Families living below the poverty line

There is a substantial literature on the potential life time impacts for a child that grows up in poverty (see below). But even in the short term, families that live below or close to the poverty line report lower levels of wellbeing than those consistently above it (Saunders 2011).

It is relatively straightforward from the Commission's micro-simulation model to estimate the impact of the policy changes on the share of families that are living at or below a 'poverty' income threshold. Ideally, this threshold is based on disposable family income and adjusted for the number and age of family members. The impact on the number of families with an income below the threshold will depend on the change in employment for families in the bottom income levels, both in terms of workforce participation and hours worked, and the impact this also has on tax benefits and family payments.

While a useful metric to report, the change in income that leads to this outcome is already included in the cost-benefit bottom line. In general, cost-benefit analysis will report on the distributional outcomes (who wins and who loses from the policy change) without making any judgment about the impact of the distributional outcome on community wellbeing.[18] As Cleveland (2012, p. 84) noted 'the implication is that a proposed ECEC policy that passes a cost-benefit test and also improves social equity will have very desirable results'.

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[18] An alternative approach is to use non-market valuation techniques to assess the 'willingness to pay' of the community for a distributional outcome in the same way that environmental outcomes can be 'valued' (Baker and Ruting 2014).

## Non-market production

Mothers participating in the paid workforce can come at a cost to household services as well as the mother's 'leisure'. In 2006, the estimated value of unpaid work (household and community and volunteer work) ranged between $416 and $586 billion (depending on the valuation method used), with childcare comprising 15 per cent of the value of unpaid work (ABS 2014b). Time-use studies also show that women do a higher share of household work than men (ABS 2008). They also show that when women work more hours in paid employment they do less household work, but only by a small amount. Conversely, men whose partner works in paid employment only spend a small amount of time more on household work than men whose partner does not work (chapter 6).

A social cost-benefit analysis needs to take significant non-market production effects into account. The time use data imply that there would be only a small net change in household production (slightly larger for childcare)[19] when women work more hours in the paid workforce. Nevertheless, even small reductions in time add up if they apply to a large number of households. This loss in household production could be significant in aggregate, but it is a private rather than a community cost.

Loss of volunteer time would, however, be a cost to the community. As the rate of volunteering is higher for working women (in 2006, 37 per cent for those working full time and 49 per cent for those working part-time) than non-working women (33 per cent), it is unclear what the impact of changing workforce participation would be on volunteer time (ABS 2014a). If workforce participation gives women greater capacity to engage in volunteer work, volunteering could rise, but as mothers move from part-time to full-time work it could fall.

If non-market production simply moves into market production as a result of a change in ECEC policy, the question of whether the community is any better off than before arises. GDP would be higher (and hence government tax revenue would also be higher for the same policy settings), but in terms of community wellbeing, the improvement depends on how much families prefer market goods and services relative to home produced ones, and how much intrinsic gain (or loss) they get from being employed and child attendance at ECEC services.

A rough approximation of the change in household production is the change in hours worked by mothers times the implied change in hours of household work per extra hour worked (the net change of women and men in partnered households). There are several methods by which household work is 'valued', the most common is to apply a relevant market wage (the ABS use the housekeeper replacement cost method and a gross

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[19] One of the difficulties with time use surveys is that the time has to add to 24 hours a day. As childcare and many other household tasks are achieved by multi-tasking, the substitution between parental care and formal ECEC care shows up only as a small reduction in the time allocated to childcare by working mothers compared to non-working mothers.

opportunity cost method based on a person's wages rate). The change in non-market production is not taken into account in the modelling estimates in chapter 16.

# J.4 Modelling the longer term impacts

There are two main sources of longer-term impacts. Those arising from:

1. changes in the workforce participation rates (and productivity) of women over their lifetimes due to the change in participation while their children were young;

2. child development impacts.

Both have an economic (income) and a social dimension. Although there is also potentially an even longer-term impact through the effect on fertility, it would probably take a much greater change than the recommended policy changes and is not discussed further.[20]

## Longer-term labour market effects for mothers

The cost of childcare and the number of hours of care to which subsidies apply affect the number of hours of work as well as the decision about whether to work. While these decisions directly affect current income, they can also affect longer-term income by changing the probability of working and hours worked once children no longer need childcare, and by changing the wages the mother is likely to earn. As the wage that can be earned will affect their decisions about work (along with other things such as household income, health, and other caring responsibilities) this is considered first.

### The effect of motherhood on wages

A number of studies have looked at what has been called the 'career costs of children' or wage penalty effect. A rough estimate of this cost is the gender wage gap, the difference in wages for full-time workers based on gender, which in Australia is estimated to be around 17 per cent (ABS 2014a). As noted above, empirical work by Cobb-Clarke and Barron (2010) suggested that for lower skilled workers, the gap can be largely explained by education and work experience, while for higher skilled workers this was not the case. Hence, both the lower levels of work experience, and other factors, such as working part-time, or choosing less challenging jobs, can be at play.

A study of Australian women — who in 1996-97 were working full-time and whose work history was known — found that:

> … earnings increase with each year of full-time experience, although the annual increment falls with each year of experience. In contrast earnings decrease with each year of part-time

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[20] The family-friendly policies of Scandinavian countries are often credited for their higher fertility rate than the rest of Europe.

experience, although at a decreasing rate. The estimated relationship between years not working and earnings remains negative and linear. (Chalmers and Hill 2007, p. 160)

Chalmers and Hill (2007) also estimated that part-time women workers in Australia lost around 6 per cent per year in earnings growth compared with those who had worked full-time. This loss accumulated to 49 per cent after 10 years, a result that was similar to those found in studies in the United Kingdom. For example, Olsen and Walby (2004) found that part-time workers annual earnings growth was lower by 4 per cent, cumulating to 34 per cent over 10 years.

There are three broad theories that explain these results:

- slower human capital accumulation, either because part-time workers have worked fewer hours, and/or part-time workers have less access to training or to more challenging work that would build their skills

- labour market segmentation, if part-time jobs inherently require less skill (are lower level), or where there is gender bias in jobs and in the perception of the market value of these jobs, even if there is no formal gender-based wage difference

- selection effects, where women choose more flexible and/or less challenging work due to the constraints of the gender division of household work; or where employers assume that women will be less productive due to their family duties and pay accordingly, or there are real or perceived costs associated with meeting more flexible work requirements (Cassells et al. 2009).

There is probably some validity in all these explanations and, in each, there can be aspects of discrimination. For example, Abhayaratna et al. (2008) reported ABS data that suggested part-time workers had lower access to training. The same study also found that there was labour market segmentation between full-time and part-time jobs, with a high rate of two-way transition between full- and part-time for low skilled jobs, but few transitions from high quality full-time to part-time jobs. However, there is Australian evidence to suggest that part-time workers are more rather than less productive, receiving a wage premium rather than discount (Day and Rogers 2013). And a recent survey by Ernst & Young (2013) found that workers with 'flexible' work arrangements (largely part-time, and mostly women), wasted less time while at work than their 'less flexible' (full-time) counterparts.

The reasons for women and part-time workers receiving lower wages is relevant to this study to the extent that changes in ECEC policy will change the 'career cost' of having children. Given the very high rate of part-time employment for Australian mothers, the impact of childcare from part-time employment and its duration is relevant to understanding the 'productivity' consequences of changes in ECEC policy.

A wage penalty is also found for women who return to work after maternity leave, with a number of studies finding that the penalty depended on the length of their leave. Using HILDA data, Baker (2011) estimated that, on average, wages growth for women was 7 per cent lower in the first year back, increasing to 12 per cent in the following year, and

was sustained for a decade or longer. However, in contrast to other findings on part-time employment, the slow-down in wages growth in the first year back was greater for women who returned to the same or more hours of work than those returning to fewer hours. Livermore, Rodgers and Siminski (2011), also using HILDA data, estimated that the unexplained motherhood penalty was around 5 per cent for one child and 9 per cent for two or more children, and that this arose from slower wages growth.

Thompson and Ben-Galim (2014) reported findings from a number of international studies of the wage penalty for mothers. They estimated that mothers earn around 11 per cent less than women without children. They also reported on the impact of availability and affordability of childcare on workforce participation, concluding that at least 30 hours a week of subsidised childcare was required to support high levels of maternal employment.

The longer-term impact of changes in the ECEC policy on wages growth can be estimated by projecting the workforce participation of women in, say, ten years time, and applying an estimate of wages growth as a function of the higher immediate participation rates. This is the approach taken by PwC in their study of the costs and benefits of early education and care in the United Kingdom (PwC 2004). They assumed that there would be a lifetime increase in the earnings of mothers of 3 per cent for those enabled to work full-time, and 1 per cent for those enabled to work part-time while their children were aged 1 to 7 years. Multiplying this by the estimated increase in workforce participation resulting from their proposed ECEC investment resulted in a 0.2 per cent increase in the United Kingdom's GDP in 2020.

An outer envelope estimate of the long-term effects from higher workforce participation by women can be made by estimating the contribution to the economy that would arise if women had the same workforce participation, and labour productivity (wages) as men. Cassells et al. (2009) estimated that the cost to the economy of the gender wage gap in 2009 was $93.4 billion. Of this 7 per cent was due to labour force history, 5 per cent to vocational qualification, 25 per cent to industry segregation, 3 per cent to firm size and 60 per cent to being female. This implies that the additional long term impact on GDP through ECEC enabling greater workforce participation for mothers (and hence adjusting labour force history) is around $6.5 billion in 2009 dollars.

## Longer-term labour market effects from ECEC's impact on child development

There can be long-term benefits from ECEC for some children that play out over their lifetime in terms of higher educational attainment and workforce attachment. These can be a result of the direct effect of receiving ECEC and flow-on from a reduction in poverty for those families where ECEC services enable the family to earn a higher income. Most studies of the long-term labour market gains for programs that target disadvantaged children have focused on the employment impact of reducing child poverty (for a summary see McLachlan et al. (2013)).

There are a few studies that have looked at the long-term labour market (and other) impacts of child development. The best known of these studies are cost-benefit analyses of specific ECEC interventions for targeted groups of children. They are discussed in chapter 5, and some caution about the portability of these findings to Australia is raised. Nevertheless, it is still worth looking at the methodology applied to estimating the long-term result of ECEC on child development outcomes.

The most well-known of these studies are based on the Perry Preschool Program in America in the 1960s. As described in chapter 5, the now adult children who participated in the program had higher rates of completing school, gaining a college education, being employed, and lower rates of incarceration than a matching group in the population who did not participate in the program. It is the estimation of impacts from this type of analysis that provides the parameters for modelling the expected impacts of similar programs. However, the relevance of these and results from similarly targeted interventions to Australia and to the policy changes proposed is highly questionable — the Perry Preschool program was an intensive intervention involving both home-based and preschool interventions in a poor African-American community. That said, while these results,  are most likely to be relevant for highly disadvantaged urban communities, the ECEC policy changes will not provide as comprehensive a program of assistance as the Perry Preschool Program. Hence, extrapolating parameters from this study for Australia is likely to greatly overstate the impact of the recommended reforms. The gains to higher ECEC attendance, even for children with additional needs, are likely to be more modest and contingent on subsequent educational and employment opportunities.

Continued access to quality education services and later to employment opportunities are very important for maintaining the advantages of a good start through high quality ECEC services. Moving families out of poverty means they are more likely to provide these types of opportunities for their children. However, for families that remain highly disadvantaged, multiple interventions may be required to ensure good life outcomes. A current research program at The Brooking Institute is examining the factors affecting children's life chances in the United States. A recent paper by Sawhill and Karpilow (2014) highlighted the importance of good early childhood education and care for disadvantaged children, but it also demonstrated that maintaining the impact required multiple interventions over the whole childhood period. The findings from that study suggest that extrapolation of improvements in child development from the ECEC investment alone to life time outcomes cannot be done without assessing the likely access to ongoing assistance (and its cost).

PwC (2004) estimated for the United Kingdom that the average impact on the lifetime income for children as a result of a proposed increase in investment in ECEC was 0.4 per cent of GDP in 2020 for an investment made in 2004. This estimate came from the assumption that children who received a preschool education increased their earnings by an average of 3 per cent. These benefits are calculated for a 65 year period with benefits starting from the age of 20 years. They only applied to children who would not otherwise have attended preschool (from the age of 3 years). The study pointed out that the gains

were likely to be greater for children from disadvantaged families (citing estimates from US-based studies of lifetime earning being higher by 5 to 10 per cent as a result of ECEC programs), and less for children from more affluent backgrounds. They did not assume an effect on employment, rather they assumed that 78 per cent would be employed (reflecting the projected workforce participation rates).

PwC (sub DR.684) estimated three sources of long-term impacts from child development outcomes (as a result of a 5 per cent decline in ECEC costs. The first long-term impact was an 'echo' effect on workforce participation of those children whose mothers were induced to participate in the labour force. As a result, these children attend ECEC services which the PwC modelling assumed resulted in these children having a 3.5 per cent higher than average probability of being employed after the age of 20. If the average employment rate is 70 per cent, with one child per mother attending ECEC, this 'echo' for the cohort of 15 000 mothers induced into increasing their labour supply would raise employment by 386 people.

The second long-term impact estimated by PwC arose from an improvement in the quality of ECEC services, which flowed through into productivity growth. They noted that even small increases in productivity growth rates can have major impacts on GDP when maintained for a long period of time. Based on PwC's estimate of a productivity 'uplift' of 0.013 per cent from 2030 on a base productivity growth rate, the Commission calculates this would mean that GDP would be higher by 0.26 per cent in 2050. That there is an impact on productivity from an improvement in the quality of ECEC services from the current high quality levels is highly uncertain. Further, as discussed in chapter 5, while preschool has been found to raise the literacy and numeracy levels of primary school aged children, with the exception of disadvantaged children there is no evidence to support long-term impacts on educational outcomes as a result of ECEC attendance.

The third source of long-term impact estimated by PwC was from increasing the ECEC attendance of children from disadvantaged or vulnerable backgrounds. While a long-term impact on employment (and with this lower fiscal costs of welfare transfers), and reduced 'regrettable' expenditures, is a probable outcome of higher ECEC attendance for this group of children, estimating the size of this outcome for Australia is difficult in the absence of Australian-based evidence. As PwC acknowledged, the impacts estimated for comprehensive interventions in highly disadvantaged communities in the United States are unlikely to apply. While PwC chose the lowest benefit-cost ratio of the three studies they cited, this choice is still likely to overstate the benefits for Australia and underestimate the costs, as these targeted interventions involved considerably more intervention and assistance than just having children from disadvantaged backgrounds attend 'mainstream' ECEC services (chapter 5).

This discussion of the PwC submission (sub. DR684) highlights the need for caution in estimating the long-term impacts of any change in ECEC services. It also illustrates the importance of developing better evidence for Australia on the outcomes for children over time from attending ECEC services.

## Other longer-term impacts from ECEC services

Better education and labour market outcomes among children for whom ECEC made a difference have a number of flow-on effects. One of the most important, for social and economic reasons, is on health.

High quality ECEC services can have direct effects on the mental and physical health for children from highly disadvantaged backgrounds through providing them with better nutrition and greater access to other human services, including health services. While this raises costs to government(s) in the short-term, it can mean a healthier life for them and lower longer term costs to governments. This is because the flow-on effect of better health to better educational and employment outcomes also has a longer-term impact on health. For example, it has been estimated for the United States that every year of education lowers mortality risk by 0.3 percentage points (Cutler and Lleras-Muney 2010). So, to the extent that attending ECEC services promotes healthier children, there are 'spillovers' over time. This includes spillovers from a more productive workforce and from lower demand for (government funded) health services.

The other longer-term impact from participation in ECEC services that has been noted in various studies is the effect on criminal behaviour and anti-social activity. This is only associated with interventions in communities where high rates of disadvantage means there is a higher probability of children growing up to engage in, or be exposed to, these behaviours. Hence, any longer-term benefits from reductions in criminal and anti-social activities will be due more to investments in  ECEC (and other complementary investments) in more disadvantaged communities than would arise from government investment in ECEC services more generally.

While studies of the impacts of child poverty often include the short-term fiscal savings on child-related interventions (for example, Bramley and Watkins (2008)), it is difficult to attribute longer-term effects on health and criminal activity to an ECEC investment alone. While aiming to improve ECEC services for children in highly disadvantaged communities, the policy changes recommended by the Commission are relatively modest and only focused on the ECEC component, so it would be drawing a long bow to include these longer term impacts in any cost-benefit analysis of the Commission's policy proposals.

# J.5    Bringing it all together

Table J.4 summarises the data needed to undertake a comprehensive cost-benefit analysis on the effect of the Commission's ECEC reform proposals.

Although the core data for the short-term impacts are the same as in table J.1, table J.4 also includes the offsetting or additional social service expenditure needed to estimate the total fiscal impact.

The modelling undertaken for this inquiry focuses on the immediate impacts of the change in out-of-pocket costs on using ECEC services and workforce participation. As discussed earlier, even this is a complex modelling task. The intermediate effects of these first round changes on the government's fiscal balance are also estimated, along with the number of families living below the poverty line.

However, the Commission's modelling does not take into account the effect of response in the supply of ECEC services (which is implicitly assumed to change to meet demand at existing prices). This is reasonable where supply is highly responsive to changes in demand.

Nor does the modelling take account of second and subsequent round effects, notably the adjustment in the labour market, which depends on the responsiveness of labour demand to the change in labour supply and shifts in demand for ECEC workers and other services over time. These are expected to be relatively small, given that Australia is a small open and fairly flexible economy. Nevertheless, the GDP estimates should only be considered indicative, as in reality the effects will be complex and (even if included in the models) the parameters are subject to ongoing change making the results inherently uncertain.

The Commission's modelling also does not consider the longer-term implications of the change in workforce participation on the future wages of mothers, nor of the longer-term outcomes for children who might otherwise have performed less well in school and (eventually) employment. The first of these impacts are likely to be a more substantial omission than the latter, which is highly contingent on ongoing access to quality educational opportunities.

Finally, the Commission's modelling does not include longer-term social or health impacts that could arise if the recommended change in ECEC policy effectively targets children from disadvantaged communities with services that make a difference to their future. Much more information on (i) the current extent of unmet need, (ii) the costs of meeting needs, and (iii) complementary policies, is needed before any such assessment can be made.

## Table J.4    Data required for a full cost-benefit analysis of ECEC policy changes

| Impacts on: | Components | Short-term considerations | Long term considerations |
| --- | --- | --- | --- |
| Fiscal cost | • Childcare program cost<br>• Welfare payments<br>• Income tax expenditure and concessions<br>• Income tax revenue | • Quality standards and impact on costs and prices<br>• Supply of ECEC workers, wages and prices<br>• Any offsetting savings or additional costs from changes in the use of social services<br>• Income taxes on additional income and reductions in welfare payments associated with higher participation | • Effect on GDP and, hence, tax revenues<br>• Superannuation balances and pension costs<br>• Health costs<br>• Social program costs associated with childhood deprivation — future health and education costs, criminal activity |
| Household net income | • Gross income<br>• Transfer payments<br>• Income tax<br>• Out-of-pocket childcare costs<br>• Other employment-related expenses | • Effective marginal tax rate facing additional income arising from loss of transfers and work-related costs (including childcare)<br>• Labour responsiveness to hourly net wage<br>• Productivity level of labour and hourly wage that can be achieved | • Effect of higher participation during 'prime age' on worker's lifetime productivity<br>• Effect on labour force attachment and hours of work preference over time |
| GDP | • Total hours worked in the economy<br>• Wages per hour worked | • Additional labour supply<br>• Additional demand for labour — in childcare, transport-related services, household work replacement services<br>• Deadweight losses of raising tax revenue opportunity cost of alternative government expenditure | Net effect on human capital supply:<br>• Hours of labour supply<br>• Productivity of labour that had higher participation rates<br>• Productivity gains from child development outcomes (very long term) |
| Non-market production | • Childcare services<br>• Household services | • Substitution with informal childcare (grandparents, friends)<br>• Changes in non-childcare household activities associated with additional hours of work | • Child development effects<br>• Health effects |
| Community wellbeing | • GDP<br>• Non-market production<br>• Leisure | • As above<br>• Changes in leisure associated with additional hours of work | Social attitudes:<br>• empowerment of women<br>• changes in workplace practices |