



KPMG Econtech

Measuring the Impact of the Productivity Agenda

Final Report

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ADVISORY

Inherent Limitations

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The findings in this report are subject to unavoidable statistical variation. While all care has been taken to ensure that the statistical variation is kept to a minimum, care should be taken whenever using this information. This report only takes into account information available to KPMG Econtech up to the date of this report and so its findings may be affected by new information. Should you require clarification of any material, please contact us.

The findings in this report have been formed on the above basis.

Third Party Reliance

This report is solely for the purpose set out in the contract between the Department of Education, Employment and Workplace Relations and KPMG dated 20 November 2009.

This report has been prepared at the request of the Department of Education, Employment and Workplace Relations in accordance with the terms of KPMG Econtech's Work Order dated 20 November 2009. Other than our responsibility to the Department of Education, Employment and Workplace Relations, neither KPMG Econtech nor any member or employee of KPMG Econtech undertakes responsibility arising in any way from reliance placed by a third party on this report.

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In the course of our work, projections have been prepared on the basis of assumptions and methodology which have been described in our report. It is possible that some of the assumptions underlying our projections may not materialise. Nevertheless, we have applied our professional judgement in making these assumptions, such that they constitute an understandable basis for estimates and projections. Beyond this, to the extent that certain assumptions do not materialise, then you will appreciate that our estimates and projections of achievable results will vary.

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Executive Summary

Overview

The purpose of this report is to quantify the potential contribution of the Government's participation and productivity reform agenda in education, employment and workplace relations (the Productivity Agenda) to labour productivity, the labour force participation rate and the Australian economy. It is a quantitative analysis of the benefits that can be expected from successful delivery of the national reform agenda.

The Productivity Agenda involves a broad approach that aims to lift national productivity and build social inclusion through reforms to early childhood, secondary and tertiary education, employment and workplace relations. This reform agenda involves the establishment of national reform targets, supported by policy and program initiatives that are developed, negotiated and monitored through partnerships between the Australian Government and the States and Territories. The policy goal is to drive partnership initiatives that will contribute to addressing the economic challenges facing the Australian economy, such as those posed by global competition and major demographic changes, by boosting productivity growth and participation in the workforce, which would, in turn, support an increase in living standards.

Initial modelling of the potential contribution of the reforms was undertaken by the Productivity Commission in 2006. This Report seeks to complement and extend that analysis, having regard to the progress that has been made since that time in setting targets and articulating the strategies that are to be used to achieve those targets. This extended analysis incorporates, as far as practicable, the latest quantitative targets from the Council of Australian Governments (COAG), new initiatives in key reform dimensions (including the Government's response to the Bradley Higher Education review, child care rebate increases, commitments in early childhood development and paid parental leave) as well as more recent empirical evidence.

KPMG Econtech has examined key elements of each stream of the reform agenda, together with domestic and international evidence, to develop reliable estimates of the impact that achievement of the reform targets would have on individual cohort and economy-wide labour productivity levels and labour force participation rates. These estimates are then used as inputs into a macro-economic model to determine Gross Domestic Product (GDP) and employment estimates.

This report models the benefits of the national reform agenda targets being achieved and finds that these benefits are substantial. There are two factors that should also be taken into account when fully assessing the national reform agenda.

- First, this report shows the benefits if all targets are met. This report does not assess the relationship between policies and their associated targets.
- Second, the estimation of costs is outside of the scope of this report. The net benefit of the policies would need to be ascertained by subtracting such an estimate of the costs from the benefits estimated in this report.

When considering the results, it should be noted that all complex modelling requires assumptions and therefore calls for care in interpretation. The report has a time horizon of 2010 to 2070. The modelling is most robust up to the period 2040, and margins of uncertainty around estimates become larger beyond that. The report includes preliminary sensitivity analysis

around key parameters where there may be some scope for different interpretations of the evidence or literature. As noted above, there will be some interaction between the reforms. This is particularly relevant when examining the results for the Early Childhood and the Schools and Higher Education reforms.

The headline finding of the report is that, if all of the reform targets are achieved, the reform agenda will contribute a substantial gain in employment and the growth potential of the Australian economy. This gain will continue into the future. The following benefits are estimated as a result of achieving the reform targets.

- During the period 2010 to 2024, GDP is expected to be 4.1 per cent higher than the baseline level over the same period that would have been expected to occur in the absence of achieving the reform targets.
- The economic benefits continue to build after 2025, such that during the period 2025 to 2040, GDP is expected to be 8.6 per cent higher than the baseline level in the absence of achieving the reform targets.
- Over the period 2010 to 2040, GDP is expected to be 6.2 per cent higher than the baseline, which translates to an additional \$108 billion (2008/09 prices) average annual gain in the economy, relative to the baseline.
- During the period 2010 to 2024, employment is expected to be 2.6 per cent higher than the baseline level of employment that would have been expected to occur in the absence of achieving the reform targets.
- The employment benefits of the reform continue to build up after 2025, such that during the period 2025 to 2040, employment is expected to be 5.7 per cent higher than the baseline level of employment in the absence of achieving the reform targets.
- Over the period 2010 to 2040, employment is expected to be 4.0 per cent higher than the baseline, which translates to an additional 526,000 jobs on average per year in the economy.
- Beyond 2040 additional GDP impacts are expected, as the full contribution of a number of key elements of the reforms - namely those in early childhood and some elements of education - build up their benefits over several decades. These additional impacts are projected to increase the impact on GDP further. GDP is expected to be 20.1 per cent higher than the baseline GDP forecast by 2070, when the economy has fully adjusted to the reforms. This is equivalent to a 0.31 percentage point gain in the annual average GDP growth rate. This represents a substantial gain in the size of the Australian economy compared to the baseline level in the absence of achieving the reform targets.

On this basis, the KPMG Econtech estimates of the contribution of the long run impacts for each of the individual elements of the reform agenda and the overall anticipated benefits for the 2025-2040 period are summarised in Table 1.

Table 1: Average long run impact on key macroeconomic variables (2025-2040)

Reform	GDP (% deviations)	Employment (% deviations)
Early Childhood	0.9%	1.9%
Schools	0.9%	0.5%
Tertiary (Bachelor+)	1.7%	0.8%
Tertiary (Cert III-Adv Dip)	2.6%	1.2%
Participation – Child Care Rebate	0.2%	0.2%
Workplace – Paid Parental Leave	2.2%	1.1%
Combined	8.6%	5.7%

Source: KPMG Econtech.

In interpreting the results in Table 1, it should be taken into account that this report does not estimate or allow for the cost of the reforms.

Early childhood reforms have an educational dimension and therefore have a link with achieving targets for the schools and tertiary education reforms. Their benefits may therefore have been captured to some extent in our modelling of those schools and tertiary education reforms. Recognising this link, while also recognising the broader non-educational benefit, has led us to report the benefits of each reform separately and add them together, to provide an aggregate figure.

The Logic of the Productivity and Participation reforms and the Modelling

Current domestic and international evidence tells us that people with more skills are: able to undertake more complex and dynamic tasks; more adaptable to the changing needs of the economy; and more able to respond to problems and develop innovative solutions. These people are more likely to be employed and are more productive when they are employed.

The extension of this is that reforms to early childhood, secondary and tertiary education, skills, labour force participation and workplace characteristics are important to making essential positive contributions to Australia's productivity and participation rates, and play a central role in economic growth.

The reforms considered in this report are part of a broad reform agenda. The agenda is supported by a range of current policy and program initiatives. The COAG structures and processes envisage that, as new approaches are identified, further strategies and programs be identified and negotiated. In this report, KPMG Econtech models the gross benefits of achieving key reform targets and these components are shown to provide a positive contribution to Australia's labour force participation rate and productivity level. Further, complementarity between the reforms means they will build upon one another. For instance, the capacity of individuals to attain tertiary qualifications is related to the skills and capacities that they learn in early childhood and at school.

In terms of the benefit derived, the evidence indicates that each element of the reform operates within a particular population group but, as individuals move through the life course, the reforms start to work in combination. Improvements in early childhood development mean that

a child is likely to have improved learning capability and socialisation, thus increasing an individual's likelihood of benefiting from improved quality and access to secondary and tertiary education, or vocational training. In turn, improved skill and education levels improve employability.

It is also important to recognise that different elements of the reform will also deliver benefits in different time frames. Impacts of the paid parental leave (workplace) and child care rebate (participation) reforms will be felt immediately, while the impacts of the early childhood and education reforms will build up over time. These reform impacts will build up gradually over time as beneficiaries of the reforms enter the labour force and will reach their full extent once the current young cohorts have completely replaced older cohorts in the labour force. The modelling addresses the contributions of the individual reform elements, over the period 2010 to 2024, and the period of 2025 to 2040. The modelling also projects the benefits out to 2070, once the economy has fully adjusted to the reforms.

This report uses KPMG Econtech's demographic model to assess how achievement of the reform targets affect, and cumulate over, successive population cohorts. The analysis of the reforms is based on evidence that more highly skilled people have higher productivity when in work and are more likely to seek and secure work. The demographic model results are then used to generate the contributions to labour productivity and labour force participation arising from the Productivity Agenda. These combined participation and productivity benefits are then used as inputs in KPMG Econtech's macro-economic model to determine the potential impact on employment and GDP.

Essentially, the logic of the modelling is that by increasing Australia's labour force participation rate and productivity level, Australia will essentially receive more 'bang for our buck' from our labour force, allowing higher levels of production and creating greater job opportunities.

The modelling seeks to project the aggregate benefits that could be expected from the current and future human capital strategies. As noted above, this report models the potential productivity, GDP and employment benefits of successful delivery against the targets in the national human capital policy agenda, before accounting for costs.

The assumptions and estimates that have been adopted in the modelling process are based on the best available information and research, and analysis of that information. It is recognised that assumptions require judgements and that there is some uncertainty regarding the degree to which the literature can be applied with absolute confidence across the target cohorts of the reforms. As indicated by the sensitivity analysis provided, the adoption of alternative assumptions could of course lead to higher or lower estimates, although KPMG Econtech regards the assumptions and estimates that have been applied as reasonable and appropriate for modelling the potential contributions of the elements of the reform agenda discussed in this report. Appendix 1 summarises the main assumptions used in this report.

Additionally, throughout the report preliminary sensitivities (typically $\pm 10\%$ or $\pm 20\%$) are presented for the key parameters on which either modelling assumptions have been made, or on which there is some uncertainty around benchmark estimates. More comprehensive sensitivity analyses would be a topic for future, more detailed, research.

Results for Each Reform Stream

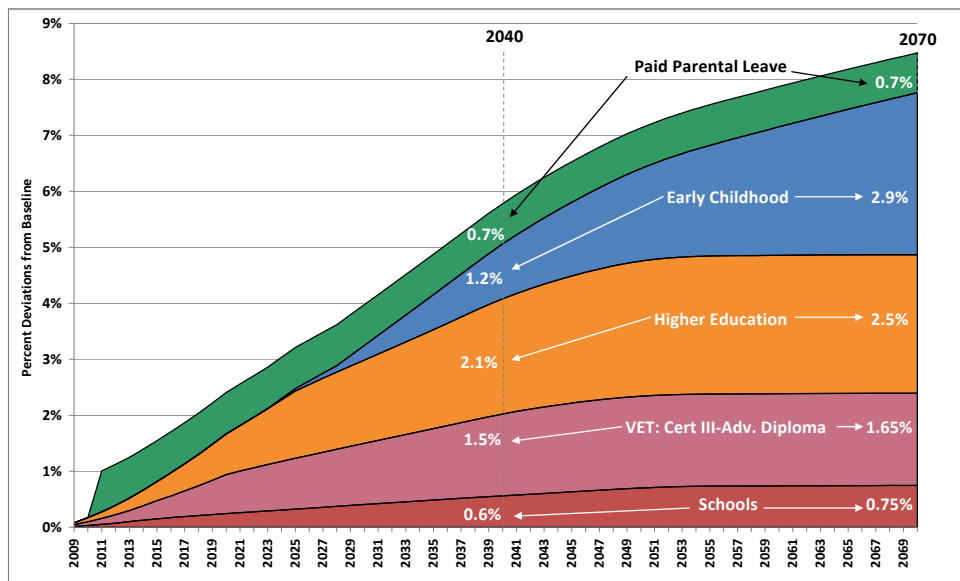
Charts 1 and 2 below summarise the potential labour productivity and participation gains up to the year 2070 associated with achieving the targets under each reform area, before allowing for the cost of the reforms. These contributions have been translated into the headline figures on the GDP and employment growth impacts presented above in Table 1. In summary, for the period up to 2040, it is estimated that the combined impact of all the reforms modelled could potentially contribute to a:

- 6.1 per cent gain in Australia’s labour productivity; and
- 3.8 percentage point gain in labour force participation rate.

Beyond 2040, further positive benefits flow, primarily as a result of the early childhood and education reform elements, and the projected gains by 2070 are:

- 8.5 per cent gain in productivity; and
- 6.1 percentage point gain in labour force participation rate.

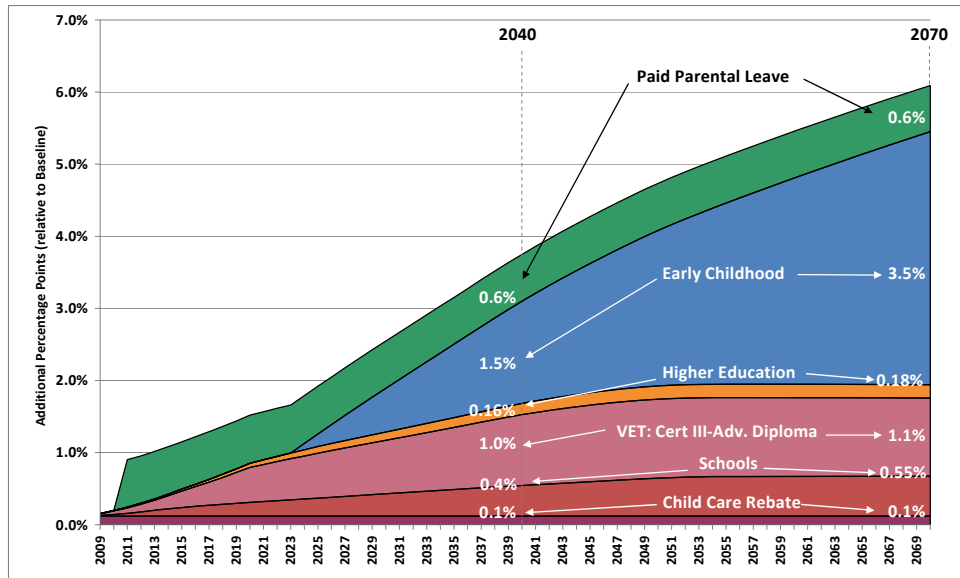
Chart 1: Contributions to gains in labour productivity levels



Source: KPMG Econtech.

Note that early childhood reforms may work together with schools and tertiary reforms to achieve targets. We have reported the benefits of each reform separately and added them together, to provide an aggregate figure.

Chart 2: Contributions to gains in labour participation rates



Source: KPMG Econtech

Note that early childhood reforms may work together with schools and tertiary reforms to achieve targets. We have reported the benefits of each reform separately and added them together, to provide an aggregate figure

The modelling assumptions and impacts in each individual reform domain are summarised hereunder.

Early Childhood Reforms Contribution

The early childhood reform agenda aims to increase the quality and level of use of early childhood services. International evidence from the Perry program shows increased use of early childhood services results in gains in labour productivity rates and participation levels through increased Year 12 completion and increased tertiary attainment.

Before allowing for costs, during the period from 2010 to 2024, productivity and participation gains associated with early childhood reforms are estimated to potentially contribute to economy-wide gains of:

- 0.3 per cent gain in GDP; and
- 0.5 per cent gain in employment.

During the period from 2025 to 2040, productivity and participation gains associated with early childhood reforms are estimated to potentially contribute to economy-wide gains of:

- 0.9 per cent gain in GDP; and
- 1.9 per cent gain in employment.

Over the period 2010 to 2040 this translates to, on average, a 0.57 per cent annual gain in GDP above current expectations (baseline), representing, on average, an additional \$9.9 billion (2008/09 prices) annually in the economy.

These economy-wide gains are derived from the estimated impact of the early childhood reforms on the participation rate and labour productivity. For the period up to 2040, KPMG Econtech estimate improvements from the early childhood reforms build to a:

- 1.5 percentage point gain in the participation rate; and
- 1.2 per cent gain in labour productivity.

The impact of the reforms would also continue to build after 2040, as illustrated in Charts 1 and 2. The full impacts of the early childhood reforms in 2070 are projected to be:

- 3.5 percentage point gain in the participation rate; and
- 2.9 per cent gain in labour productivity.

Parallel to the early childhood reforms, as well as the child care rebate, there is an undertow of reforms targeting quality improvements in the provision of early childhood services. This study has not considered the interaction of elements of these reforms and at some point in time, there will need to be significant policy choices made regarding the costs and benefits of these reforms.

Schools Reform Contribution

The fundamental target underpinning the schools reform agenda is to increase Year 12 completion rates to 90 per cent by 2015, on the basis of evidence suggesting that increased educational attainment would in turn increase the skill level of the average Australian worker and potentially generate medium to longer term economic gains.

Before allowing for costs, during the period from 2010 to 2024, if the schools reforms modelled in this report achieve their target, KPMG Econtech estimate they could contribute to economy-wide gains of:

- 0.4 per cent gain in GDP; and
- 0.2 per cent gain in employment.

During the period from 2025 to 2040, if the schools reforms modelled in this report achieve their target, KPMG Econtech estimate they could contribute to economy-wide gains of:

- 0.9 per cent gain in GDP; and
- 0.5 per cent gain in employment.

Over the period 2010 to 2040 this translates to, on average, a 0.65 per cent gain in GDP annually above current expectations (baseline), representing, on average, an additional \$11.3 billion (2008/09 prices) annually in the economy.

For the period up to 2040, KPMG Econtech estimate improvements from the school reforms build to a:

- 0.4 percentage point gain in the participation rate; and
- 0.6 per cent gain in labour productivity.

The impact of the reforms would also continue to build after 2040, as illustrated in Charts 1 and 2. The full impacts of the school reforms in 2070 are projected to be:

- 0.55 percentage point gain in the participation rate; and
- 0.75 per cent gain in labour productivity.

Tertiary Reform Contribution

The tertiary reform agenda has a number of different dimensions. One core element is increasing the proportion of the 25 to 34 year old cohort with a bachelor qualification, or higher, to 40 per cent by 2025. Further, Vocational Education and Training (VET) reforms include halving the proportion of Australians aged 20 to 64 without Certificate III qualifications or above. The consensus of research into this area, as well as evidence from Australian data, supports the view that an increase in higher education and VET qualifications will generate gains in both Australia's long-term labour productivity and labour force participation rate. As with the schools reform agenda, the intention is to increase the skill level of the average Australian worker and potentially generate economic gains. This will be essential to a successful transition to a high skilled economy and in offsetting the challenges faced by an ageing population.

Before allowing for costs, during the period from 2010 to 2024, productivity and participation gains associated with the tertiary reform agenda are estimated to potentially contribute to economy-wide gains of:

- 0.8 cent gain in GDP through increased higher education;
- 0.4 per cent gain in employment through increased higher education;
- 0.9 per cent gain in GDP through increased VET; and
- 0.5 per cent gain in employment through increased VET.

During the period from 2025 to 2040, productivity and participation gains associated with the tertiary reform agenda are estimated to potentially contribute to economy-wide gains of:

- 1.7 per cent gain in GDP through increased higher education;
- 0.8 per cent gain in employment through increased higher education;
- 2.6 per cent gain in GDP through increased VET; and
- 1.2 per cent gain in employment through increased VET.

Over the period 2010 to 2040 tertiary reforms generate, on average, a 2.9 per cent gain in GDP annually above current expectations (baseline), representing, on average, an additional \$50.3 billion (2008/09 prices) annually in the economy.

By 2040, the tertiary reforms modelled in this report are estimated build to additional contributions of:

- 0.16 percentage point gain in the participation rate through increased higher education;
- 2.1 per cent gain in labour productivity through increased higher education;
- 1.0 percentage point gain in the participation rate through increased VET; and
- 1.5 per cent gain in labour productivity through increased VET.

The impact of the reforms would also continue to build after 2040, as illustrated in Charts 1 and 2. The full impacts of the tertiary reforms in 2070 are projected to be:

- 0.18 percentage point gain in the participation rate through increased higher education;
- 2.5 per cent gain in labour productivity through increased higher education;
- 1.1 percentage point gain in the participation rate through increased VET; and
- 1.65 per cent gain in labour productivity through increased VET.

Participation – Child Care Rebate Contribution

The participation reform agenda includes reforms to employment services and measures to increase labour force participation of women and participation in education, training and employment by young people.

The key reform discussed in this report is the Child Care Rebate (CCR). This reform proposes a payment from the government to assist working families with the cost of childcare. From 1st July 2004, 30 per cent of out-of pocket expenses of up to \$4,000 per child per annum were refunded in 2005-06 tax returns. In July 2008, the CCR was increased from 30 per cent of out-of pocket expenses of up to \$4,000 per child per annum to 50 per cent of out of pocket expenses of up to \$7,778 per child per annum for families using approved childcare services. This rebate could reduce the cost of child care services and increase use, encouraging women to rejoin the labour force. Evidence from Australian data indicates the introduction of the Child Care Rebate has increased women's, thus overall, labour force participation.

Before allowing for costs, during each of the periods from 2010 to 2024 and 2025 to 2040, productivity and participation gains associated with the Child Care Rebate reforms are estimated to potentially contribute to economy-wide gains of:

- 0.2 per cent gain in GDP; and,
- 0.2 per cent gain in employment.

Over the period 2010 to 2040 this translates to, on average, a 0.2 per cent gain in GDP annually above current expectations (baseline), representing, on average, an additional \$3.5 billion (2008/09 prices) annually in the economy.

As shown in Chart 2, the Child Care Rebate reforms modelled in this report are estimated to contribute a 0.1 percentage point gain in the participation rate.

Workplace – Paid Parental Leave Contribution

Paid parental leave impacts on the workplace relations reform agenda. This report does not include a comprehensive coverage of the impacts of all the workplace relations reform agenda. Further information of workplace reforms can be found on the DEEWR website, and assessment of the impacts of these is the subject of more detailed work.

This element of the modelling is confined to consideration of the potential benefits of paid parental leave. International evidence, along with quantitative analysis conducted in this report, finds that paid parental leave could encourage women to rejoin or remain in the labour force, and could increase women's labour force productivity level and participation rate. Increased retention of skills and reduced turnover costs are also likely.

Further, as with all of the reforms considered in this report, the report only considers the gross benefits of paid parental leave – that is the benefits associated with this reform achieving gains in productivity and workforce participation. The net impact of the scheme can be determined by subtracting the costs of providing paid parental leave from these gross benefits.

During the period from 2010 to 2024, productivity and participation gains associated with the paid parental leave reform are estimated to potentially contribute to economy-wide gains of:

- 1.6 per cent gain in GDP; and
- 0.9 per cent gain in employment.

During the period from 2025 to 2040, productivity and participation gains associated with the paid parental leave reform are estimated to potentially contribute to economy-wide gains of:

- 2.2 per cent gain in GDP; and
- 1.1 per cent gain in employment.

Over the period 2010 to 2040 this translates to, on average, a 1.9 per cent gain in GDP annually above current expectations (baseline), representing an additional \$32.7 billion (2008/09 prices) annually in the economy.

For the period up to 2040, the paid parental leave reform modelled in this report is estimated to contribute gains of:

- 0.6 percentage point gain in the participation rate; and
- 0.7 per cent gain in labour productivity.

These impacts are constant across time and remain the same through to 2070.

1 Introduction

The education, employment and workplace relations agenda (the Productivity Agenda) is a reform agenda that could potentially generate significant impacts on the Australian economy.

The main objective of the Productivity Agenda is to support higher Australian living standards in the face the challenge of an aging population and other economic challenges. As Australia's population ages over the coming decades, the rise in the aged dependency ratio will significantly affect Australia's economic performance. The Productivity Agenda also aims to improve living standards in Australia, with a specific emphasis on improving the outcomes of low Socio-Economic-Status (SES) groups. The reform agenda aims to achieve these objectives by helping Australia transition to a highly skilled economy, thereby raising Australia's labour productivity and labour force participation rate.

The Productivity Agenda is a broad ranging approach in raising Australia's labour force productivity level and participation rate. This report quantifies the key components of the reform agenda that are amenable to economic modelling. Specifically, this report will discuss:

1. Early Childhood;
2. Schools;
3. Tertiary Education;
4. Workplace; and
5. Participation.

KPMG Econtech was commissioned by the Department of Education, Employment and Workplace Relations (DEEWR) to model the effect of these reforms on labour productivity, labour force participation, employment and GDP. This report uses qualitative discussions and quantitative modelling to determine the impacts of achieving the targets associated with these reforms. These impacts are presented in terms of a contribution to Australia's labour productivity and labour force participation rate. KPMG Econtech's macroeconomic forecasting model (MM2) was then used to estimate how these productivity and participation impacts flow through to affect Australia's economic performance.

This report models the benefits of the national reform agenda targets being achieved and finds that these benefits are substantial. There are two factors that should also be taken into account when fully assessing the national reform agenda.

- First, this report shows the benefits if all targets are met. This report does not assess the relationship between policies and their associated targets.
- Second, the estimation of costs is outside of the scope of this report. The net benefit of the policies would need to be ascertained by subtracting such an estimate of the costs from the benefits estimated in this report.

When considering the results, it should be noted that all complex modelling requires assumptions and therefore calls for care in interpretation. The report has a time horizon of 2010 to 2070. The modelling is most robust up to the period 2040, and margins of uncertainty around estimates become larger beyond that. The report includes preliminary sensitivity analysis around key parameters where there may be some scope for different interpretations of the evidence or literature. As noted above, there will be some interaction between the reforms. This

is particularly relevant when examining the results for the Early Childhood and the Schools and Higher Education reforms.

The remainder of this report is structured as follows.

- Section 2 provides a review of literature and assesses the contribution of each reform to Australia's labour productivity and labour force participation rate;
- Section 3 discusses the approach taken to estimate the impact of these reforms on key macroeconomic variables in the Australian economy and summarises the results arising from the modelling exercise;
- Appendix 1 summarises the main assumptions used in this report; and
- Appendix 2 presents detailed information about MM2 (the main model used).

Throughout the report, preliminary sensitivities (typically $\pm 10\%$ or $\pm 20\%$) are presented for key parameters on which either modelling assumptions have been made, or on which there is some uncertainty around the benchmark estimates.

2 Assessing the Contribution to Labour Productivity and Labour Force Participation

This section will discuss each of the reform streams covered in this report. It will discuss each reform stream in turn and determine the contribution that each of the reforms considered will make to Australia's labour force productivity level and participation rate. This section will outline any assumptions made in this report and draw on a range of domestic and international evidence, along with quantitative analysis, to reach its conclusions.

2.1 Early Childhood

The agenda for early childhood services and child care (as outlined by DEEWR) focuses on providing Australian families with high-quality, accessible and affordable integrated early childhood services and child care.

Key Reforms¹

1 National Quality Framework for Early Childhood Services and Care

- The National Quality Framework seeks to deliver a higher standard of care for children in the critical areas of education, health and safety and will provide clearer and comprehensive information for families. The reform includes:
 - *A new National Quality Standard* to help services provide the best possible level of early childhood services and care by being clear about the factors that best support a child's development;
 - *a Quality Rating System* to enable families to assess information on the quality of their childcare service, while also encouraging improvements in the quality of such services; and
 - *Early Year Learning Framework*.

2 Early Childhood Services - Universal Access

- The Australian Government is committed to ensuring that every child has access to a quality early childhood services program.

3 Indigenous Early Childhood Development National Partnership

- The COAG Indigenous Early Childhood Development National Partnership Agreement recognises there are significant differences in life experiences and outcomes between Indigenous and non-Indigenous children. Closing these gaps is a priority for the Australian Government. The Australian Government provides funding for a range of early childhood initiatives to assist Indigenous families and give their children a good start in life.

¹ As stated in <http://www.deewr.gov.au>.

The initiatives outlined above may have important implications for the early childhood system in Australia and potentially generate long-term economic gains. The following discussion aims to identify how these reforms could contribute to Australia's labour force productivity level and participation rate, and how this could potentially generate economic growth.

Increased use and quality of preschool childcare services increases lifetime outcomes for children and hence provides overall economic gains (Heckman, 2000). Heckman's² work in this area emphasises the view that early childhood learning sets the scene for improved outcomes of later life education and improved lifetime outcomes. "Skill begets skill; learning begets learning"³. These improved lifetime outcomes include both benefits to the individual from increases in education and increased incomes, as well as flow-on social benefits in terms of reduced crime rates and reduced welfare burden.

Generally, the impacts of childhood education on the economy are not felt for many years. There is a long time lag between pre-school and entering the labour force. During this time many other events or influences can occur. Thus, it can be difficult to quantify the impact of early childhood reforms on labour force participation and lifetime outcomes.

One of the most comprehensive and widely referenced longitudinal studies into early childhood services is the Perry program (Michigan, U.S.A.). This program examines the impact of early childhood intervention on education and early adult employment rates by comparing a treatment group with a control group without early childhood intervention. Results show an increase in high school completion of 18 per cent, an increase in college attendance of 17 per cent and an increase in early adult workforce participation rates of 18 per cent. These are perhaps the most rigorous results indicating that early childhood services do increase labour force participation and labour productivity through increased education. Results vary and another study, the Carolina Abecedarian study, shows marginally significant increases in employment participation amongst the treatment group.⁴ In line with Productivity Commission (2006) and Department of Education, Science and Training (2006), this report uses results from the Perry program study. In addition to our benchmark calculations, $\pm 20\%$ adjustments to the Perry program results are used as preliminary sensitivities, since there is uncertainty in the literature regarding the underlying parameter values.

The Perry program study is widely used as a key source of empirical evidence on the impact of early childhood interventions. The study is recognised for having used a rigorous and robust methodology. It conducts a full longitudinal tracking of its participants throughout their lives, and uses robust statistical estimation techniques. In addition, the study focuses on a disadvantaged sector of the population, consistently with the target group of the early childhood reforms discussed in this report.

On balance, empirical evidence on the impact of early childhood reforms from longitudinal studies suggests some increase in educational achievement especially for disadvantaged children and thus long-term improvements in labour force participation and labour productivity amongst this group.

² James Heckman, Nobel Laureate in Economics

³ Flavio Cunha and James Heckman, Investing in our young people, p67, at www.news.uchicago.edu/releases/06/061115.education.pdf

⁴ Productivity Commission (2006), Table 12.1, p 239.

This report shows the benefits if the early childhood reforms achieve their aims of universal access. The goal of universal access is to provide early childhood services to all who want to use it. This will provide early childhood services to those previously unable to access them and encourage increased use amongst disadvantaged sections of the population.

The Perry program resembles the Australian Early Childhood reforms in that both programs target low SES groups and aim to increase service quality and access. This report estimates the impact on labour productivity and labour force participation if the Australian Early Childhood reforms achieve results in line with the Perry program results and increases the use of early childhood services to disadvantaged sections of the population. This is in line with the Productivity Commission (2006) conclusions.

The following discussion will draw on the Perry program results, along with population data for Australia, to determine the contribution to Australia's labour force participation rate. It will then discuss the potential gains to Australia's labour force productivity level, through increased early childhood services flowing on to increased school and tertiary attainment rates, leading to higher skilled and more productivity workers.

Contribution to Labour Force Participation– Early Childhood

The early childhood reform agenda aims to reduce gaps in childcare provisions between different SES groups and allow universal access to childcare services. Higher income families are less likely to face budget constraints that will affect their decision to use childcare. Accordingly, it is reasonable to assume the impact of the early childhood reforms will primarily be felt by families with below average incomes, although higher quality services will potentially benefit all children.

SES groups are typically ranked by quintiles. By definition, the lowest two quintiles are constituted by households with below average income. Given that the reforms target low SES groups, we have made a conservative assumption that the early childhood reforms impact these bottom two quintiles (lowest 40 per cent) of the income distribution. The 40 per cent weighting is then applied to the labour force participation increase derived from the Perry program results. The assumption is that the reforms target the lowest two quintiles (lowest 40 per cent) of the population.

The impact on labour force participation is based on the Perry program results. The Perry program finds increased labour force participation rates amongst the disadvantaged children who participated in the program. In line with this, the modelling in this report assumes that children in the current 0-5 year age cohort, who have parents from the lowest 40 per cent of the income distribution, will benefit from an 18 per cent increase in labour force participation rates later in life.

As Table 2.1 shows, applying an 18 per cent increase in labour force participation rates to 40 per cent of the population generates an increase in labour force participation of 7.2 per cent across the Australian population. This increase will begin to impact the labour force as the current 0-5 year age cohort enters the labour market. The full impact on the labour force will not be felt, until the current young cohorts completely replace older cohorts who will not directly benefit from the reforms.

Table 2.1: Increase in labour force participation for current 0-5 year age cohort upon entering the labour market.

	Increase in cohort labour force participation	Share of cohort impacted	Per cent increase in cohort labour force participation (0-5 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Early Childhood	18%	40%	7.2%	5.9%	3.5%

Source: KPMG Econtech

The 7.2 per cent increase in the 0 to 5 age cohort translates into a 5.9 per cent increase in the overall working age population (15 to 64) labour force participation rate. This occurs as the impact on the overall working age population is moderated by two factors, to which we now turn.

1) **Realisation Age:** The increase in participation in the labour force generated by early childhood reforms is likely to be realised between the ages of 15 to 25, as people in the cohort gradually join the workforce (the upper age limit would correspond to people who pursue tertiary education). This report assumes (as the median assumption) the impact on participation rates is realised from the age of 20. This implies that for people who join the labour force between the ages of 15 and 19, the gains to participation have not yet realised, and so this proportion of the working age population is unaffected by the increase in labour force participation rate.

2) **Migration:** The impact on the overall working age population is further reduced by migration into Australia. Migrants who enter Australia and join the labour force will not have been beneficiaries of the reforms and will reduce proportion of the working age population directly affected by the reforms.

These two factors explain the drop from 7.2 per cent to 5.9 per cent.

The 5.9 per cent increase in the above table translates into a 3.5 percentage point increase in the level of the participation rate, as shown in Chart 2 The current expected participation rate in 2070 is 59.3. A 5.9 per cent increase is equivalent to a 3.5 percentage point increase in the participation rate ($59.3 \times 1.059 = 62.8$; $62.8 - 59.3 = 3.5$), bringing the labour force participation rate up to 62.8 per cent.

Sensitivity Analysis:

Similar calculations to those shown above reveal that an adjustment of $\pm 20\%$ to the benchmark Perry program estimate of 18% increase in labour force participation rate on the 0-5 age cohort generates the following results.

Sensitivity: -20%	Increase in cohort labour force participation	Share of cohort impacted	Per cent increase in cohort labour force participation (0-5 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Early Childhood	14%	40%	5.8%	4.7%	2.8%

Source: KPMG Econtech

Sensitivity: +20%	Increase in cohort labour force participation	Share of cohort impacted	Per cent increase in cohort labour force participation (0-5 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Early Childhood	22%	40%	8.6%	7.1%	4.2%

Source: KPMG Econtech

From these preliminary sensitivities, it follows that there is an approximate ± 0.7 percentage point band around the benchmark estimate of 3.5 percentage points increase in the labour force participation rate for the working age population (15-64 age cohort).

Parallel to the early childhood reforms, as well as the child care rebate, there is an undertow of reforms targeting quality improvements in the provision of early childhood services. This study has not considered the consequences of these reforms and at some point in time, there will need to be significant policy choices made regarding the costs and benefits of these reforms.

Contribution to Labour Productivity– Early Childhood

Increased early childhood services will have an impact on labour productivity by increasing lifetime educational achievement. This would occur through two mechanisms: increased labour productivity through increased school completion; and increased labour productivity through increased participation in higher education.

The Perry program results show there is an 18 per cent increase in school completion and a 17 per cent increase in higher education completion. Presently, Australia requires schooling up to the age of 15 years (equivalent to Year 10)⁵. Accordingly, it is assumed that completing Year 12 adds (on average) another 2 years of education. As a standard bachelor degree is 3 years, it is assumed finishing higher education adds another 3 years of education.

⁵http://www.dest.gov.au/sectors/school_education/publications_resources/other_publications/participation_in_post_compulsory_schooling.htm

Increase in school completion due to early childhood reforms

We now examine the effects that quality early childhood services have on productivity through higher school completion rates.

The Mincer equation⁶ for Australia shows that the expected increase in wages due to an additional year of education is around 8 to 12 per cent (see Attachment 1). The modelling in this report uses the bottom end of this range (8 per cent) to be conservative and avoid overstating the productivity returns from increasing education levels. This is because the higher wages earned by those with higher education levels may reflect other factors, rather than the education itself. This conservative assumption is justified, as there is some uncertainty regarding the degree to which the estimates from literature can be applied to the target populations of the reforms.

If education increases labour productivity, the wage premium given to extra years of schooling can be used as a proxy for labour productivity. This is an appropriate measure as higher wages are paid to more productive workers.

Changes in labour productivity due to higher education are now calculated. Multiplying the increase in Year 12 completions from the Perry Program (an additional 18 per cent), by the wage benefit to education (8 per cent per additional year of education) and by the increase in years of education (2 years), will give the increase in labour productivity due to an increased uptake of early childhood services. This gives an increase in labour productivity of 2.9 per cent due to higher school completion rates brought about by interventions in early childhood. This must then be weighed down by the share of people with low SES, similar to the labour force participation rate above (40 per cent, the lowest two quintiles). This gives a weighted increase of 1.2 per cent in labour productivity due to school completion amongst the 0-5 year age cohort when they enter the labour market. Table 2.2 details the calculation results.

Table 2.2: Increase in labour productivity due to increases in school completion resulting from early childhood reforms

	Increase in cohort year 12 completions (0-5 age cohort)	Additional years of education	Wages benefit on extra education (per annum)	Share of cohort impacted	Increase in cohort labour productivity	Increase in working age population labour productivity (15-64 age cohort)
School completion	18%	2	8%	40%	1.2%	0.95%

Source: KPMG Econtech

The 1.2 per cent increase in the 0 to 5 age cohort then translates into a 0.95 per cent increase in overall working age population (15 to 64) labour force productivity. The overall working age population is affected slightly less than the impact on the 0 to 5 age cohort, as the reforms are assumed to begin impacting productivity levels (through increased Year 12 completion) at the age of 20. As previously discussed (see discussion below Table 2.1), this means that for people who join the labour force between the ages of 15 and 19 the benefits of the early childhood reforms on productivity are not yet realised. Likewise, the impact on the overall working age population is further reduced by migration into Australia, as migrants who enter Australia and join the labour force will not have been beneficiaries of the reforms.

⁶ Mincer equation was developed by Jacob Mincer to model wages as a function of human capital

Sensitivity Analysis:

An adjustment of $\pm 20\%$ to the benchmark Perry program estimate of 18% increase in school completions for the 0-5 age cohort generates the following results.

Sensitivity: -20%	Increase in cohort year 12 completions (0-5 age cohort)	Additional years of education	Wages benefit on extra education (per annum)	Share of cohort impacted	Increase in cohort labour productivity	Increase in working age population labour productivity (15-64 age cohort)
School completion	14%	2	8%	40%	0.9%	0.76%

Source: KPMG Econtech

Sensitivity: +20%	Increase in cohort year 12 completions (0-5 age cohort)	Additional years of education	Wages benefit on extra education (per annum)	Share of cohort impacted	Increase in cohort labour productivity	Increase in working age population labour productivity (15-64 age cohort)
School completion	22%	2	8%	40%	1.4%	1.14%

Source: KPMG Econtech

These preliminary sensitivities imply an approximate band of ± 0.19 percentage points around the benchmark estimate of 0.95 per cent increase in labour productivity for the working age population (15-64 age cohort).

Increase in higher education due to early childhood interventions

We now examine the effects that quality early childhood service has on productivity through increased higher education completion rates.

Similar to the method used above for increased school education, an extension of the Mincer relationship is used to determine the impacts of increased higher education on labour productivity. Leigh (2008) estimates a wage benefit of 45 per cent for those with a bachelor degree relative to those without. This estimate has been weighed down by a further 10 per cent, to err on the conservative side. This results in a wage benefit on a bachelor degree of approximately 40 per cent relative to those without⁷.

Using the Perry program results, a 17 per cent increase in higher education results in a labour productivity increase of 6.8 per cent (17 per cent additional higher education completions x 40 per cent wage benefit). As this increase only applies to low SES populations (bottom 40 per cent of the income distribution), it is weighed down to an increase of 2.7 per cent in labour productivity due to higher education amongst the 0-5 year age cohort when they enter the labour market. Table 2.3 details the calculation results.

⁷ 40 % = 0.9*45 % (rounded to 40 %)

Table 2.3: Increase in labour productivity due to increases in higher education completion resulting from early childhood reforms

	Increase in cohort higher education attainment (0-5 age cohort)	Wage benefit on extra education (Bachelor)	Share of cohort impacted	Increase in cohort labour productivity	Increase in working age population labour productivity (15-64 age cohort)
Higher education completion	17%	40%	40.0%	2.7%	1.95%

Source: KPMG Econtech

The 2.7 per cent increase in the 0 to 5 age cohort then translates into a 1.95 per cent increase in overall working age population (15 to 64) labour force productivity. The overall working age population is affected slightly less than the impact on the 0 to 5 age cohort, as the reforms are assumed to begin impacting productivity levels (through increased tertiary attainment) at the age of 25. As previously discussed (see discussion below Table 2.1), this means that for people who join the labour force between the ages of 15 and 24, the benefits of the early childhood reforms on productivity are not yet realised. Likewise, the impact on the overall working age population is further reduced by migration into Australia, as migrants who enter Australia and join the labour force will not have been beneficiaries of the reforms.

Sensitivity Analysis:

A $\pm 20\%$ adjustment around the benchmark Perry program estimate of 17% increase in higher education completion for the 0-5 age cohort generates the following results.

Sensitivity: -20%	Increase in cohort higher education attainment (0-5 age cohort)	Wage benefit on extra education (Bachelor)	Share of cohort impacted	Increase in cohort labour productivity	Increase in working age population labour productivity (15-64 age cohort)
Higher education completion	14%	40%	40.0%	2.2%	1.56%

Source: KPMG Econtech

Sensitivity: +20%	Increase in cohort higher education attainment (0-5 age cohort)	Wage benefit on extra education (Bachelor)	Share of cohort impacted	Increase in cohort labour productivity	Increase in working age population labour productivity (15-64 age cohort)
Higher education completion	20%	40%	40.0%	3.3%	2.34%

Source: KPMG Econtech

These sensitivities imply an approximate band of ± 0.39 percentage points around the benchmark 1.95 per cent increase in labour productivity for the working age population (15-64 age cohort).

2.2 Schools Reforms

The schools reform agenda seeks to ensure that all Australian school students acquire the knowledge and skills to participate effectively in society and employment in a globalised economy. The schools reform agenda consists of a number of initiatives to lead Australia towards the COAG target of a 90 per cent Year 12 (or equivalent) attainment rate by 2015.⁸ The current rate of Year 12 or equivalent completion is 84.2 per cent⁹ (2008) amongst young cohorts. This means an additional 5.8 per cent of the current, and future, young cohorts population must obtain Year 12 or equivalent levels of education, to achieve the COAG target. The impact of increased schooling is well researched. It is expected that an increase in schooling will increase both Australia's long run labour productivity and labour force participation rate. The key reforms for this component of the Agenda are described below.

Key Reforms¹⁰

1 National Partnership on Youth Attainment and Transitions

- Funding to develop and consolidate a range of programs to commence from 1 January 2010, namely:
 - *Maximising Engagement, Attainment and Successful Transitions Program*: to support the implementation of reforms in areas of multiple learning pathways, career development and mentoring;
 - *School Business Community Partnership Brokers Program*: to improve community and business engagement with schools;
 - *Youth Connections Program*: to provide an improved safety net for young people at risk; and
 - *National Career Development*.

2 Compact with Young Australians

- COAG has agreed to a *Compact with Young Australians* policy to increase young people's engagement with education and training pathways. The reform comprises:
 - A National Youth Participation Requirement;
 - an entitlement to education or training places for 15 to 24 year olds; and
 - changes to Youth Allowance and Family Tax Benefit making education and training a precondition for these payments.

3 Digital Education Revolution

- To prepare students for further education, training and to live and work in the digital world:
 - Provide ICT equipment to schools and ICT support mechanisms;

⁸ This is one of three targets agreed by COAG and outlined in the National Education Agreement.

⁹ As stated in COAG Reform Council, National Education Agreement: Baseline Performance Report for 2008, 30 September 2008.

¹⁰ As stated in <http://www.deewr.gov.au> and <http://www.coag.gov.au>.

- support high-speed broadband connections;
- ensure that teachers have access to training in the use of ICT; and
- online curriculum resources and digital architecture.

4 Building the Education Revolution

- To provide world class educational facilities through new infrastructure and refurbishments.

5 Smarter Schools National Partnerships

- Implement practices that will deliver sustained improvement in literacy and numeracy outcomes for all students, especially those most in need of support;
- identify teaching performance and reward quality teaching;
- support education reform activities in low SES schools; and
- close the gap between educational outcomes of Indigenous Australians and other Australians.

6 Transparency Agenda

- *The National Assessment Program – Literacy and Numeracy*: students in years 3, 5, 7 and 9 to be assessed using national tests; and
- nationally comparable data for each school will be available online, including information about the type of school, student and staff numbers and results from national numeracy and literacy tests.

7 Development of a National Curriculum

- The Australian Curriculum, Assessment and Reporting Authority (ACARA) is currently developing a rigorous and internationally advanced national curriculum from Kindergarten to Year 12.

8 Closing the Gap in Indigenous Education

- COAG has also committed to two further targets as part of the reform agenda that aim to Close the Gap in educational attainment between Indigenous and non-Indigenous Australians. These include:
 - Halving the gap for Indigenous students in reading, writing and numeracy within a decade; and
 - at least halving the gap for Indigenous students in Year 12 or equivalent attainment rates by 2020.
- The targets will be supported by initiatives including: the Indigenous Education Action Plan; and The Closing the Gap in the Northern Territory National Partnership.

The initiatives outlined above may have important implications for Australia's labour force. The school reform agenda could increase the skill level of the average Australian worker and potentially generate long-term economic gains. The following discussion aims to identify how these reforms could contribute to Australia's labour force productivity level and participation rate, and how this could potentially generate economic growth.

Modelling the schools agenda

The potential impacts of the schools agenda on Australia’s labour force participation rate and labour productivity level are now discussed.

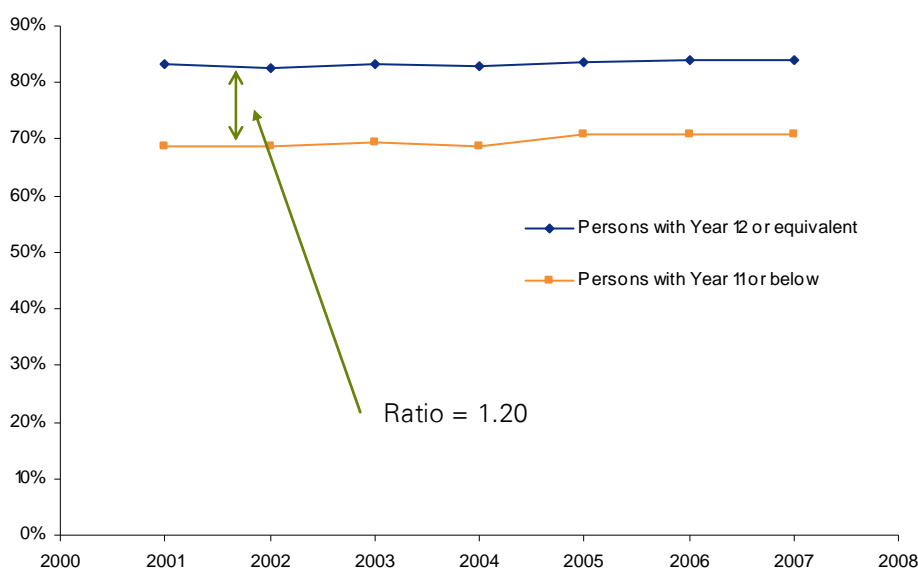
Rather than focus on specific components, this report focuses on the overall target of 90 per cent Year 12 or equivalent completion by 2015. This approach is used to identify the main objective of the reform and capture the impacts of the various components, to the extent that they contribute to achieving this target. However it is acknowledged that the reform agenda may achieve outcomes outside of increasing Year 12 or equivalent completions. For example, the reforms would also be expected to boost the quality and relevance of skills acquired (for example, by raising teaching standards and the digital education revolution). These indirect impacts have not been directly estimated in this report. However they are captured to the extent that they contribute towards the overall target and its contribution to increasing labour productivity and labour force participation.

The potential contributions to Australia’s labour force productivity and participation rate generated by increasing Year 12 or equivalent completions and the potential economic gains, are now discussed in turn.

Contribution to Labour Force Participation– Schools

Increasing the educational level of the population increases the proportion of highly skilled people. Evidence shows that higher skilled people generally have higher labour force participation rates. Higher skills can attract higher wages which increases the reward for working and increases the opportunity cost of not working. Participating in the labour force thus becomes more attractive for someone with higher skills relative to someone with low skills.

Chart 2.1: Labour force participation rates across time



Source: ABS 4102 Australian Social Trends, Table 1 Education and training, National Summary, 1997-2007

A time series of labour force participation rates in Australia reveals that people who completed Year 12 have 20 per cent higher labour force participation than people who did not (see Chart 2.1). This relationship has proved stable over time. We use this relationship to estimate the impacts of increased school completion on labour force participation rates.¹¹

To achieve the COAG target of a 90 per cent Year 12 or equivalent completion rate, the current school completion rate of 84.2 per cent will need to increase 5.8 percentage points. This means an additional 5.8 per cent of the current, and future, young Australian population must obtain Year 12 or equivalent levels of education, to achieve the COAG target.

The extra school finishers that make up the additional 5.8 per cent of the young Australian population with Year 12 or equivalent completion will have 20 per cent higher labour force participation rates than if they did not complete school. However, people already expected to complete school will be unaffected by the reforms to raise Year 12 or equivalent completion. Table 2.4 details the calculation results.

This increase will begin to directly impact the economy once these young cohorts enter the labour force and then continue to contribute to increased labour force participation into the future. The full impact will be felt once the current young cohorts completely replace older cohorts in the labour force.

Table 2.4: Increase in labour force participation rate resulting from schools reforms

	Extra school completions (20-24 age cohort)	Participation increase	Per cent increase in cohort labour force participation (20-24 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
School completion	5.8%	20%	1.2%	0.9%	0.55%

Source: KPMG Econtech

The 1.2 per cent increase in the 20 to 24 age cohort translates into a 0.9 per cent increase in the overall working age population (15 to 64) labour force participation rate. This occurs as the impact on the overall working age population is moderated by the realisation age of 20 and migration (see discussion below Table 2.1).

These two factors explain the drop from 1.2 per cent to 0.9 per cent.

The 0.9 per cent increase in the above table translates into a 0.55 percentage point increase in the level of the participation rate, as shown in Chart 2. The current expected participation rate in

¹¹ An alternative procedure would be estimate a statistical regression equation. This would take the labour force participation rate as its dependent variable, and educational attainment as one of its independent variables. Estimation of such a regression would require identification of other independent variables as well as use of an extensive dataset, such as HILDA (Household, Incomes and Labour Dynamics in Australia, which is a household-based panel dataset dating back to 2001. See <http://www.melbourneinstitute.com/hilda/>). This is a time-intensive exercise which lies outside the scope of this study. On the other hand, whilst acknowledging the limitations of the present analysis, the estimates we have used are population means using ABS data. This provides an added level of reliability that population samples (even as extensive as the HILDA dataset), do not possess. For added robustness, we provide sensitivity analysis on the 20% estimate after Table 2.4.

2070 is 59.3. A 0.9 per cent increase is equivalent to a 0.55 percentage point increase in the participation rate ($59.3 \times 1.009 \approx 59.85$; $59.85 - 59.3 = 0.55$).

Sensitivity Analysis:

A $\pm 10\%$ sensitivity around the benchmark 20% labour force participation increase generates the following results.

Sensitivity: -10%	Extra school completions (20-24 age cohort)	Participation increase	Per cent increase in cohort labour force participation (20-24 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
School completion	5.8%	18%	1.0%	0.8%	0.50%

Source: KPMG Econtech

Sensitivity: +10%	Extra school completions (20-24 age cohort)	Participation increase	Per cent increase in cohort labour force participation (20-24 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
School completion	5.8%	22%	1.3%	1.0%	0.61%

Source: KPMG Econtech

These sensitivities imply an approximate band of ± 0.05 percentage points around the benchmark 0.55 percentage point increase in labour force participation for the working age population (15-64 age cohort).

Contributions to Labour Productivity– Schools

The COAG goal of 90 per cent Year 12 or equivalent completion not only effects labour participation rates, but also labour productivity. The impact on labour productivity is now discussed. As schooling in Australia is currently compulsory until the age of 15 years (equivalent to Year 10)¹², it is assumed that finishing school adds (on average) another 2 years of education for those who do not complete Year 12.

The increase in labour productivity is calculated using the method previously discussed under early childhood reforms. This method multiplies the wage premium awarded for the extra years of schooling, by the educational increase in years (Leigh and Ryan). Table 2.5 details the calculation results.

¹²http://www.dest.gov.au/sectors/school_education/publications_resources/other_publications/participation_in_post_compulsory_schooling.htm

Table 2.5: Increase in labour productivity resulting from schools reforms

	Extra school completions	Extra years of education	Wage benefit per extra year	Increase in cohort labour force productivity (20-24 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
School completion	5.8%	2	8.0%	0.9%	0.75%

Source: KPMG Econtech

Achieving the COAG target of a 90 per cent rate of Year 12 or equivalent completions will increase labour productivity by 0.9 per cent, per cohort. This increase will materialise when the additional students with Year 12 qualifications enter the labour force. The increase in labour productivity will gradually increase over time (as more cohorts enter the workforce) until the time when younger cohorts have completely replaced older cohorts in the labour force. The 0 to 5 age cohort that benefits from the reforms will have 0.9 per cent higher productivity levels.

The 0.9 per cent increase in the 20 to 24 age cohort then translates into a 0.75 per cent increase in overall working age population (15 to 64) labour force productivity. The overall working age population is affected slightly less than the impact on the 20 to 24 age cohort, as the reforms are assumed to begin impacting productivity levels (through increased Year 12 completion) at the age of 20. As previously discussed (see discussion below Table 2.1), this means that for people who join the labour force between the ages of 15 and 19, the benefits of the schools reforms on productivity are not yet realised. Likewise, the impact on the overall working age population is further reduced by migration into Australia, as migrants who enter Australia and join the labour force will not have been beneficiaries of the reforms.

Sensitivity Analysis:

A $\pm 10\%$ adjustment around the benchmark 8% wage benefit per additional year of education generates the following results.

Sensitivity: -10%	Extra school completions	Extra years of education	Wage benefit per extra year	Increase in cohort labour force productivity (20-24 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
School completion	5.8%	2	7.2%	0.8%	0.67%

Source: KPMG Econtech

Sensitivity: +10%	Extra school completions	Extra years of education	Wage benefit per extra year	Increase in cohort labour force productivity (20-24 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
School completion	5.8%	2	8.8%	1.0%	0.82%

Source: KPMG Econtech

These sensitivities imply an approximate band of ± 0.08 percentage points around the benchmark 0.75 per cent increase in labour productivity for the working age population (15-64 age cohort).

The above discussion details the impact on Australia's overall population. However, this impact will differ significantly across jurisdictions and segments of the population. The increase in school completion will be primarily felt by children in the relatively lower SES bands. Children in higher SES bands generally have higher school completion rates and thus will be less affected by the reform.

Indirect impacts

Increased school completion rates are likely to lead to a range of indirect impacts, which are now discussed. A key indirect impact will be higher tertiary education levels generated from the higher completion rates. This is likely to provide an additional benefits to the Australian economy, by increasing labour productivity and labour force participation rates further. The indirect benefit depends on the link between school completion rates and tertiary education.

Evidence suggests there is a positive link. However, the modelling in this study, of the increase in tertiary education, will be based on Government targets. The link, between increased school completion and increased tertiary attainment, is captured to the extent that increased school completion contributes to the increased tertiary attainment target. The impacts of increased tertiary education on labour productivity and labour force participation rates are discussed further in the following section on tertiary reform.

2.3 Tertiary Education Reforms

In 2008, the proportion of 25 to 34 year old Australians with a bachelor or above qualification was approximately 32 per cent¹³. The *Transforming Australia's Higher Education System* agenda is aimed, amongst other things, at increasing this proportion to 40 per cent by 2025. Further, Vocational Education and Training (VET) reforms include halving the proportion of Australians aged 20 to 64 without Certificate III qualifications or above¹⁴. Similar to the schools reform agenda, this increase is essential to help Australia transition to a high skilled economy and offset the challenges faced by an ageing population.

The consensus of research into this area supports the view that an increase in higher education and VET qualifications will increase both Australia's long-term labour productivity and labour force participation rate. We use empirical estimates of the wage returns from these qualifications and of the expected numbers of people affected by the reforms to estimate an aggregate effect on labour productivity and labour force participation.

Details of the key reforms under this component of the Agenda are discussed below.

¹³ Source: Table 14, Australian Bureau of Statistics, Education and Work, Australia, May 2008

¹⁴ As stated in COAG Reform Council, National Agreement for Skills and Workplace Development: Baseline Performance Report for 2008, 30 September 2008.

Key Reforms¹⁵

1 *Productivity Places Program*

- Funds opportunities for job seekers and existing workers to gain or upgrade their skills and qualifications, and is a means to develop new partnerships between the Australian Government and state and territory governments in the delivery of VET qualifications.

2 *Transforming Australia's Higher Education System*

- The current cap on over enrolment will be raised from 5 to 10 per cent in 2010 and ultimately removed in 2012;
- from 2012, universities will be funded based on student demand;
- a national regulatory and quality agency for higher education will be established to carry out audits of standards and performance, quality assure international education, and provide for national consistency in regulatory arrangements; and
- focus on equal accessibility of tertiary education for all Australians.
 - Funding for quality teaching and research in regional Australia; and
 - working closely with the Indigenous Higher Education Advisory Council to improve higher education access and outcomes for Indigenous Australians.

3 *Green skills initiatives*

- *Skills for Carbon Challenge*: building the capacity of the tertiary education sector to supply the skills needed for workers and businesses to prosper in a low carbon economy; and
- *Clean Sustainable Skills Package*: providing training and apprenticeships to help Australians develop clean and green skills.

4 *Australian Apprenticeships Initiatives*

- *Apprentice Kickstart Bonus*: provides additional incentives for employers who take on a young person in a skills shortage trade between 1 December 2009 and 28 February 2010 or until 21,000 new Kickstart commencements occur during this period to counteract the impact of the global recession on Australian Apprenticeships commencements and retention;
- broadening of eligibility for the commencement and completion incentive to all employers of Australian Apprentices studying Diploma and Advanced Diploma qualifications (prior to 1 January 2010, these incentives were limited to only 51 qualifications); and

¹⁵ As stated in <http://www.deewr.gov.au> and <http://www.coag.gov.au>.

- *Supporting Adult Apprentices:* broadens eligibility from those aged 30 and over to those aged 25 and over. The initiative aims to encourage more adults in the workforce to undertake a trade apprenticeship by providing additional financial support in the first two years of the Australian Apprenticeship. The payment is directed either to the employer or the Australian Apprentice, depending on the actual wage paid to the Australian Apprentice.

5 Pre Apprenticeship Initiatives

- *Increased Pre-Apprenticeship Training Opportunities*, which provides \$20 million to state and territory governments to increase pre-apprenticeship training opportunities in traditional trades to provide a flow of suitable candidates for emerging traditional trade apprenticeship opportunities resulting from economic recovery.

The initiatives outlined above may have important implications for Australia's labour force. The tertiary reform agenda could increase the skill level of the average Australian worker and potentially generate long-term economic gains. The following discussion aims to identify how these reforms could contribute to Australia's labour productivity level and participation rate, and how this could potentially generate economic growth.

Modelling the Tertiary agenda

This report focuses on the targets of increasing the proportion of the population with bachelor or above qualifications to 40 per cent and halving the proportion of the population with below certificate III education. The potential impacts on Australia's labour force participation rate and labour productivity level are now discussed in turn. To the extent that the effects of boosting the quality and relevance of the skills (for instance in the green jobs agenda) are not captured by the overall targets, the modelling presented here does not capture them either.

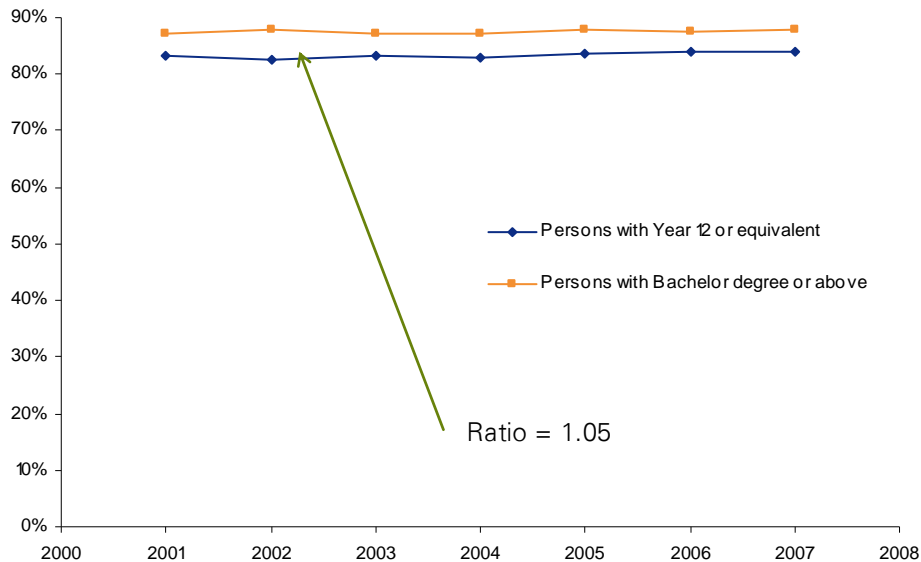
The potential contributions to Australia's labour productivity and participation rate generated by increasing tertiary education levels and the potential economic gains, are now discussed in turn. This report discusses two aspects of the tertiary reform agenda. First it discusses increasing higher education attainment and second it discusses Vocational Education and Training.

Higher Education

Contributions to Labour Force Participation – Higher Education

As discussed above, increasing education levels increases the number of high skilled workers. As high skilled workers tend to have higher average labour force participation, this effect increases the aggregate labour force participation rate.

Chart 2.2: Labour force participation rates across time



Source: ABS 4102 Australian Social Trends, Table 1 Education and training, National Summary, 1997-2007

A time series of labour force participation rates in Australia reveals that people who have a bachelor or above qualification have a labour force participation rate that is 5 per cent higher than people who have Year 12 qualifications (see Chart 2.2). This relationship has proved stable over time. This relationship is used to estimate the impacts of increased higher education completion on labour force participation rates.¹⁶

To achieve the Government target that 40 per cent of the 25 to 34 years age cohort will have bachelor or above qualifications by 2025, will require an increase of 8 percentage points from the current 32 per cent in 2008. This means an additional 8 per cent of the current, and future, 25 to 34 year old Australian population must obtain bachelor or above qualifications to achieve the COAG target.

The extra young cohorts that make up the additional 8 per cent of the 25 to 34 year old Australian population with bachelor degrees (or above), will have 5 per cent higher labour force participation rates than if they had only Year 12 qualifications. However, people already expected to obtain a bachelor qualification are assumed to be unaffected by the reforms (and thus impacts of the higher education reforms beyond increased labour force participation are not modelled here). Table 2.6 details the calculation results.

This increase will begin to directly impact the economy once this cohort enters the labour force and then continue to contribute to increased labour force participation rates into the future. The full impact will be felt once the current young cohorts completely replace older cohorts in the labour force.

¹⁶ The discussion under footnote 11 also applies to this estimate.

Table 2.6: Increase in labour force participation rate amongst the 25 to 34 year old cohort resulting from higher education reforms

	Increase in Bachelor degrees	Labour force participation increase	Per cent increase in cohort labour force participation (25-34 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Bachelor degree	8.0%	5.0%	0.4%	0.3%	0.18%

Source: KPMG Econtech

The 0.4 per cent increase in the 25 to 34 age cohort translates into a 0.3 per cent increase in the overall working age population (15 to 64) labour force participation rate. This occurs as the impact on the overall working age population is moderated by the realisation age of 25 and migration (see discussion below Table 2.1).

These two factors explain the drop from 0.4 per cent to 0.2 per cent.

The 0.3 per cent increase in the above table translates into a 0.18 percentage point increase in the level of the participation rate, as shown in Chart 2. The current expected participation rate in 2070 is 59.3. A 0.3 per cent increase is equivalent to a 0.18 percentage point increase in the participation rate ($59.3 \times 1.003 = 59.48$; $59.48 - 59.3 = 0.18$).

Sensitivity Analysis:

A $\pm 10\%$ sensitivity around the benchmark 5% labour force participation increase generates the following results.

Sensitivity: -10%	Increase in Bachelor degrees	Labour force participation increase	Per cent increase in cohort labour force participation (25-34 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Bachelor degree	8.0%	4.5%	0.4%	0.3%	0.17%

Source: KPMG Econtech

Sensitivity: +10%	Increase in Bachelor degrees	Labour force participation increase	Per cent increase in cohort labour force participation (25-34 age cohort)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Bachelor degree	8.0%	5.5%	0.4%	0.3%	0.20%

Source: KPMG Econtech

These sensitivities imply an approximate band of ± 0.01 percentage points around the benchmark 0.18 percentage point increase in labour force participation for the working age population (15-64 age cohort).

Contributions to Labour Productivity– Higher Education

As discussed above, achieving the Government’s higher education target will require an additional 8 per cent of the 25 to 34 year age cohort to obtain bachelor or above qualifications by 2025.

As a standard bachelor degree is three years, it is assumed that obtaining a higher education qualification adds 3 years of additional education.

A useful study was conducted by Leigh (2008), who estimated the wage benefits to different forms of education, such as Certificates, Diplomas and Bachelor Degrees, using a Mincer equation (see Attachment 2). Leigh also estimates the effects of education on the probability of positive earnings, that is on the probability of being employed. The estimates are made using the HILDA data set. Leigh’s estimates are chosen since they:

- Are derived from high quality and recent data;
- are estimated through a rigorous and robust statistical methodology;
- are corrected for upward bias;
- provide separate estimated effects for different levels of education; and
- are specific to Australia.

According to Leigh’s estimates, a bachelor degree is expected to increase an individual’s earnings by 45 per cent, compared to the situation where that same individual had no post-school qualifications. This estimate will be weighed down by a further 10 per cent, to err on the conservative side. This results in a wage premium on a bachelor degree of approximately 40 per cent relative to those without ($\approx 0.9 \times 45\%$, rounded to 40%)¹⁷.

The wage premium given to obtaining a bachelor degree is used as a proxy for labour productivity. This is justified on the basis that in a free market, worker productivity is closely correlated with wages. The increase in labour productivity is therefore measured by multiplying this wage premium by the additional 8 per cent of the 25 to 34 age cohort with a bachelor or above qualifications. Table 2.7 details the calculation results.

¹⁷ Leigh (2008) presents estimated wage benefits on both an annual and an hourly basis. This report uses the annual basis for the following reasons. First, the model used in this report (KPMG Econtech’s MM2), does not feature labour-leisure choice. As such, its labour productivity input is equivalent to an annual aggregate. Using hourly estimates would have required introducing an additional layer of modelling assumptions (particularly regarding the labour-leisure time allocation) which is unnecessary, given the availability of annual estimates. Second, hourly wage data is more prone to measurement error.

Table 2.7: Increase in labour productivity of the 25-34 year old cohort resulting from higher education reforms

	Increase in Bachelor degrees	Wages benefit on degree	Increase in cohort labour force productivity (25-34 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
Bachelor degree	8.0%	40%	3.2%	2.5%

Source: KPMG Econtech

Achieving the Government's bachelor or above qualifications target will impact on labour productivity once this age cohort enters the labour force, increasing as more highly skilled cohorts enter working age. The effect on the target cohort's productivity will gradually increase until it reaches 3.2 per cent, when the current and future 25 to 34 year old cohorts affected by the achievement of the targets have completely replaced older cohorts in the labour force.

The 3.2 per cent increase in the 25 to 34 age cohort then translates into a 2.5 per cent increase in overall working age population (15 to 64) labour force productivity. The overall working age population is affected slightly less than the impact on the 25 to 34 age cohort, as the reforms are assumed to begin impacting productivity levels (through increased bachelor completion) at the age of 25. As previously discussed (see discussion below Table 2.1), this means that for people who join the labour force between the ages of 15 and 24, the benefits of the tertiary reforms on productivity are not yet realised. Likewise, the impact on the overall working age population is further reduced by migration into Australia, as migrants who enter Australia and join the labour force will not have been beneficiaries of the reforms.

Sensitivity Analysis:

A $\pm 10\%$ adjustment around the benchmark 40% wage benefit on degree generates the following results.

Sensitivity: -10%	Increase in Bachelor degrees	Wages benefit on degree	Increase in cohort labour force productivity (25-34 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
Bachelor degree	8.0%	36%	2.9%	2.2%

Source: KPMG Econtech

Sensitivity: +10%	Increase in Bachelor degrees	Wages benefit on degree	Increase in cohort labour force productivity (25-34 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
Bachelor degree	8.0%	44%	3.5%	2.7%

Source: KPMG Econtech

These sensitivities imply an approximate band of ± 0.3 percentage points around the benchmark 2.5 per cent increase in labour productivity for the working age population (15-64 age cohort).

This impact on labour productivity will differ significantly across jurisdictions and segments of the population. The increase in higher education will be primary felt by those in relatively lower SES brackets. Those in higher SES brackets are generally already participating in higher education and thus will be less affected by these reforms.

Vocational Education and Training (VET): Certificate III-Advanced Diploma

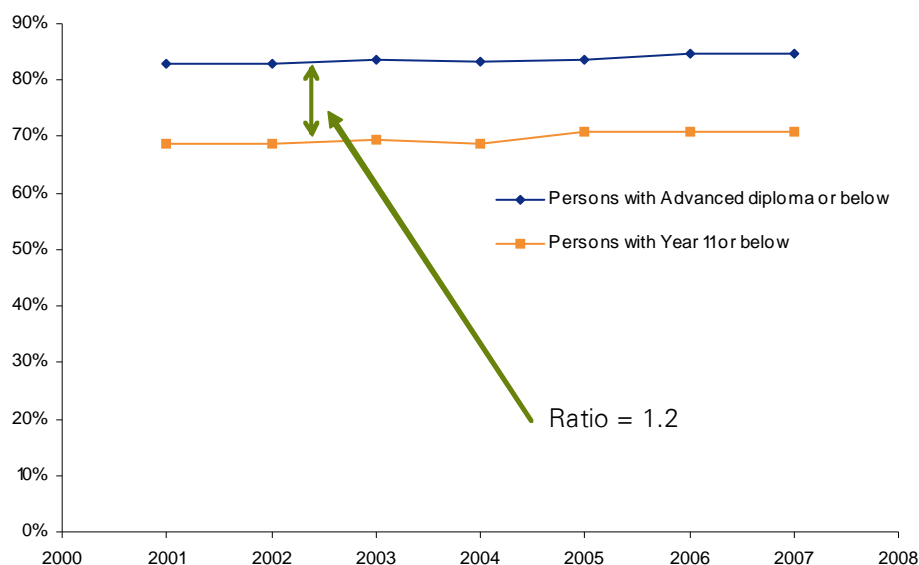
The COAG reform target for VET is to halve the proportion of the 20 to 64 year old population without Certificate III qualifications or higher. For the purposes of this report we have assumed that the main target is the 25 to 34 years age group. This is because it is this age group where we would expect to see the biggest increase in VET qualifications and because the available data does not lend itself to estimating the impact on the 20 to 64 year age group. Achieving the target for the 25 to 34 year old cohort would require an additional 11.8 per cent of the 25 to 34 year old cohort to obtain Certificate III-Advanced Diploma qualifications. This increase is found by reducing the current 39.8 per cent of the 25 to 34 age group without Certificate III or above by half, to 19.9 per cent. Deducting the additional targeted 8 per cent of the 25 to 34 year old cohort obtaining higher education qualifications (discussed above), leaves an additional 11.8 per cent of the population required to obtain Certificate III-Advanced Diploma qualifications to achieve the COAG reform target for VET.

This estimate of the additional population requiring Certificate III or above qualifications to achieve the COAG target is based on the best available information. However there is some uncertainty regarding the interaction between this reform target and the others, which could adjust the estimate upwards or downwards. Nevertheless, KPMG Econtech regards this estimate as reasonable and appropriate for modelling the potential contributions of the COAG reform target for VET.

Contributions to Labour Force Participation – VET

Similar to the method used above, the impact on labour force participation rates through increasing the proportion of the population with Certificate III-Advanced Diploma or equivalent education is found by examining the labour force participation rates over time. This report assumes that the increase in people with Certificate III-Advanced Diploma or equivalent qualifications comes from the pool of people with educational attainment of Year 11 or below.

Chart 2.3: Labour force participation rates across time



Source: ABS 4102 Australian Social Trends, Table 1 Education and training, National Summary, 1997-2007

As with school reforms, people with Certificate III-Advanced Diploma have labour force participation rates 20 per cent higher than those people who have not completed Year 12 (see Chart 2.3).¹⁸

Combining the above, the additional 11.8 per cent of the 25-34 year old population with Certificate III-Advanced Diploma or equivalent education will have 20 per cent higher labour force participation rates than if they did not finish Year 12. However, people already expected to obtain a Certificate III-Advanced Diploma or equivalent education will be unaffected by the reforms to raise the share of people with Certificate III-Advanced Diploma. Table 2.8 details the calculation results. The increase will impact the economy once this cohort enters the labour force and will continue to contribute to increased labour force participation rates into the future.

Table 2.8: Increase in labour force participation amongst the 25 to 34 year old cohort resulting from VET reforms

	Increase Certificate III-Advanced Diploma	Labour force participation increase	Per cent increase in labour force participation rate (25-34 age group)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Cert III-Adv Dip	11.8%	20.0%	2.4%	1.8%	1.1%

Source: KPMG Econtech

The 2.4 per cent increase in the 25 to 34 age cohort translates into a 1.8 per cent increase in the overall working age population (15 to 64) labour force participation rate. This occurs as the

¹⁸ The discussion under footnote 11 also applies to this estimate.

impact on the overall working age population is moderated by the realisation age of 25 and migration (see discussion below Table 2.1).

These two factors explain the drop from 2.4 per cent to 1.8 per cent.

The 1.8 per cent increase in the above table translates into a 1.1 percentage point increase in the level of the participation rate, as shown in Chart 2. The current expected participation rate in 2070 is 59.3. A 1.8 per cent increase is equivalent to a 1.1 percentage point increase in the participation rate ($59.3 \times 1.018 = 60.4$; $60.4 - 59.3 = 1.1$).

Sensitivity Analysis:

A $\pm 10\%$ sensitivity around the benchmark 20% labour force participation increase generates the following results.

Sensitivity: -10%	Increase Certificate III-Advanced Diploma	Labour force participation increase	Per cent increase in labour force participation rate (25-34 age group)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Cert III-Adv Dip	11.8%	18.0%	2.1%	1.6%	1.0%

Source: KPMG Econtech

Sensitivity: +10%	Increase Certificate III-Advanced Diploma	Labour force participation increase	Per cent increase in labour force participation rate (25-34 age group)	Per cent increase in working age population labour force participation (15-64 age cohort)	Percentage point increase in working age population labour force participation (15-64 age cohort)
Cert III-Adv Dip	11.8%	22.0%	2.6%	2.0%	1.2%

Source: KPMG Econtech

These sensitivities imply an approximate band of ± 0.1 percentage points around the benchmark 1.1 percentage point increase in labour force participation for the working age population (15-64 age cohort).

Contributions to Labour Productivity – VET

Using the same method described above, the impact on labour productivity is calculated using the average of Leigh's wage benefit estimate from Certificate III-Advanced Diploma degrees, 19.5 per cent. As before, this estimate is weighted down to err on the conservative side. This yields a figure of 18 per cent. The impact on labour productivity of the increased qualification level of the workforce is then calculated by multiplying the proportion of the cohort affected by the increased return. Table 2.9 details the calculation results.

Table 2.9: Increase in labour productivity of the 25-34 year old cohort resulting from VET reforms

	Increase Certificate III-Advanced Diploma	Wages benefit on extra education (VET)	Increase in cohort labour force productivity (25-34 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
Cert III-Adv Dip	11.8%	18%	2.1%	1.65%

Source: KPMG Econtech

Achieving the target will require an additional 11.8 per cent of the 25 to 34 year old cohort to obtain Certificate III-Advanced Diploma or equivalent qualifications by 2020. The effect of this increase on the productivity of the 25-34 age cohort will gradually build up until reaching 2.1 per cent, when the younger 25 to 34 year old cohorts have completely replaced the older cohorts in the labour force.

The 2.1 per cent increase in the 25 to 34 age cohort then translates into a 1.65 per cent increase in overall working age population (15 to 64) labour force productivity. The overall working age population is affected slightly less than the impact on the 25 to 34 age cohort, as the reforms are assumed to begin impacting productivity levels (through increased Certificate III-Advanced Diploma or equivalent completion) at the age of 25. As previously discussed (see discussion below Table 2.1), this means that for people who join the labour force between the ages of 15 and 24, the benefits of the tertiary reforms on productivity are not yet realised. Likewise, the impact on the overall working age population is further reduced by migration into Australia, as migrants who enter Australia and join the labour force will not have been beneficiaries of the reforms.

Sensitivity Analysis:

A $\pm 10\%$ adjustment around the benchmark 18% wage benefit per Certificate III-Advanced Diploma or equivalent degree completion generates the following results.

Sensitivity: -10%	Increase Certificate III-Advanced Diploma	Wages benefit on extra education (VET)	Increase in cohort labour force productivity (25-34 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
Cert III-Adv Dip	11.8%	16%	1.9%	1.48%

Source: KPMG Econtech

Sensitivity: +10%	Increase Certificate III-Advanced Diploma	Wages benefit on extra education (VET)	Increase in cohort labour force productivity (25-34 age cohort)	Increase in working age population labour productivity (15-64 age cohort)
Cert III-Adv Dip	11.8%	20%	2.3%	1.81%

Source: KPMG Econtech

These sensitivities imply an approximate band of ± 0.16 percentage points around the benchmark 1.65 per cent increase in labour productivity for the working age population (15-64 age cohort).

2.4 Participation – Child Care Rebate Reform

The Child Care Rebate reform is part of the employment, education and training participation reform agenda, which includes reforms to employment services and measures to increase labour force participation of women and participation in education, training and employment by young people. The key reforms under this stream are discussed below and this is then followed by a discussion of the potential impacts of the Child Care Rebate on labour force participation.

Key Reforms

Job Services Australia

In 2008, the Hon. Brendan O'Connor MP, then Minister for Employment Participation, instigated a review of the current employment services and their future direction. This review resulted in Job Services Australia, a \$4.9 billion investment by the Australian Government¹⁹. Job Services Australia replaced Australian Government employment services, such as Job Network, on the 1st July 2009. A review of the previous service found a need for change; to simplify, streamline, and improve the services and provide a greater emphasis on skills development and training.

Job Services Australia aims to:

- Provide more tailored assistance for job seekers;
- increase early assistance to disadvantaged job seekers;
- better meet the skills and needs of employers;
- enhance opportunities for work experience;
- introduce a more work-like compliance system; and
- streamline programs and processes.

Job Services Australia also represents a new focus on the needs of employers and promotes a greater emphasis on helping employers find work-ready job seekers.

Fundamentally, Job Services Australia aims to boost employment participation and the productive capacity of the Australian workforce by addressing skills shortage areas and better meeting the needs of employers.

However, as Job Services Australia has only recently been implemented and as the Australian economy weathers the global recession, more information is needed before a conclusion can be drawn and the size of impact from the introduction of Job Services Australia can be modelled.

¹⁹ www.deewr.gov.au/employment/JSA

Compact with Young Australians

In April 2009, the Council of Australian Governments (COAG) agreed to a Compact with Young Australians comprising a National Youth Participation Requirement, an entitlement to education or training places for 15 to 24 year olds, and changes to Youth Allowance and Family Tax Benefit making education and training a precondition for these payments.

The Compact with Young Australians policy is designed to address the following issues:

- Communicate the importance of education and training for young people;
- provide an education and training entitlement;
- ensure consistent standards for young people across Australia through a National Youth participation Requirement;
- help improve education and training and qualification levels; and
- strengthen conditions for some income support payments.

The Compact policy aims to increase the engagement of 15 to 24 year olds with education and training pathways. As part of this initiative the COAG target has been brought forward so that by 2015, 90 per cent of 20 to 24 year olds will have attained Year 12 (or equivalent).

The labour productivity and participation impacts of this initiative have been highlighted previously in the schools reform agenda (section 2.2 of this report). The schools reform agenda consists of a number of initiatives to lead Australia towards the COAG target of a 90 per cent Year 12 or equivalent educational completions rate by 2015.

Women's labour force participation: Early childhood reforms and Child Care Rebate

Earlier research for DEEWR shows couple families (where both parents were in the workforce) and sole parents were the most likely to use childcare. Further, female labour force participation has steadily increased in recent years, both for married women and sole parents (most of whom are women), with the largest increase in employment for parents with children under 5 years of age. Evidence suggests that use of childcare is increasing.

The following discussion on the impact of increasing women's participation rates identifies the potential economic gains that could arise through cost reductions in the use of childcare services.

Child Care Rebate

The Child Care Rebate (CCR) (formerly Child Care Tax Rebate, CCTR) is a payment from the government to assist working families with the cost of childcare.

From 1st July 2004, 30 per cent of out-of-pocket expenses of up to \$4,000 per child per annum were refunded in 2005-06 tax returns. In July 2008, the CCR was increased from 30 per cent of out-of-pocket expenses of up to \$4,000 per child per annum to 50 per cent of out-of-pocket expenses of up to \$7,778 per child per annum for families using approved childcare services²⁰.

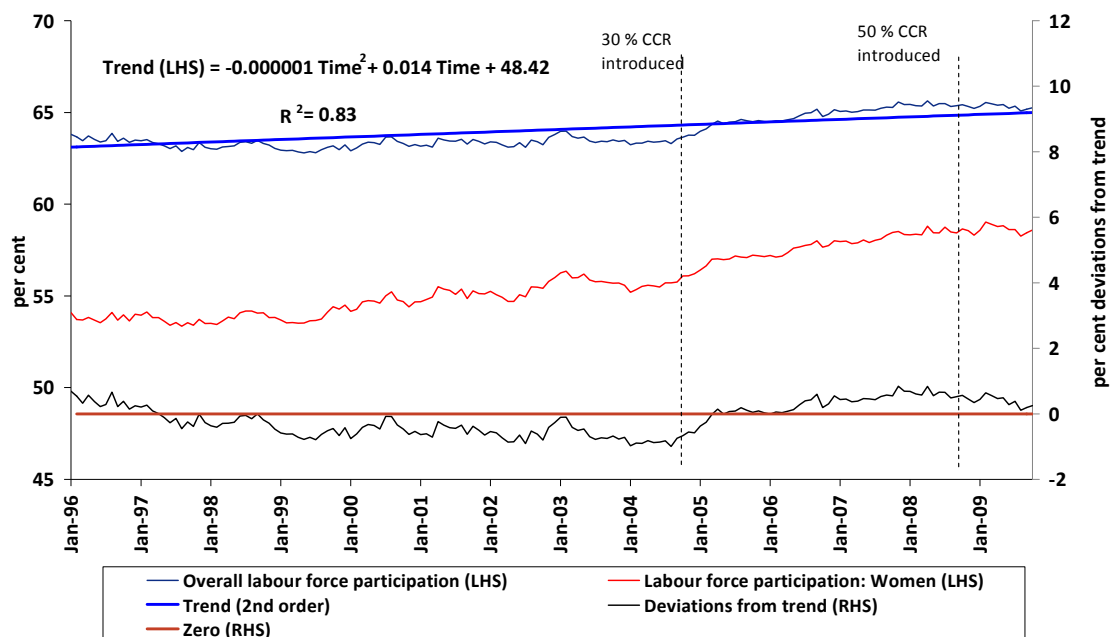
²⁰ As stated in Fact Sheet 10, <http://www.deewr.gov.au/EarlyChildhood/Resources/Pages/CCfactsheetkit.aspx>

As outlined above, evidence suggests that women’s participation rates are correlated with increased use of childcare. This correlation is examined further below.

Contribution to Labour Force Participation Rates – Child Care Rebate

The first step in examining the effect that the child care rebate had on labour force participation rates is to consider the change in labour force participation after implementation. Chart 2.4 displays total monthly labour force participation rates from January 1996 to October 2009.

Chart 2.4: Labour force participation rates over time



Source: Australian Bureau of Statistics: *Labour Force, Australia, October 2009* (Cat. No. 6202.0). Data are seasonally adjusted.

Of particular interest is the spike in the labour force participation rate occurring between mid 2004 to 2008 – roughly a 2-percentage point increase in the labour force participation rate. This timeframe is consistent with the implementation of the Child Care Rebate. This increase in labour force participation can be mostly explained by the increase in the labour force participation of females. As can be seen from the graph above, there is steep increase in women’s labour force participation.

When the policy was introduced in July 2004, the labour force participation rate for women was 55.7 per cent, seasonally adjusted. The second most recent labour force details show that women’s labour force participation rate was 58.5 per cent in December 2009 in seasonally adjusted terms, an increase of almost 2.8 percentage points. In contrast, the overall labour force participation rate was 63.5 per cent in July 2004 and has risen to 65.2 per cent. An increase of 1.7 percentage points. Given women currently make up approximately half the labour force, the increase in women’s participation rate accounts for the majority of the overall increase. This highlights the importance of women’s participation in explaining the current overall labour force participation rate.

It is also important to note that the increased labour force participation cannot be presumed to be entirely due to the introduction of the CCR, as there would have been other effects operating in parallel. Chart 2.4 also compares the labour force participation rate to the trend and shows deviations from the trend.

Comparing the labour force participation rate to the trend allows the portion of growth attributed to the trend growth to be separated out. The deviation from the trend is the maximum amount that can be attributed to the effects of the CCR. As the CCR was implemented in July 2004 and subsequently increased as of July 2008, it is important to consider these time periods separately. Between the policy's implementation in July 2004 and June 2008, the average deviation from trend was 0.18 percentage points. After the increase in rebate from July 2008, the average deviation from trend was 0.43 percentage points. The difference between the two averages is 0.24 percentage points, which could be interpreted as the maximum increase in labour force participation attributable to the latter policy. Since this increase could be due to several other factors, to be on the conservative side, we discount this amount by 50 per cent, which results in a 0.12 percentage points increase in labour force participation. The calculation results are detailed in Table 2.10 below.

Table 2.10: Increase in labour force participation

Time	Average deviation from labour force participation rate trend (% pts)
CCR (July 2004 - July 2008)	0.18
CCR (July 2008 - October 2009)	0.43
Difference in rates	0.24
Increase in labour force participation	0.12

Source: Australian Bureau of Statistics, Labour Force, 2009 and KPMG Econtech estimates.

Sensitivity Analysis:

A $\pm 10\%$ sensitivity around the benchmark 50% discount results in an increase in labour force participation ranging from 0.11 percentage points ($=0.45 \times 0.24$) to 0.13 percentage points ($=0.55 \times 0.24$).

2.5 Workplace – Paid Parental Leave

The paid parental leave reform impacts on the workplace relations reform agenda, which consists of a number of reforms²¹. The key reforms are discussed below and this is then followed by a more detailed discussion and modelling of the Paid Parental Leave reform and its potential impact on labour force participation and labour productivity.

Key Reforms

- 1 *Fair Work Act and establishment of Fair Work Australia.*
- 2 *Paid Parental Leave.*
- 3 *National Workplace Relations System.*

The contributions to labour productivity and labour force participation rates of the various reform components are summarised in the following table.

Reform	Economic impacts
<i>Fair Work Act and establishment of Fair Work Australia</i> (a) Setting minimum wages and award modernisation (b) Re-introduction of unfair dismissal laws (c) Industrial relations and the effects of unionisation within the workforce	<ul style="list-style-type: none"> • Overall, the empirical evidence is inconclusive and the impact of the Fair Work Act and FWA is likely to be difficult to isolate from other components of the Productivity Agenda. Moreover, as the reforms have only recently been implemented and as the Australian economy weathers the global recession, more information is needed before a conclusion can be drawn and the size of impact from these reforms can be modelled
<i>Paid Parental Leave</i>	<ul style="list-style-type: none"> • The estimated increase in the labour force participation rate for women in the 20-40 years age cohort is 0.6% points. See details below; and • the estimated increase in labour productivity is 0.7% for women in the 20-40 years age cohort.
<i>National Workplace Relations System</i>	<ul style="list-style-type: none"> • To be considered in a separate report commissioned by DEEWR (2010).

The above table summarises the impacts of the reforms on labour productivity and labour force participation rates. Paid parental leave is likely to increase the labour force participation rate of

²¹ Further discussion of the paid parental leave reform can be found in Productivity Commission (2009).

women in the 20-40 years age cohort by 0.6 percentage points and labour productivity of the same group by 0.7 per cent.

Paid Parental Leave

In the 2009-10 Budget, the government announced that it will introduce a paid parental leave scheme, to be available to parents for births and adoptions that occur on or after 1 January 2011. Parents will be able to lodge claims from 1 October 2010.

The scheme will provide 18 weeks of payments at the federal minimum wage (currently \$543.78 per week). In 2007, less than one quarter of women on very low wages had access to paid parental leave, compared to nearly three quarters of women on high wages.

Sources: <http://www.deewr.gov.au/WorkplaceRelations/Pages/Paidparentalleave.aspx> and http://www.deewr.gov.au/Ministers/Gillard/Media/Releases/Pages/Article_090512_183005.asp

The paid parental leave scheme will see parents guaranteed to receive a minimum payment. Receipt of this payment would be conditional on a number of eligibility requirements including the parent having a minimum of 10 months' of paid work in the 13 months prior to the expected date of the birth or adoption.²²

The introduction of paid parental leave is expected to have a number of impacts, with greater impacts for women. These impacts can be summarised as follows:

- An increase in labour force participation, especially for women, particularly prior to childbirth;
- a decrease in hours worked in the period immediately after childbirth;
- increased likelihood for mothers to return to the workforce after having children; and
- improved workplace efficiency resulting from greater workplace attachment.

The exact impact which the introduction of paid parental leave will have on the labour force is uncertain at this stage. Although there has not been a study into Australian parenting and paid leave, there have been a number of studies conducted internationally which give an indication of the likely impacts on employment and labour force participation in Australia.

Further, this analysis only considers the gross benefit of paid parental leave. A cost benefit analysis would need to be conducted to determine the net benefit of the reform. The estimated costs would then need to be deducted from gross benefits in order to calculate the net benefits of the reform.

Contribution to Labour Force Participation – Paid Parental Leave

Studies into the impact of the introduction of parental leave found that the behaviour of men was almost unchanged by the increased access to leave. However, a large number of studies found significant impacts on female workforce participation associated with improving access to both paid and unpaid maternity leave.

²² See <http://www.deewr.gov.au/WorkplaceRelations/Pages/Paidparentalleave.aspx>

Ronsen and Sundstrom (1996) found that women with access to paid leave were far more likely to resume employment and would resume employment sooner, after having children. Jaumotte (2003) conducted a study in 17 OECD countries and found that paid maternity schemes resulted in positive impacts on labour force participation rates for women aged 25-54 years (with diminishing returns on schemes longer than 20 weeks). A German study by Spiess and Wrolich (2006) using a behavioural microsimulation model found that paid maternity leave resulted in an increase in labour force participation rates for mothers from 36% to 39% in the second year after birth (an addition of 3 percentage points). Also, a study in Taiwan by Zveglic and van der Meulen Rodgers (2003) found that the introduction of a paid maternity scheme resulted in women's employment increasing by 2.5 percentage points, as well as increasing women's hours worked overall.

Considering the evidence available from international studies (for example, Spiess and Wrolich 2006 and Zveglic and van der Meulen Rodgers 2003), we estimate that the introduction of a paid parental leave scheme in Australia will lead to an increase in workforce participation of approximately 3 percentage points for women in the childbearing age bracket between the ages of 20 and 40. When weighted by this group's weight in the labour force (approximately 21 per cent²³), the overall contribution to labour force participation is an addition of 0.6 percentage points over baseline labour force participation (3 percentage points*21 per cent²⁴).

Sensitivity Analysis:

A $\pm 10\%$ sensitivity around the benchmark 3 percentage points increase in workforce participation for women in the childbearing age bracket between the ages of 20 and 40 results in estimates of the overall contribution to labour force participation ranging from 0.58 percentage points ($=3\% \text{ pts} * 21\% * 0.9$) to 0.69 percentage points ($=3\% \text{ pts} * 21\% * 1.1$).

Contribution to Labour Productivity – Paid Parental Leave

Increased attachment to the workforce for parents with new children should result in a number of subtle but important benefits which would improve labour productivity in the longer term. Lower staff turnover leads to lower costs for training new staff members. By the same token, new staff will be less productive while they are still learning a new job.

The available literature strongly suggests that the introduction of paid parental leave will increase overall workforce attachment. A Canadian study by Baker and Milligan (2008) found that any sort of leave entitlement increased job continuity with the pre-birth employer. A study by ten Cate (2003) into the introduction of mandated job-protected unpaid leave from 0 to 52 weeks in Canada led to an increase of between 2.8% and 3.6% in the employment rate for women whose youngest child is aged between 0 and 2 years. Waldfogel et al. (1998) found that maternity leave coverage increased the probability of a mother returning to work with the same employer within 12 months by 23% in the US and 16% in the UK. A similar study by Burgess et al. (2002) in the UK found the probability of a mother returning to the same job within 7 months was increased by 19%.

²³ ABS (2009), "Detailed Labour Force".

²⁴ $3\% \text{ points} * 21\% = 0.63\% \text{ points}$, rounded to 0.6 % points.

To quantify the labour productivity increase, note first that the proportion of women in the labour force of childbearing age (20-40 years) is approximately 21% of the labour force²⁵. The literature suggests that a paid maternity leave scheme will increase the probability of a mother returning to the same job by around 20%. That is, worker turnover will be reduced by 20%. We assume that the costs to train a new worker to fill a position are 1/12 of the wages for the position (that is, it takes a new starter on average one month to learn their job and become productive). Assuming the average woman has around 2 children, this means these turnover costs occur twice per woman. Thus, the reduced cost from lower workforce turnover imputable as increased labour productivity is:

$21\% \text{ of workforce} * 20\% \text{ lower turnover} * 1/12 \text{ training costs} * 2$ $= 0.7\% \text{ increase in labour productivity}$

Sensitivity Analysis:

A $\pm 10\%$ sensitivity around the benchmark 20% lower turnover results in estimates of the increase in labour productivity ranging from 0.63% (=21%*20%*1/12*2*0.9) to 0.77% (=21%*20%*1/12*2*1.1).

2.6 Summary of Contributions to Labour Productivity and Labour Force Participation

This section summarises the overall contributions to labour productivity and labour force participation of the Productivity Agenda reform targets mentioned above.

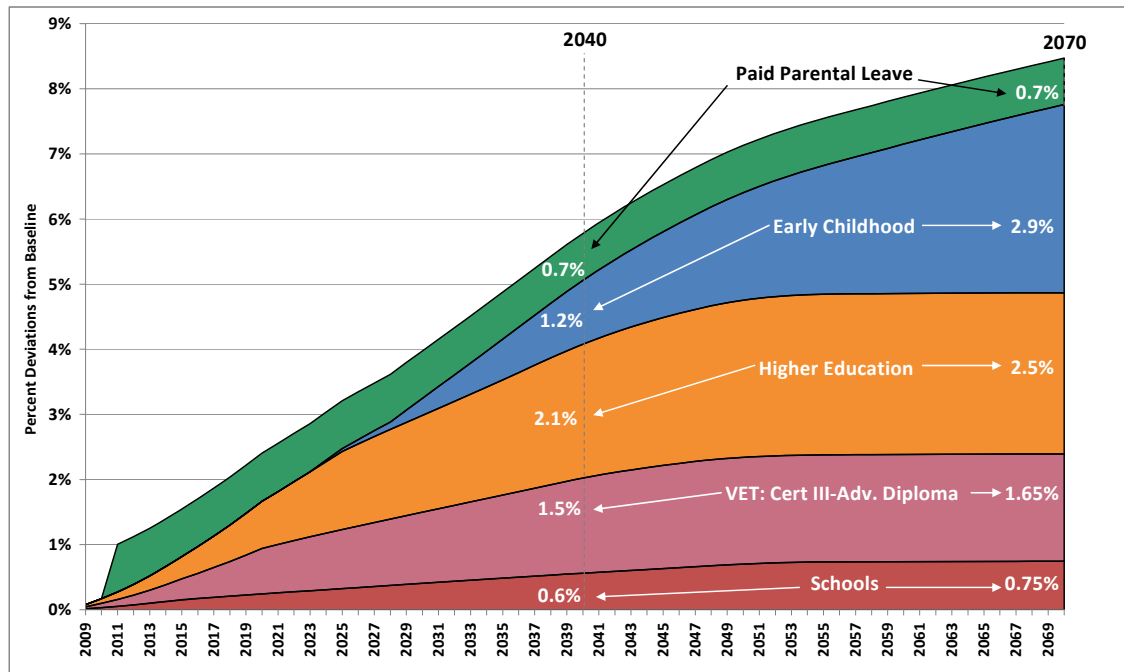
The contributions of the Productivity Agenda targets were estimated over time using a demographic model. This is important to capture the impacts of the reforms on specific cohorts of the population. Further, this enabled KPMG Econtech to correctly track the contribution as it builds up over time. This is particularly relevant to educational reforms, as the full effects of these reforms are only felt once the new cohorts (who benefit from the education reforms) have completely replaced earlier cohorts in the working age population.

Contributions to Labour Productivity

The contribution of the individual reform targets to labour productivity varies depending on what proportion of the population is affected, the timing of the impacts and the degree to which the reform will alter the current situation. In this light the reforms fall into two broad categories, those that have an immediate and sustained impact, and those that build up over time. Chart 2.5 below shows how each reform stream will impact labour productivity over time.

²⁵ Ibid.

Chart 2.5: Contribution to labour productivity increases (per cent deviation from baseline)



Source: KPMG Econtech.

Note that early childhood reforms may work together with schools and tertiary reforms to achieve targets. We have reported the benefits of each reform separately and added them together, to provide an aggregate figure

As shown in Chart 2.5, the contribution of the paid parental leave reform is a 0.7 per cent increase in labour productivity levels, relative to the baseline, that is constant over time. This contribution is constant as it represents the immediate impact of paid parental leave. The economy receives a once and for all labour productivity gain by reducing turnover of women of child bearing age (20 to 40 years), which retains workplace experience and saves on training costs.

The remainder of the reforms impacting labour productivity focus on increasing productivity, through *increased education*. As the reforms will result in increased education for current and future cohorts, the contribution to the overall labour productivity level gradually builds up over time. This increase occurs until the new, more highly educated cohorts replace the earlier cohorts in the labour force. The resulting impact on labour productivity differs significantly depending on the type of education and the number of people each reform will affect.

In 2040, education reform targets contribute from 0.6 per cent for school reforms to 2.1 per cent for higher education reforms, relative to the baseline labour productivity levels. The education reform contributions continue to build up until 2070 when the contributions range from 0.75 per cent for school reforms to 2.9 per cent for early childhood reforms, relative to the baseline labour productivity levels.

The contribution to labour productivity resulting from VET and higher education reform targets represent a substantial increase in Australia's long run labour productivity level, relative to the baseline. Together, these reforms will affect a substantial proportion of the population

(approximately 20 per cent of the 25-34 year old population). The evidence shows a significant labour productivity return to these types of education. The contributions of these two factors to increases in labour productivity by 2040 are a substantial 1.5 per cent for VET and 2.1 per cent for higher education, relative to the baseline. This impact continues to build up until around 2055 when the reforms' contribution to productivity is an increase of 1.65 per cent for VET and 2.5 per cent for higher education, relative to the baseline.

In contrast, the contribution of the school reform targets to labour productivity is relatively less than that of VET and higher education reforms. The agenda affects a relatively smaller proportion of the population: The target population is approximately 5.8 per cent of 20-24 year olds. Moreover, there is a lower return in terms of labour productivity, relative to the VET and tertiary reforms. To the extent that the schools reform agenda boosts a range of outcomes outside of the achievement of the Year 12 target (for example, the relevance and quality of the education that students receive) then there will be additional benefits associated with this reform agenda.

Finally, as the early childhood reforms impact the 0-5 years age cohort, the full contribution of these reforms is not felt for many decades. Early childhood reforms are expected to set the scene for improved lifetime outcomes, including increasing education. The estimated 1.2 per cent increase in labour productivity contributed by this agenda in 2040 (relative to the baseline) is expected to continue to build up until reaching around 2.9 per cent in around 2070, becoming the single most important contribution to labour productivity. The full effects of these reforms are only felt once the new cohorts, benefiting from the early childhood reforms, have fully replaced older cohorts in the labour force. This occurs by 2070.

Combined, by 2040 the reforms modelled contribute to a 6.1 per cent increase to Australia's labour productivity levels, relative to the baseline forecast. This increase continues to build up until around 2070, when the reforms modelled are expected to contribute around an additional 8.5 per cent to Australia's labour productivity levels, relative to the baseline forecast.

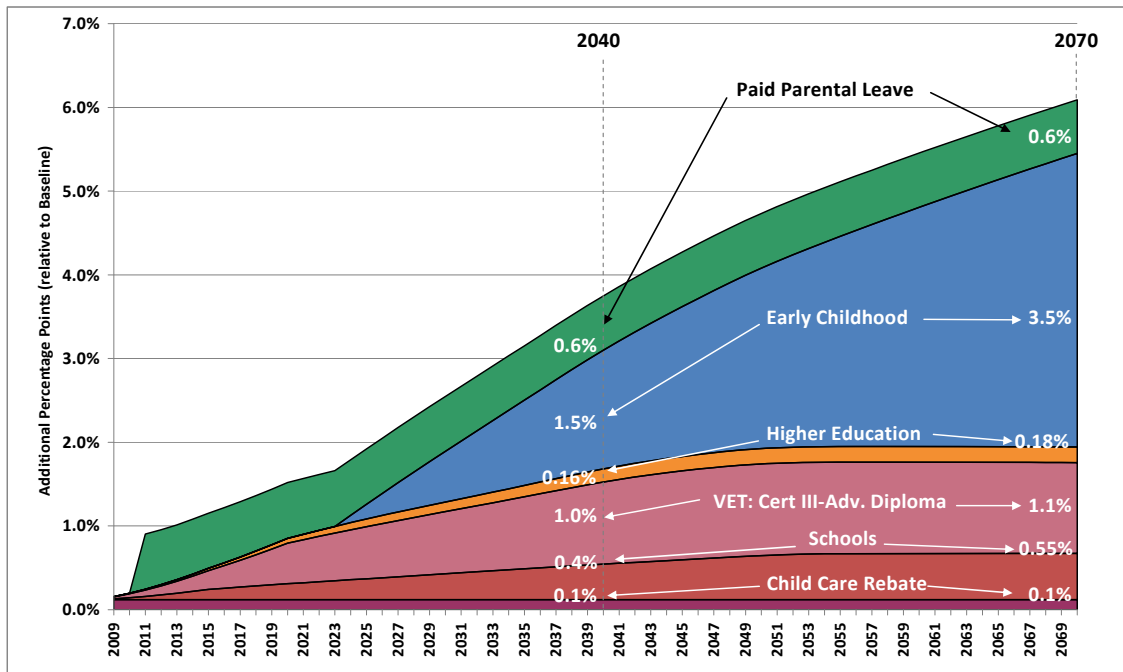
Contributions to Labour Force Participation

In line with labour productivity, the effect of the reform targets discussed above on labour force participation rates varies depending on each reform. The contribution of each reform towards labour force participation rates depends on:

- what proportion of the population is affected;
- the timing of the impacts; and
- the degree to which the reform will alter the current situation.

The contribution to labour force participation again falls into two broad categories, immediate and those that build up over time. Chart 2.6 below shows how each reform stream will impact labour force participation over time.

Chart 2.6: Contribution to labour force participation increases (percentage point deviation from baseline)



Source: KPMG Econtech.

Note that early childhood reforms may work together with schools and tertiary reforms to achieve targets. We have reported the benefits of each reform separately and added them together, to provide an aggregate figure

The contribution to labour force participation rates through paid parental leave and child care rebates are once and for all shocks that are constant over time. These impacts represent the impact of paid parental leave and the increase in the child care rebates on women's labour force participation rates. These reforms immediately increase women's participation in the labour force and only affect women of child bearing age, so do not build up over time.

The remainder of the reforms' contributions to increased labour force participation rates come about through education reforms. Similar to labour productivity, these effects gradually increase over time as the reforms are phased-in and new cohorts replace older ones. The full effects of these reforms are only felt when the new cohorts benefiting from the education reforms have completely replaced earlier cohorts in the working age population.

The most noticeable difference between the reforms' contributions to labour productivity and labour force participation is seen in the higher education reforms. While higher education reforms made a substantial contribution to the overall productivity reform, they make a relatively minor contribution to labour force participation. This is because there is only a 5 per cent difference between labour force participation levels of those with higher education relative to those with Year 12 completion as their highest level of education. Completing higher education, however, makes a significant difference to an individual's earnings and therefore their labour productivity.

The school reforms and VET reforms both make significant contributions to the overall labour force participation rate. They represent contributions of 0.4 percentage points and 1 percentage

points, relative to the baseline, respectively in 2040. This further increases until around 2055, when the reforms contribute 0.55 percentage points and 1.1 percentage points, relative to the baseline, respectively. Evidence shows that completing year 12 or, obtaining a certificate III or equivalent, increases labour force participation by around 20 per cent, relative to those who do not. VET reforms contribute relatively more to overall labour force participation, compared to school reforms, as they impact around 11.8 per cent of the target population relative to schools reforms, which only impact 5.8 per cent of its target population.

Again, similar to its labour productivity impacts, early childhood reforms are expected to increase lifetime education and increase labour force participation rates. The estimated 1.5 percentage point contribution to overall labour force participation in 2040 is expected to continue to increase until around 2070, when it will contribute 3.5 per cent to overall labour force participation. The contribution of early childhood reforms to higher labour force participation increases over time as new cohorts of Australians benefiting from these reforms completely replace earlier cohorts in the labour force.

Altogether, the reforms modelled by KPMG Econtech contribute to a 3.8 percentage point increase in Australia's long-term labour force participation rate in 2040, relative to the baseline labour force participation rate. This increase continues to build until 2070, when the reforms contribute to a 6.1 percentage point increase in overall labour force participation. In a historical context, these reforms represent a substantial increase in labour force participation rates over the next six decades.

To the extent that Early Childhood reforms are part of the strategy of achieving targets for the Schools and Tertiary Education reforms, then their benefits may already have been captured to some extent in our modelling of those Education reforms. However, in the absence of further information, we have added in the benefits of each reform taken separately.

3 Results

This section will first discuss the approach used in the macroeconomic forecasting modelling, followed by a presentation and discussion of the results of the modelling process.

3.1 Modelling Approach

Once the contributions to labour productivity and labour force participation are determined, KPMG Econtech used the results and findings from the research and modelling undertaken in section 2 as inputs into the economy wide modelling process. These contributions to labour productivity and labour force participation are used as inputs into our model of the Australian economy, the MM2, to calculate the economic contributions of the reforms.

About MM2

KPMG Econtech's forecasting tool, MM2, is Australia's leading national, industry and state forecasting model. It has a highly respected forecasting track record and its forecasts are used by Federal and State Governments, industry associations, financial institutions and major companies. Indeed, the development of MM2-States was funded by two state Governments.

There are a number of benefits in using MM2 forecasts.

- MM2 is a highly regarded forecasting model with an enviable track record. For instance, MM2 warned of the current slowdown earlier than others. In early May 2008 KPMG Econtech's forecast of Gross Domestic Product (GDP) for 2008/09 was around 2 per cent, whilst other forecasters were predicting GDP growth of 4 per cent²⁶.
- There is a transparent methodology underlying MM2 as documented in the publication, *Inside a Modern Macroeconometric Model - A Guide to the Murphy Model*²⁷. In addition, the forecasts produced by MM2 are based on historical data published by the Australian Bureau of Statistics (ABS), which means that our forecasting results are reproducible. An important point to note is that the methodology employed by KPMG Econtech ensures consistency between the National and State forecasts. For example, KPMG Econtech's forecast of Gross State Product for each State and Territory add to our national forecast of GDP. Similarly, our forecast of employment at the State and Territory level is fully consistent with our forecast of National employment.
- Importantly, MM2 incorporates the current involvement of the global financial crisis. Further, because MM2 is updated on a quarterly basis, its forecasts are regularly adjusted to account for changes in international economic conditions.

Using the labour productivity and labour force participation contributions, the MM2 model is used to generate the impacts of the reforms on key macroeconomic variables. These variables include GDP, private consumption (a measure of living standards), employment and the unemployment rate. Results are stated as deviations from baseline and are discussed in the following section.

²⁶ Alan Mitchell, "Caught between Interest Rates and Commodity Prices", Australian Financial Review, 4 May 2008

²⁷ Powell, A.A. and Murphy, C.W. (1997), *Inside a Modern Macroeconometric Model - A Guide to the Murphy Model*, Springer, Berlin, 2nd ed., 455pp.

3.2 Modelling Results

All impacts are relative to baseline forecasts, with the results showing the average cumulative deviation from baseline forecasts. Long run impacts (2025-2040 average) tend to be stronger, relative to the medium run (2010-2025 average). In long-run, the reforms have had sufficient time to achieve their targets (phasing-in is accomplished) as well as filter through successive population cohorts. Accordingly, the long run cumulative impacts of the reforms are larger.

The following seven subsections (3.2.1 through 3.2.7) present results for each of the six reforms considered, plus the aggregate impact. Each subsection presents results in a table showing impacts from increases in labour force participation and labour productivity associated with each reform, as well as their combined (overall) impact. The aggregate results also show the increase in the implied annual growth rates required to generate the reform impacts. All of the results presented in this section refer to the gross impact of the reforms. The net benefit of the reforms can be ascertained by subtracting the estimated cost of the reforms from the gross benefits presented in this report.

3.2.1 Early Childhood Reforms

The gross impacts are presented in Table 3.1, below. Average medium run (2010-2024) additional real GDP is 0.3% above baseline. As the impact of the reform grows over time and successive cohorts of children come through the new system, the impact builds to a 0.9% long run (2025-2040) average addition to baseline real GDP. These additions are generated through:

- 1) higher labour force participation rates when these children begin their working lives – on average, this adds 0.2% to baseline real GDP in the medium run, and 0.6% in the long run; and
- 2) higher labour productivity upon start of working life – on average, this adds 0.1% to baseline real GDP in the medium run and 0.3% in the long run.

Real Consumption is also higher relative to baseline forecasts, with the logic being similar to real GDP. Employment is higher, whilst unemployment is lower. The moves in employment and unemployment are the outcomes of a variety of forces, which include the impact of the time profile of the labour productivity and labour force participation increases and the speed of labour market adjustment.

Table 3.1: Economic impacts of Early Childhood Reforms

Overall			
Early Childhood reforms	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.3%	0.9%	0.6%
Consumption (% deviations)	0.7%	0.9%	0.8%
Employment (% deviations)	0.5%	1.9%	1.1%
Unemployment rate (% points)	-0.4%	-0.4%	-0.4%

	Participation			Productivity		
	2010-2024	2025-2040	2010-2040	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.2%	0.6%	0.4%	0.1%	0.3%	0.2%
Consumption (% deviations)	0.5%	0.6%	0.5%	0.2%	0.3%	0.2%
Employment (% deviations)	0.3%	1.6%	1.0%	0.2%	0.2%	0.2%
Unemployment rate (% points)	-0.2%	-0.3%	-0.2%	-0.1%	-0.2%	-0.1%

Source: KPMG Econtech

Note: The results above focus on the gross benefits of achieving reform targets.

3.2.2 Schools Reforms

Table 3.2, below, summarises the gross impacts. Average medium run (2010-2024) additional real GDP is 0.4% above baseline, and this reaches 0.9% in the long run (2025-2040). As before, the additions are generated by:

- 1) higher labour force participation rates when these students start work – on average, this adds 0.2% to baseline real GDP in the medium run, and 0.5% in the long run; and
- 2) higher labour productivity – on average, this adds 0.2% to baseline real GDP in the medium run and 0.4% in the long run.

Real consumption increases relative to baseline forecasts, similar to real GDP. Employment effects are small but positive and unemployment is largely unaffected.

Table 3.2: Economic impacts of Achieving Schools Reform Targets

Overall			
School reforms	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.4%	0.9%	0.6%
Consumption (% deviations)	0.4%	1.1%	0.7%
Employment (% deviations)	0.2%	0.5%	0.4%
Unemployment rate (% points)	0.0%	0.0%	0.0%

	Participation			Productivity		
	2010-2024	2025-2040	2010-2040	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.2%	0.5%	0.3%	0.2%	0.4%	0.3%
Consumption (% deviations)	0.2%	0.6%	0.4%	0.2%	0.5%	0.3%
Employment (% deviations)	0.2%	0.5%	0.3%	0.0%	0.0%	0.0%
Unemployment rate (% points)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: KPMG Econtech

Note: The results above focus on the gross benefits of achieving reform targets.

3.2.3 Tertiary Reforms: Higher Education

The gross impacts are shown in Table 3.3. Over the medium run, the average real GDP gain is 0.8% above baseline, and this reaches 1.7% in the long run. Additions to real GDP are generated by:

- 1) higher labour force participation rates – on average, this adds 0.1% to baseline real GDP in the medium run, and 0.3% in the long run; and
- 2) higher labour productivity – on average, this adds 0.6% to baseline real GDP in the medium run and 1.4% in the long run.

Real consumption tracks real GDP, and hence is also higher relative to baseline forecasts. Employment effects are positive and unemployment shows a contraction with respect to the baseline.

Table 3.3: Economic impacts of Achieving Tertiary Reform Targets - Higher Education

Overall			
Tertiary reforms: Bachelor+	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.8%	1.7%	1.2%
Consumption (% deviations)	0.9%	2.2%	1.5%
Employment (% deviations)	0.4%	0.8%	0.6%
Unemployment rate (% points)	-0.2%	-0.3%	-0.2%

	Participation			Productivity		
	2010-2024	2025-2040	2010-2040	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.1%	0.3%	0.2%	0.6%	1.4%	1.0%
Consumption (% deviations)	0.2%	0.4%	0.3%	0.7%	1.7%	1.2%
Employment (% deviations)	0.2%	0.4%	0.3%	0.2%	0.4%	0.3%
Unemployment rate (% points)	0.0%	0.0%	0.0%	-0.2%	-0.3%	-0.2%

Source: KPMG Econtech

Note: The results above focus on the gross benefits of achieving reform targets.

3.2.4 Tertiary Reforms: Vocational Education and Training

Table 3.4 displays the gross impacts of achieving Vocational Education and Training (VET) reform targets. Over the medium run, the average real GDP gain is 0.9% above baseline, and this reaches 2.6% in the long run. Additions are generated by:

- 1) Higher labour force participation rates. On average, this adds 0.4% to baseline real GDP in the medium run, and 1.3% in the long run.
- 2) Higher labour productivity. On average, this adds 0.5% to baseline real GDP in the medium run and 1.2% in the long run.

Real consumption increases relative to baseline forecasts, in line with real GDP. Employment effects are positive for labour force participation, negligible for labour productivity. Unemployment impacts are also negligible.

Table 3.4: Economic impacts of Achieving Tertiary Reform Targets - VET

Overall			
Tertiary reforms: Cert III-Adv. Diploma	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.9%	2.6%	1.7%
Consumption (% deviations)	0.8%	3.0%	1.9%
Employment (% deviations)	0.5%	1.2%	0.8%
Unemployment rate (% points)	0.0%	0.0%	0.0%

	Participation			Productivity		
	2010-2024	2025-2040	2010-2040	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.4%	1.3%	0.9%	0.5%	1.2%	0.8%
Consumption (% deviations)	0.4%	1.5%	0.9%	0.4%	1.5%	0.9%
Employment (% deviations)	0.5%	1.2%	0.8%	0.0%	0.0%	0.0%
Unemployment rate (% points)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: KPMG Econtech

Note: The results above focus on the gross benefits of achieving reform targets.

3.2.5 Participation - Childcare Tax Rebate Reform

The gross impacts of the childcare tax rebate reform are shown in Table 3.5. The table shows an average real GDP gain of 0.2% above baseline, for the medium as well as the long run. Real consumption is higher than the baseline forecasts, following real GDP. Employment effects are positive, while unemployment impacts are negligible.

Table 3.5: Gross Benefits of Childcare Tax Rebate Reform

Overall			
Child Care Rebate	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.2%	0.2%	0.2%
Consumption (% deviations)	0.2%	0.3%	0.2%
Employment (% deviations)	0.2%	0.2%	0.2%
Unemployment rate (% points)	0.0%	0.0%	0.0%

	Participation			Productivity		
	2010-2024	2025-2040	2010-2040	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.2%	0.2%	0.2%	0.0%	0.0%	0.0%
Consumption (% deviations)	0.2%	0.3%	0.2%	0.0%	0.0%	0.0%
Employment (% deviations)	0.2%	0.2%	0.2%	0.0%	0.0%	0.0%
Unemployment rate (% points)	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%

Source: KPMG Econtech

Note: The results above focus on the gross benefits of achieving reform targets.

3.2.6 Workplace - Paid Parental Leave Reform

Table 3.6 shows the gross impacts associated with paid parental leave. This table shows, over the medium run, the average real GDP gain is 1.6% above baseline, and reaches 2.2% in the long run. Additions are generated by:

- 1) higher labour force participation rates – on average, this adds 0.9% to baseline real GDP in the medium run, and 1.4% in the long run; and
- 2) higher labour productivity – on average, this adds 0.7% to baseline real GDP in the medium run and 0.9% in the long run.

In the short-run paid parental leave immediately encourages increase labour force participation amongst women. This increases both the number of people with employment and the number of people looking for work. The economy takes time to adjust to the immediate increase in labour supply, causing, all else equal, a slight short-run surplus in the labour market. This results in a slight increase in the short-run unemployment rate that will gradually reduce to zero.

Table 3.6: Gross Impacts of Paid Parental Leave Reforms

Overall			
Paid Parental Leave	2010-2024	2025-2040	2010-2040
GDP (% deviations)	1.6%	2.2%	1.9%
Consumption (% deviations)	1.6%	2.8%	2.2%
Employment (% deviations)	0.9%	1.1%	1.0%
Unemployment rate (% points)	0.1%	0.1%	0.1%

	Participation			Productivity		
	2010-2024	2025-2040	2010-2040	2010-2024	2025-2040	2010-2040
GDP (% deviations)	0.9%	1.4%	1.1%	0.7%	0.9%	0.7%
Consumption (% deviations)	0.9%	1.7%	1.3%	0.7%	1.1%	0.9%
Employment (% deviations)	0.9%	1.1%	1.0%	0.0%	0.0%	0.0%
Unemployment rate (% points)	0.1%	0.0%	0.1%	0.0%	0.0%	0.0%

Source: KPMG Econtech

Note: The results above focus on the gross benefits of achieving reform targets.

3.2.7 Aggregate Results

Table 3.7 aggregates the gross benefits associated with the preceding reforms. Over the medium run, the average real GDP gain is 4.1% above baseline, and this reaches 8.6% in the long run. Additions to real GDP are generated by:

- 1) higher labour force participation rates – on average, this adds 2% to baseline real GDP in the medium run, and 4.5% in the long run; and
- 2) higher labour productivity – on average, this adds 2% to baseline real GDP in the medium run and 4.1% in the long run.

Real consumption tracks real GDP, and hence also rises relative to baseline forecasts. Employment effects are positive and unemployment shows a contraction with respect to the baseline.

Table 3.7: Aggregate Gross Benefits of Early Childhood, Schools, Tertiary, Paid Parental Leave and Child Care Rebate Reforms

Overall					
Combined Impacts	2010-2024	2025-2040	2010-2040	2070	Implied average annual growth (2010-2070)
GDP (% deviations)	4.1%	8.6%	6.2%	20.1%	0.31%
Consumption (% deviations)	4.6%	10.3%	7.2%	27.3%	0.40%
Employment (% deviations)	2.6%	5.7%	4.0%	10.1%	0.16%
Unemployment rate (% points)	-0.4%	-0.6%	-0.5%	0.0%	0.0%

	Participation				Productivity			
	2010-2024	2025-2040	2010-2040	2070	2010-2024	2025-2040	2010-2040	2070
GDP (% deviations)	2.0%	4.5%	3.2%	10.9%	2.0%	4.1%	3.0%	9.2%
Consumption (% deviations)	2.3%	5.2%	3.7%	14.8%	2.3%	5.0%	3.6%	12.5%
Employment (% deviations)	2.3%	5.1%	3.6%	10.1%	0.4%	0.6%	0.5%	0.0%
Unemployment rate (% points)	-0.1%	-0.2%	-0.1%	0.0%	-0.3%	-0.4%	-0.4%	0.0%

Source: KPMG Econtech

1. Note that early childhood reforms may work together with schools and tertiary reforms to achieve targets. We have reported the benefits of each reform separately and added them together, to provide an aggregate figure.
2. The results above focus on the gross benefits of achieving reform targets.

Table 3.7 also shows the aggregate gross benefits in 2070, as well as the implied average annual growth rate. As discussed in the sections above, the impacts of the education reforms continue to build up past 2040. The impacts will continue to build up until young cohorts who will receive the direct benefits of the reforms, have completely replaced older cohorts who have not directly benefited from the reform. The above aggregate economic impacts show the effects on the economy once it has fully adjusted to the reforms. KPMG Econtech modelling indicates that the economy will fully adjust to the reforms around 2070.

KPMG Econtech estimates in 2070 the gross benefits of the reforms will add 20.1 per cent to baseline real GDP, this implies an average annual growth rate of 0.31 per cent above baseline current expectations of GDP growth.

It is also expected that once the labour market has fully adjusted to the reforms, employment will be 10.1 per cent higher than the baseline. This increase in employment comes through the increase in participation rates. The increase in participation rates increases both the amount of people employed and people looking for work in equal proportions. Once the labour market clears, this implies the overall unemployment rate is unaffected.

To the extent that Early Childhood reforms are part of the strategy of achieving targets for the Schools and Tertiary Education reforms, then their benefits may already have been captured to some extent in our modelling of those Education reforms. However, in the absence of further information, we have added in the benefits of each reform taken separately.

3.2.8 Converting figures into dollar amounts and jobs

In the Executive Summary of the report we present the aggregate economic impacts of each reform agenda in dollar amounts and in jobs. To calculate these estimates we calculate the average level of baseline GDP over the period 2010-2040 (A\$1.74 trillion) and multiply the increase in GDP from baseline by each reform agenda by the estimated level of GDP to calculate a dollar figure. For instance, we multiply 6.2 per cent by A\$1.74 trillion to calculate the total benefit of the reforms over the 2010 to 2040 period is, on average, A\$107.7 billion. Similarly we estimate that, on average, there will be 13 million people employed annually on average over 2010-2040 and we multiply this figure by the expected percentage increase in employment (4.0 per cent), to yield an increase in employment of 526,000 workers/jobs over the 2010-2040 horizon, on average.

Appendix 1: Assumptions

This section outlines the main assumptions used in this report.

General Assumptions

- The increase in productivity and participation for the target age cohort (detailed in the tables in section 2) will be moderated when applied to the entire working age population. This occurs through other factors such as migration and early insertion into the labour force. New migrants will add to the working age population, but will not have received the benefit of the reforms and so will not be affected. Insertion into the labour force at an early age will bring workers who have not had the full benefits of the reforms. These two factors will moderate the impacts of the reforms and imply there will always be some proportion of the working age population who have not directly benefited from the reforms.
- This report does not consider all elements of the entire reform agenda.
- Further the report considers the gross potential benefits of the reforms modelled here. The costs of each reform would need to be subtracted from these gross benefits to allow comparison and detailed assessment of each reform.

Early Childhood Reforms Assumptions

- The impact on participation rates is realised at the age of 20 onwards. This implies that for people who join the labour force between the ages of 15 and 19, the gains to participation are not yet realised, and so this proportion of the working age population is unaffected. The increase in participation in the labour force generated by early childhood reforms is likely to be realised between the ages of 15 to 25. This report used 20 as the median assumption. Further, early childhood reforms increase the likelihood of finishing Year 12 and obtaining tertiary qualifications. The assumption of the participation gains being realised at the age of 20 onwards is further justified as it is in line with the school reforms target of Year 12 completion.
- The impact on productivity through increased Year 12 attainment is realised from the age of 20 onwards in line with the schools reforms target. This implies that for people who join the labour force between the ages of 15 and 19, the gains to productivity (through increased Year 12 attainment) are not yet realised, and so this proportion of the working age population is unaffected.
- The impact on productivity through increased tertiary attainment is realised from the age of 25 onwards in line with the tertiary reforms target. This implies that for people who join the labour force between the ages of 15 and 24, the gains to participation (through increased tertiary attainment) are not yet realised, and so this proportion of the working age population is unaffected.
- The target group in the reform is low SES groups. In this report, it is assumed that this is the lowest two quintiles of the income distribution (40%).

- This report does not consider the impacts to the economy through the aspects of the reform agenda targeting quality improvements in the provision of early childhood services.

Schools Reforms Assumptions

- This report shows the gross benefits if the schools reforms achieve the target of 90 per cent Year 12 completion rates amongst the 20 to 24 age cohort by 2015.
- This report also assumes Year 12 completion adds another 2 years of education on average, for people who otherwise would not have finished school.
- The impact on productivity and participation through increased Year 12 attainment is realised from the age of 20 onwards, in line with the reform target. This implies that for people who join the labour force between the ages of 15 and 19, the gains to productivity and participation (through increased Year 12 attainment) are not yet realised, and so this proportion of the working age population is unaffected.

Tertiary Reforms (Higher Education) Assumptions

- This report shows the gross benefits if the tertiary reforms (higher education) achieve the target that 40 per cent of the 25 to 34 age cohort will have bachelor or above qualifications by 2025.
- This report also assumes obtaining bachelor qualifications adds another 3 years education on average, for people who otherwise would not have obtained a bachelor degree.
- The impact on productivity and participation through increased higher education attainment is realised from the age of 25 onwards, in line with the reform target. This implies that for people who join the labour force between the ages of 15 and 24, the gains to productivity and participation (through increased higher education attainment) are not yet realised, and so this proportion of the working age population is unaffected.

Tertiary Reforms (VET) Assumptions

- This report shows the benefits if the tertiary reforms (VET) achieve the target by halving the proportion of the 24 to 35 population with below Certificate III or equivalent education by 2025. This is estimated to increase the proportion of the population with Certificate III or equivalent education by 11.8 per cent.
- The impact on productivity and participation through increased VET is realised from the age of 25 onwards, in line with the reform target. This implies that for people who join the labour force between the ages of 15 and 24, the gains to productivity and participation (through increased VET) are not yet realised, and so this proportion of the working age population is unaffected.

Participation - Child Care Rebate Reform Assumptions

- This report focuses on the Child Care Rebate element of the participation reform agenda.

Workplace - Paid Parental Leave Reform Assumptions

- This report focuses on the Paid Parental Leave element of the workplace relations reform agenda; and
- this report only considers the gross benefit of paid parental leave. A cost benefit analysis would need to be conducted to determine the net impact of paid parental leave.

Appendix 2: MM2

KPMG Econtech's forecasting tool, Murphy Model 2 (MM2), is Australia's leading national, industry and state forecasting model. It has a highly respected forecasting track record and is used by Federal and State Governments, industry associations, financial institutions and major companies. Subscriptions to forecasting reports and Windows-based forecasting software are available.

Development

KPMG Econtech's founder, Chris Murphy, has undertaken macroeconomic modelling at the Australian Treasury, Economic Planning Advisory Council, and the Australian National University. In 1988, Chris published the first version of the Murphy Model in *Australian Economic Papers*, and it was soon recognised as Australia's leading national or macroeconomic model.

In 1994, the first major redevelopment of the model was undertaken to distinguish 12 industry sectors. This marked the introduction of the Murphy Model 2 (MM2), a fully integrated macro and industry model.

In 1995, under contract to two state treasuries, the MM2-States was developed as an extension to MM2. The MM2-States allocates a number of MM2's key outputs across the eight Australian States and Territories.

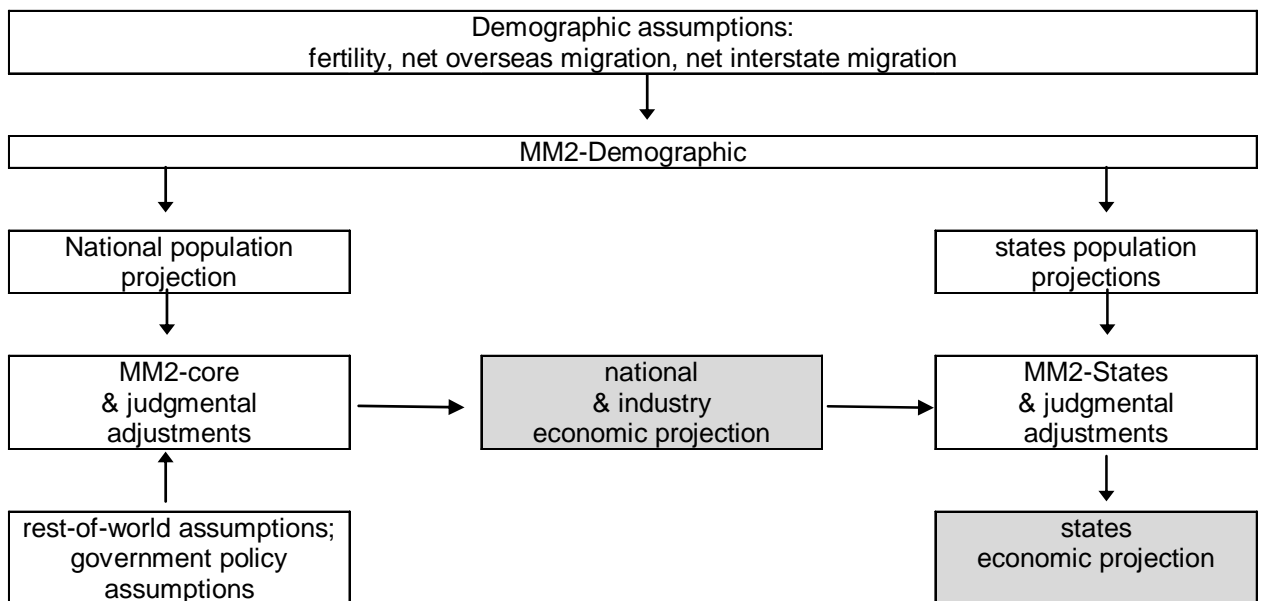
In the same year, the current version of MM2-Demographic was developed under contract to the Australian Bureau of Immigration Research. Using assumptions for fertility, mortality, overseas and interstate migration, it generates consistent state and national population scenarios.

In 1996, the MM2 was further developed to expand the sectoral detail from 12 sectors to the 18 sectors corresponding to the Australian and New Zealand Standard Industrial Classification (ANZSIC) industry divisions. The linkages between the three models are illustrated in the figure on the next page.

Features

MM2 is a state-of-the-art, fully integrated macro-industry model with the following features:

- produces quarter-by-quarter nine-year-ahead forecasts;
- forward-looking financial sector for realism;
- Keynesian short-run for forecasting; and
- neoclassical long-run for policy analysis.



Documentation

Powell, A.A. and Murphy, C.W. (1997), *Inside a Modern Macroeconometric Model - A Guide to the Murphy Model*, Springer, Berlin, 2nd ed., 455pp.

Attachments

Attachment 1: Empirical studies on education and earnings

Many attempts have been made to measure the private returns to education, using econometric methods to estimate the well-known Mincer equation. The Mincer equation explains an individual's earnings as a function of their education, experience and a number of other relevant factors, and can be written as follows:

$$\ln(\text{earnings}_i) = \beta_0 + \beta_1 \text{educ}_i + \alpha Z_i + \varepsilon_i$$

where β_1 can be interpreted as the (private) return to education, since it measures the percentage increase in earnings from an increase in education by one year. Z_i is a vector of other control variables, such as labour force experience and gender.

As is widely acknowledged in the literature, there are a number of problems with such estimates of returns to education. The most significant of these is bias caused by the impossibility of measuring an individual's innate ability. Conventional measurement error is also seen as a problem.

Hausman and Taylor (1981) attempt to address the omitted variable bias problem by using an instrumental variable technique with the random effects model²⁸. After correcting for the omitted variable bias, the results indicate that one year of additional schooling will result in a 21 per cent increase in wages. This result is quite a bit higher than other studies. Hausman and Taylor (1981) initially used an Ordinary Least Squares and General Least Squares specification which assumes no correlation of the explanatory variables and the error and found that an additional year of schooling increased wages by 6.7 per cent. Traditional Instrumental Variable (IV) estimation yielded 9.7 per cent. The random effect IV technique yields a result of 12.5 per cent and, in the final specification (where some of the noncorrelation assumptions are relaxed), an increase in one year of schooling increases wages by 21.7 per cent. However, the standard errors are high and the coefficient estimates imprecise. The key result of their study was that all methods which control the correlation with the latent individual effects increase the schooling coefficient.

Ashenfelter and Krueger (1994) attempt to overcome both the omitted variable bias and measurement error by using a sample of identical twins. They are able to eliminate the problem of omitted ability bias by appealing to the idea that twins will have a similar level of innate ability and adjust their data accordingly by using a fixed effects estimator. Measurement error problems are overcome by taking independent estimates of each individual's level of schooling by asking each twin to also report their sibling's years in education.

Australian authors have also taken the same methods used in the Ashenfelter and Krueger study and applied them to comprehensive data from the Australian Twin Register (Miller, et al., 1995). Their results, after correcting for the various problems, suggest that the return to schooling was between 5 and 8 per cent at the time of the study. The same authors updated their findings in 2006, and estimated that the return to schooling is between 5 and 7 per cent (Miller, et al., 2006). This implies that if an Australian were to increase their schooling by one year,

²⁸ Omitted variable bias refers to the bias that appears in estimates of parameters in regression analysis when the assumed specification is incorrect, in that it omits an independent variable that should be in the model.

they can expect a 5 to 7 per cent increase in their earnings. The results also imply that standard estimates are biased upward by around 10 per cent.

Leigh and Ryan (2008) also attempt to take into account the various problems in estimating the private return to education. They also find that bias in the estimators is not a large problem, only affecting the estimated rate of return by 10 per cent. Leigh and Ryan use three different methods to estimate the returns to education. They estimate the return to an additional year of education at 8 to 12 per cent. This is a higher estimate than the results from Miller et al (2006). Leigh and Ryan (2008) point to the more accurate measurement of income in their data sample, which is taken from HILDA²⁹, to explain this difference.

Since bias is only a small problem, an estimate made by Voonn and Miller (2005) based on the 1996 Australian Census can be considered valid. Their Mincer equations estimate a 9 per cent return to an additional year of education, which is close to Leigh and Ryan's (2008) estimate. The return can be split into a 9.2 per cent return for men and an 8 per cent return for women.

Table A1 summarises estimates of the earnings premium arising from an extra year of education.

Table A1: Returns to education in Australia

Author (s)	Sample	Return to extra year of education
Miller, Mulvey & Martin (2006)	Australian Twin Register, 759 identical twin pairs, 1031 fraternal twin pairs, young age cohort	5 - 7%
Leigh & Ryan (2008)	Household, Income and Labour Dynamics in Australia (HILDA) survey, 2003 wave, 25-64 yrs, positive income	8 - 12 %
Voon & Miller (2005)	1996 Census of Population and Housing Household Sample File (HSF), sample size 42669	9%

Source: KPMG Econtech

In this Report we will use Leigh and Ryan's estimates. The wage premiums are then discounted to ensure that the labour productivity returns from expanding the education level are not overstated. To some extent, the existing wage premiums earned by those with a higher education reflect higher innate ability rather than the education itself. Leigh uses a 10 per cent discount to allow for these factors.

²⁹ HILDA: Household, Incomes and Labour Dynamics in Australia. See <http://www.melbourneinstitute.com/hilda/>.

Attachment 2: Empirical study for different forms of higher education

Leigh (2008) estimates the returns to different forms of education, such as Certificates, Diplomas and Bachelor Degrees, using a Mincer equation. This approach allows the returns to education to differ across different levels of education. Leigh also estimates the effects of education on the probability of positive earnings, that is on the probability of being employed. The estimates are made using the HILDA data set. The annual returns relative to individuals with non post-school qualifications are reported in Table A2.

Table A2: Post school qualifications and earnings

Educational level	Earnings premium
Certificate Level III-Advanced Diploma	19.5%
Bachelor Degree	45%
Graduate Diploma or Graduate Certificate	41%
Masters or Doctorate	67%

Source: Leigh (2008), Tables 3 and 4.

Note: These estimates have been corrected for a 10 per cent upward bias.

To some extent, the existing wage premiums earned by those with a higher education reflect factors other than the education itself. Leigh uses a 10 per cent discount to allow for these factors.

According to Leigh's estimates, a bachelor degree is expected to increase an individual's earnings by 45 per cent, compared to the situation where that same individual had no post-school qualifications. KPMG Econtech will discount this result to 40 per cent. Likewise, graduate certificate III – advanced diplomas yield a return of 19.5 per cent, which KPMG Econtech discounts to 18 per cent.

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