

Economic Analysis of Building and Construction Industry Productivity: 2013 Update

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Executive summary

Introduction

Econtech Pty Ltd (now trading as Independent Economics) has analysed trends in construction industry productivity since 2007. The original 2007 report, which was commissioned by the Office of the Australian Building and Construction Commissioner (ABCC), found that reforms tailored to the building and construction industry, including those recommended by the Cole Royal Commission, had improved work practices, lifting productivity. It also modelled the flow on effects to the wider economy from this productivity outperformance in the building and construction industry, showing significant benefits for consumers. The original report was updated for the ABCC in 2008. Since then, Master Builders Australia (MBA) has commissioned updates in 2009, 2010 and 2012, as well as this latest update. The data analysed for each update has consistently confirmed the original findings.

This 2013 report, like the previous reports, assesses the impact on productivity of the earlier industry reforms. These include the regulation of the industry by both the Building Industry Taskforce (Taskforce) and its successor the ABCC, as well as the industrial relations reforms in the years to 2006.

In addition, this report also considers, for the first time, the impact on productivity of recent developments in the industry reform process. Specifically, on 1 June 2012, the ABCC was abolished and a new agency, the Office of the Fair Work Building Industry Inspectorate (also known as Fair Work Building and Construction or FWBC), was established in its place to regulate the building and construction industry. The broad aim of establishing the FWBC was to bring the industry's regulation back much more closely into line with those of other industries.

This represents a reversal of the approach that was recommended by the Cole Royal Commission and implemented through the Taskforce/ABCC of tailoring regulation to the building and construction industry. This raises the question of whether the FWBC era will see a partial or complete reversal of the industry's productivity outperformance achieved in the Taskforce/ABCC era.

Thus, while our earlier reports focused on the industry's productivity performance across two regulatory regimes (pre and post Taskforce/ABCC), this report analyses industry productivity across three regimes:

- **the pre-Taskforce/ABCC era** – the period prior to the establishment of the Taskforce and ABCC (up to and including 2002);
- **the Taskforce/ABCC era** – the period of operation for the Taskforce and ABCC (between 2002 and mid-2012); and
- **the FWBC era** – from mid-2012 onwards, when the FWBC was established.

Methodology

First, this report compares the industry environment and workplace relations regulations during the three regimes. A particular focus is on determining the extent to which the industry environment and regulations associated with the FWBC represent a return to the circumstances that prevailed prior to the Taskforce and ABCC. This can be used to indicate the extent to which the productivity gains achieved during the Taskforce and ABCC era are likely to be preserved in the FWBC era.

Next, the latest data on construction industry productivity from a variety of sources is examined to provide an up-to-date analysis of trends in construction industry productivity and the factors driving these trends. In line with earlier reports, three types of productivity indicators are assessed to determine the extent of any shifts in industry productivity from changes in industry regulation between regulatory regimes.

- Year-to-year comparisons of construction industry productivity are made using data from the Australian Bureau of Statistics (ABS), the Productivity Commission (PC) and academic research. The timing of any shifts in productivity trends is compared with the timing of the three regulatory regimes.
- Industry reforms have focussed on the commercial construction sector, comprising non-residential building and multi-unit residential building, where construction costs have historically been higher than for the housing construction sector. Rawlinsons data is used to compare the timing of any changes in this cost gap (for undertaking the same building tasks in the same states) with the timing of the three regulatory regimes.
- Case studies of individual projects, undertaken for earlier reports by Econtech Pty Ltd and by other researchers, are used to provide comparative information on productivity performance between the three regulatory regimes.

Using both the analysis of the nature of the three regulatory regimes and the productivity data, conclusions are drawn on the impact on productivity in the building and construction industry from the regulatory changes.

- First, the boost to productivity from improved workplace practices associated with the Taskforce and ABCC is estimated.
- Second, the extent to which this productivity boost is expected to be preserved under the FWBC regime is also estimated.

These productivity effects are then introduced into an economy-wide model to estimate the impacts of the regulatory changes in the construction industry on the Australian economy as a whole.

The economy-wide modelling is undertaken using Independent Economics' Computable General Equilibrium model, the Independent CGE model. This modelling provides estimates of the permanent or long-term effects on activity in the construction industry and other industries from changes to the productivity of the construction industry. It also estimates the permanent, flow-on impacts on consumers from changes in costs in the construction industry: higher construction productivity leads to lower prices and taxes while lower construction productivity has the opposite effects.

This report continues the pattern of previous reports of further developing the sophistication of the economy-wide modelling. Hence, the estimates of the economy-wide impact of changes to workplace practices presented in this report are even more robust than those presented in earlier reports. The Independent CGE model has the following features that are important for this report.

- The model separately identifies four sectors within the building and construction industry: residential building; non-residential building; engineering construction; and construction trade services. This means that the model can better trace the economy-wide impact of improved workplace practices in different sectors of the building and construction industry. It also means that the jurisdiction of the ABCC and FWBC can be more closely identified.
- The modelling is contemporary, adopting 2012/13 as its reference year. This involves using Input-Output (IO) tables for 2007/08 released by the ABS in late 2011, and uprating this snapshot of the economy to a normalised 2012/13, by allowing for growth in wages, productivity, population and normalised commodity prices. Likewise, the model uses the latest ABS industry classification, ANZSIC 2006.
- The production process in each of the model's 120 industries distinguishes nine different types of capital, including dwellings and buildings and structures. This supports more robust estimates of the flow-on effects from reform in the building and construction industries, which produce the dwellings, buildings and structures used by the 120 industries.
- The model provides a robust measure of consumer welfare derived from the consumption of goods and services. Consumer welfare is the key measure used to assess the public policy merits of economic policies, such as the changes in workplace practices analysed here.

Workplace practices in the building and construction industry

Reporting in 2003, the Royal Commission into the Building and Construction Industry (Cole Royal Commission) found that the industry's productivity performance was poor and that this was linked to poor work practices. Unions had assumed control of managing construction projects, rather than head contractors and major subcontractors. The Cole Royal Commission identified that attitudinal change was required to solve this problem and that the "benefits to the industry and the Australian economy from improved productivity flowing from this cultural change are very significant"¹.

The Cole Royal Commission concluded that these problems occurred because the unique structure of the building and construction industry meant that head contractors had an "unwillingness and incapacity ... to respond to unlawful industrial conduct causing them loss"². Commercial pressures meant that contractors would concede to union demands rather than become involved in long disputes. Consequently, the Cole Royal Commission concluded that the conditions in the Australian building and construction industry were unlike those in other industries.

¹ Royal Commissioner, the Honourable Terence Rhoderic Hudson Cole RFD QC, *Final Report of the Royal Commission into the Building and Construction Industry: Summary of Findings and Recommendations*, February 2003, p4.

² *Ibid.*, p11.

*These findings demonstrate an industry which departs from the standards of commercial and industrial conduct exhibited in the rest of the Australian economy. They mark the industry as singular. They indicate an urgent need for structural and cultural reform.*³

In response to these special circumstances, the Cole Royal Commission recommended that mechanisms be put in place to restore the rule of law, with significant penalties for those breaching the law. The Cole Royal Commission recommended that an “Act of special application to the building and construction industry”⁴ be put in place, as well as codes of practice for the industry. It also recommended that an independent commission be established to monitor the conduct of the industry. These recommendations were enacted with the strengthening of the Taskforce, followed by the introduction of the ABCC. The data presented in the following section shows that this led to significant improvements in productivity in the building and construction industry.

Despite this, the changes in replacing the ABCC with the FWBC have meant that the regulatory environment has largely returned to that of the pre-Taskforce/ABCC era. The five main changes associated with the FWBC are as follows.

- The circumstances under which industrial action attracts penalties are narrowed, to be in line with other industries.
- The maximum penalties applicable for breaches of industrial law have been cut, to be in line with other industries.
- The use of the compulsory examination notice powers is now subject to a number of restrictions. Despite acknowledgements that these powers have been useful in assisting investigations, the use of these powers has been significantly reduced.
- The FWBC cannot continue to participate in proceedings or initiate fresh proceedings on matters which have been settled between building industry participants.
- The right of union officials to enter work sites has been expanded to allow them to visit for the purpose of “discussions with potential members”.

This means that the building and construction industry now largely lacks the regulations required to address the industry-specific issues identified by the Cole Royal Commission. The main remaining feature from the Taskforce/ABCC era is that the FWBC is still a specialist regulator for the industry. However, its most important powers used to obtain information are substantially weakened and used in only limited circumstances. Just as the Taskforce/ABCC era led to productivity gains, this regulatory reversal under the FWBC can be expected to lead to a partial or complete reversal of those productivity gains.

Productivity comparisons in the building and construction industry

The results of our analysis of the latest productivity indicators are outlined below.

³ Royal Commissioner, the Honourable Terence Rhoderic Hudson Cole RFD QC, *Final Report of the Royal Commission into the Building and Construction Industry: Summary of Findings and Recommendations*, February 2003

⁴ *Ibid.*, p13

Year-to-Year Comparisons

- ABS data shows that, from 2002 to 2012, construction industry labour productivity has outperformed by 21.1 per cent. This productivity outperformance is identified after controlling for factors driving productivity in the economy as a whole and trends in construction industry productivity prior to 2002 (the year improved workplace practices began). Data for 2013 is not yet available.
- The Productivity Commission's analysis of ABS data has found that multifactor productivity in the construction industry was no higher in 2000/01 than 20 years earlier⁵. In contrast, the latest ABS data on productivity shows that construction industry multifactor productivity accelerated to rise by 16.8 per cent in the ten years to 2011/12. Similar to the labour productivity data, multifactor productivity data for 2012/13 is not yet available.
- Published academic research on total factor productivity shows that productivity in the construction industry grew by 13.2 per cent, between 2003 and 2007, whereas productivity grew by only 1.4 per cent between 1998 and 2002. Data on total factor productivity is only available up to 2007.

Commercial versus domestic

- Rawlinsons data to January 2012 shows that the cost penalty for completing the same tasks in the same state for commercial construction compared to domestic construction has shrunk. The boost to productivity in the commercial construction sector, as estimated by the narrowing in the cost gap, is conservatively estimated at 11.8 per cent between 2004 and 2012. This narrowing in the cost gap developed over several years, as the industry gradually adjusted to the industry-specific regulatory regime of the Taskforce/ABCC era.
- Similarly, the cost gap can be expected to widen again over several years, as the industry gradually adjusts to the weaker regulatory environment in the FWBC era. However, the latest cost gap data refers to January 2013, when the FWBC had been in operation for only seven months. Over that time, from January 2012 to January 2013, the cost penalty for commercial construction widened by 0.9 percentage points. Based on past experience, this is likely to represent the start of a widening trend in the cost gap, driven by an erosion in the productivity outperformance of the Taskforce/ABCC era.

Individual Projects

- Case studies undertaken as part of the original 2007 Econtech report found that improved workplace practices in the Taskforce/ABCC era led to better management of resources in the building and construction industry. This, in turn, has boosted productivity in the building and construction industry compared to the pre-Taskforce/ABCC era.
- Other studies considered reached similar conclusions, including those assessing the impact of improved workplace practices on major engineering construction projects. The gain in productivity as a result of improved workplace practices in the Taskforce/ABCC era is estimated at around 10 per cent.

⁵ Productivity Commission, *Productivity Estimates to 2005-06*, December 2006.

Days lost to industrial action

- ABS data shows that the days lost to industrial action in the building and construction industry averaged 159,000 per year between 1995/96 and 2001/02. This gradually declined during the first five years of the Taskforce/ABCC era, and working days lost then remained at a low level from 2006/07 to 2011/12. However, with the replacement of the ABCC by the FWBC, working days lost jumped from 24,000 in 2011/12 to an estimated 89,000 in 2012/13. Hence, more than one half of the improvement in working days lost in the Taskforce/ABCC era has already been relinquished in the first year of the FWBC era.

The impact of changes in workplace practices on construction industry productivity

Productivity gains in the Taskforce/ABCC era

While the productivity indicators listed above are not directly comparable, they all indicate that the significant productivity outperformance in the construction industry began to appear around 2002/03 and continued to develop over several years. This supports the interpretation that it was the activities of the Taskforce (established in late 2002) and, more importantly, the ABCC (established in October 2005) that made a major difference. That is, while general industrial relations reforms provided a more productivity-friendly environment, it was the ABCC (with its enforcement powers) which made a significant impact on building and construction industry productivity.

As seen above, after considering the latest economic data, case studies and other research, the estimated magnitude of the productivity gain under the Taskforce/ABCC era ranges between 10 and 21.1 per cent, depending on the measure and the source of information that is used. However, after excluding the effects on industry productivity of recent compositional change in favour of engineering construction, the indicated productivity gain from the Taskforce/ABCC is towards the bottom of this range. In light of this, we conservatively use a productivity gain of 9.4 per cent, because this is the same scenario that has been modelled in previous updates of this report.

Productivity losses in the FWBC era

As detailed above, replacing the ABCC with the FWBC has meant that the regulatory environment has largely been returned to that of the pre-Taskforce/ABCC era, when regulation of the workplace in the building and construction industry was similar to that of other industries. This runs counter to the recommendations of the Cole Royal Commission. Likewise, it does not heed the evidence in our earlier reports that the industry-specific regulation by the Taskforce and the ABCC has led to a substantial boost to building and construction industry productivity.

Because the building industry-specific nature of regulation in the Taskforce/ABCC era has been almost completely removed, it is reasonable to expect that most or all of the productivity gains achieved during the Taskforce/ABCC era will also be lost. This would justify an assumption that 100 per cent of the productivity gains will be lost in the FWBC era.

However, just as the productivity gains of the Taskforce/ABCC era developed gradually over several years, those gains are likely to be lost over a similar timeframe in the FWBC era. The fact that more than one half of the improvement in working days lost in the Taskforce/ABCC era has already been

relinquished in the first year of operation of the FWBC era is not a good sign. However, several years more data will be needed before the full loss of the productivity gains can be confirmed. In the meantime, this report adopts the conservative assumption that only 75 per cent of the productivity gains will be lost. That is, it is assumed that replacing the ABCC with the FWBC will result in the productivity gains generated by the Taskforce and ABCC being wound back by 75 per cent.

The main remaining feature of the Taskforce/ABCC era is that there is still an industry-specific regulator in the form of the FWBC. However, this is likely to be of little benefit in preserving the productivity gains of Taskforce/ABCC era. This is because the FWBC largely lacks the support of the industry-specific approach to regulation that was recommended by the Cole Royal Commission and successfully exercised by the Taskforce/ABCC.

Modelling the impact of changes to workplace practices

The Independent CGE model of the Australian economy is used to estimate the long-term economy-wide impacts of changes to workplace practices. The following three scenarios were developed.

- A “Baseline Scenario” provides a snapshot of the Australian economy representing the workplace practices in place before the Taskforce and ABCC era.
- An “ABCC Scenario” provides a snapshot of the Australian economy with higher productivity in the construction industry due to improved workplace practices resulting from the ABCC, Taskforce and industrial relations reforms in the years to 2006. That is, productivity in the construction industry is 9.4 per cent higher than in the baseline scenario.
- An “FWBC Scenario” provides a snapshot of the Australian economy where 75 per cent of the productivity boost achieved in the Taskforce/ABCC era is unwound in the FWBC era. This deliberately-conservative estimate can be refined in future annual updates as more data on the FWBC era becomes available.

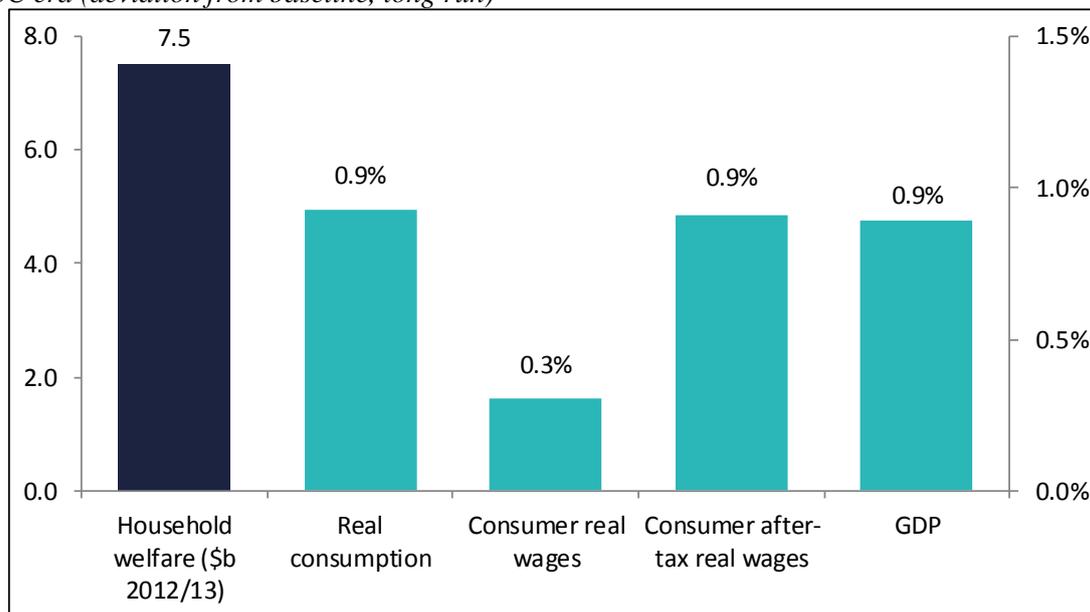
The economic benefits of improved workplace practices in the Taskforce/ABCC era are estimated as the difference between the ABCC scenario and the baseline scenario. The economic losses from the less productive workplace practices during the FWBC era are estimated as the difference between the FWBC scenario and the ABCC scenario.

Economic impact of improved workplace practices in the Taskforce/ABCC era

This section presents the economy-wide effects of improved workplace practices in the construction industry resulting from the ABCC, Taskforce and industrial relations reforms in the years to 2006. As discussed above, these have been estimated using the Independent CGE model. Chart A below summarises the key impacts of these improved workplace practices which, as explained above, are assumed to have boosted building and construction industry productivity by 9.4 per cent.

The improvements in labour productivity during the Taskforce and ABCC era have lowered construction costs, relative to what they would otherwise be. This in turn reduces costs across the economy, as both the private and government sectors are significant users of commercial building and engineering construction.

Chart A. National macro-economic effects of improved workplace practices during the Taskforce and ABCC era (deviation from baseline, long run)



Source: Independent CGE model simulations

Note: The results refer to permanent effects on the levels, not growth rates, of indicators relative to what they otherwise would be. For example, the ABCC Scenario shows a gain of 0.9% in the level of GDP relative to what it would otherwise be, and not its annual growth rate.

In the private sector, the cost savings to each industry from lower costs for buildings and engineering construction flow through to households in the form of lower consumer prices. This is reflected in the gain of 0.3 per cent in consumer real wages seen in Chart A.

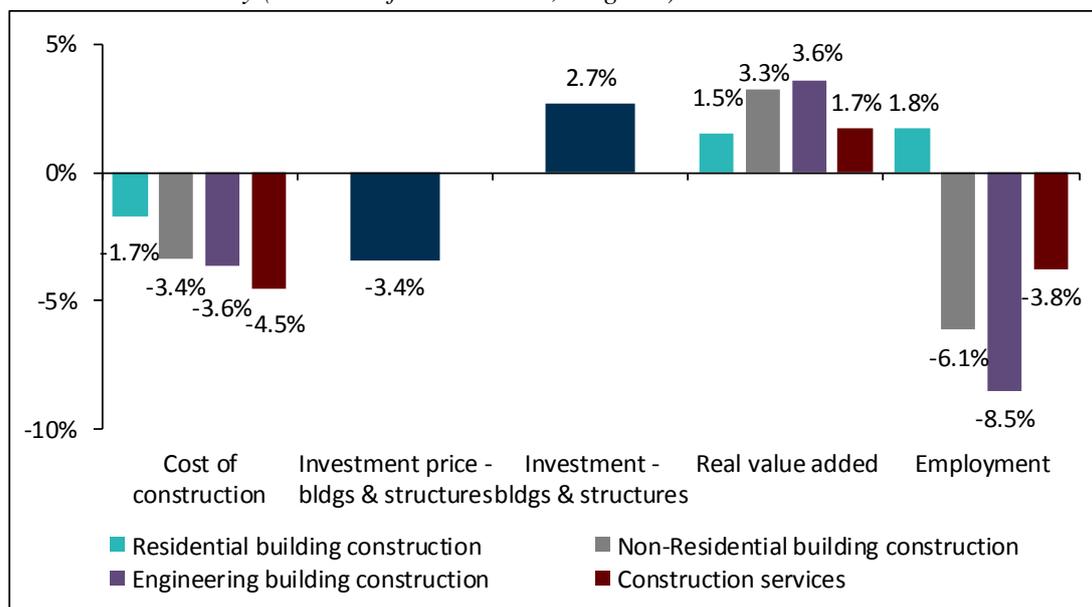
In the government sector, the budget saving from the lower cost of public investment in schools, hospitals, roads and other infrastructure is assumed to be passed on to households in the form of a cut in personal income tax. This boosts the gain in consumer real wages from 0.3 per cent on a pre-tax basis, to 0.9 per cent on a post-tax basis, as seen in Chart A. Consumers are better off by \$7.5 billion on an annual basis, in current (2012/13) dollars.

After allowing for economic growth over the last year, this is consistent with the consumer gain estimated in the 2012 report of \$6.3 billion in 2011/12 terms⁶. The estimate of consumer gains is similar across reports, since each report has consistently modelled a productivity gain of the same magnitude (9.4 per cent) and from the same source (improved workplace practices in the building and construction industry). Chart B summarises the effects on the building and construction industry.

The ABCC Scenario confirms that higher productivity in the construction industry lowers its costs, leading to lower prices for new construction. This stimulates demand for new construction, leading to a significant permanent gain in construction activity of 2.1 per cent.

⁶ An additional factor raising the estimated gain in living standards in this report compared to the 2012 report is the improved modelling approach, which now recognises the value that consumers place on their leisure time.

Chart B. Effect of improved workplace practices during the Taskforce and ABCC era on the building and construction industry (deviation from baseline, long run)



Source: Independent CGE model simulations

The industry subsectors more fully under the jurisdiction of the ABCC, non-residential building and engineering construction, experience larger labour productivity gains and hence have larger activity gains of 3.3 per cent and 3.6 per cent respectively. For residential building, multi-unit complexes were within the jurisdiction of the ABCC but houses were not, leading to a smaller labour productivity gain and a commensurately smaller activity gain of 1.5 per cent. Construction trade services, such as site preparation, electrical, plumbing and plastering services, are delivered across the entire construction industry, so they share in the gains in activity in the other three subsectors, with a gain of 1.7 per cent.

Labour saving from higher productivity leads to employment losses in non-residential building and engineering construction. However, some displaced construction workers migrate to residential building, which experiences an employment gain, while there are also employment gains in other industries, leading to no overall job loss in aggregate.

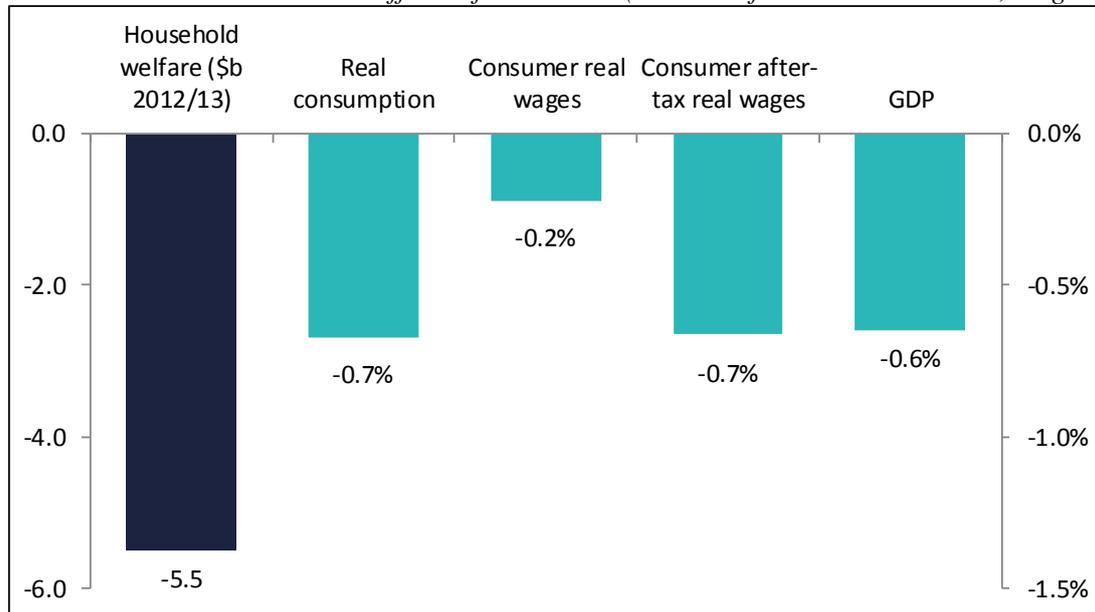
Economic impact of less productive workplace practices during the FWBC era

This section presents the economy-wide effects from less productive workplace practices in the construction industry resulting from replacing the ABCC with the FWBC. As explained above, it is conservatively assumed that 75 per cent of the productivity gains from the Taskforce/ABCC era are lost in the FWBC era. Thus, the results in this section show economic losses that are around 75 per cent of the magnitude of the economic gains shown in the previous section. Given the economic drivers are the same, the explanation here can be briefer, to avoid unnecessary repetition.

Chart C summarises the key impacts from this loss in productivity. A key result is that construction costs are higher. In the private sector, the additional construction costs flow through to households in the form of higher consumer prices, while in the government sector higher construction costs are paid for by raising personal income tax rates. These two effects combine to generate a loss in consumer

real wages of 0.7 per cent on a post-tax basis, as seen in Chart C. Lower real after-tax wages leave consumers worse off by \$5.5 billion on an annual basis.

Chart C. National macro-economic effects of FWBC era (deviation from ABCC scenario, long run)

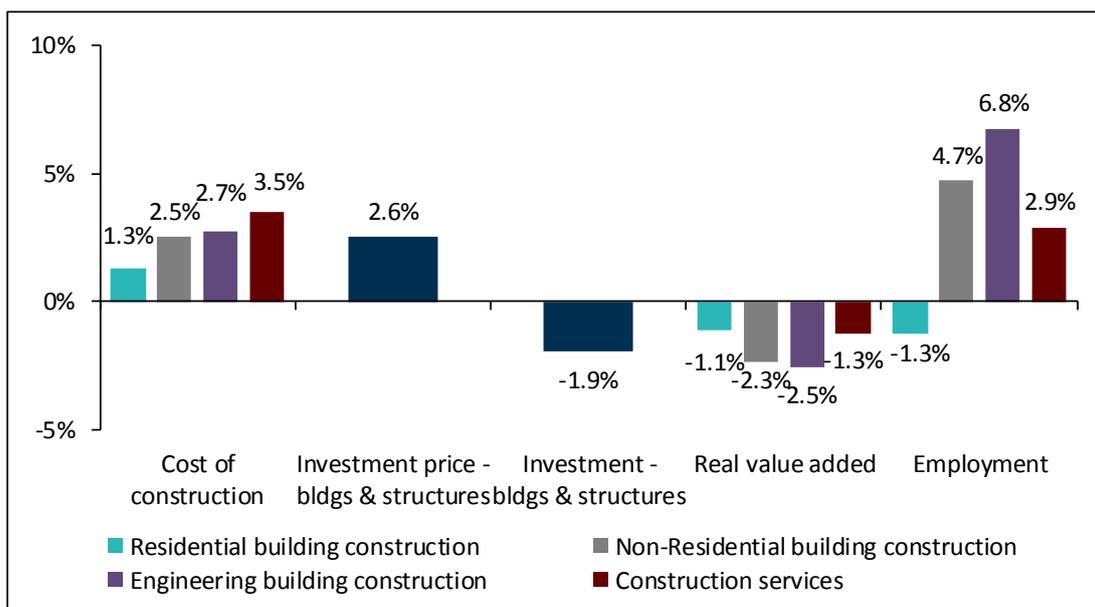


Source: Independent CGE model simulations

Note: The results refer to permanent effects on the levels, not growth rates, of indicators.

Higher construction costs also reduce demand for new construction, leading to a permanent loss in construction activity of 1.5 per cent. This includes losses of 2.3 per cent for non-residential building construction, 2.5 per cent for engineering construction, 1.1 per cent for residential construction and 1.3 per cent for construction trade services. Chart D summarises these effects.

Chart D. Building & construction industry effects of FWBC era (deviation from ABCC scenario, long run)



Source: Independent CGE model simulations

1 Introduction

Econtech Pty Ltd (now trading as Independent Economics) has analysed trends in construction industry productivity since 2007. The original 2007 report, which was commissioned by the Office of the Australian Building and Construction Commissioner (ABCC), found that reforms in the building and construction industry, including those recommended by the Cole Royal Commission, had improved work practices, lifting productivity. It also modelled the flow on effects to the wider economy from this productivity outperformance in the building and construction industry, showing significant benefits for consumers. The original report was updated for the ABCC in 2008. Since then, Master Builders Australia (MBA) has commissioned updates in 2009, 2010 and 2012, as well as this latest update. The data analysed for each update has consistently confirmed the original findings.

This 2013 report, like the previous reports, assesses the impact on productivity of the earlier industry reforms. These include the regulation of the industry by both the Building Industry Taskforce (Taskforce) and its successor the ABCC, as well as the industrial relations reforms in the years to 2006.

In addition, this report also considers, for the first time, the impact on productivity of recent developments in the industry reform process. Specifically, on 1 June 2012, the ABCC was abolished and a new agency, the Office of the Fair Work Building Industry Inspectorate (also known as Fair Work Building and Construction or FWBC), was established in its place to regulate the building and construction industry. The broad aim of establishing the FWBC was to bring the industry's regulation back much more closely into line with those of other industries.

This represents a reversal of the approach that was recommended by the Cole Royal Commission and implemented through the Taskforce/ABCC of tailoring regulation to the building and construction industry. This raises the question of whether the FWBC era will see a partial or complete reversal of the industry's productivity outperformance achieved in the Taskforce/ABCC era.

Thus, while our earlier reports focused on the industry's productivity performance across two regulatory regimes (pre and post Taskforce/ABCC), this report analyses industry productivity across three regimes:

- **the pre-Taskforce/ABCC era** – the period prior to the establishment of the Taskforce and ABCC (up to and including 2002);
- **the Taskforce/ABCC era** – the period of operation for the Taskforce and ABCC (between 2002 and mid-2012); and
- **the FWBC era** – from mid-2012 onwards, when the FWBC was established.

Section 2 of this report begins by comparing workplace relations regulations during the three regimes. A particular focus is on determining the extent to which the industry environment and regulations associated with the FWBC represent a return to the circumstances that prevailed prior to the Taskforce and ABCC. This can be used to indicate the extent to which the productivity gains achieved during the Taskforce and ABCC era are likely to be preserved in the FWBC era.

Next, the latest data on construction industry productivity from a variety of sources is examined to provide an up-to-date analysis of trends in construction industry productivity and the factors driving these trends. In line with earlier reports, three types of productivity indicators are assessed to determine the extent of any shifts in industry productivity from changes in industry regulation. It compares construction industry productivity between different years, between the commercial and domestic construction sides of the industry and between individual projects completed before and after changes to workplace practices. It then assesses the source of these productivity changes.

Using both the analysis of the nature of the three regulatory regimes and the productivity data, conclusions are drawn on the impact on productivity in the building and construction industry from the regulatory changes. First, the boost to productivity from improved workplace practices associated with the Taskforce and ABCC is estimated. Second, the extent to which this productivity boost is expected to be preserved under the FWBC regime is also estimated.

Section 3 of this report describes how these productivity effects are introduced into an economy-wide model to estimate the impacts of the regulatory changes in the construction industry on the Australian economy as a whole. This economy-wide modelling is undertaken using Independent Economics' Computable General Equilibrium model, the Independent CGE model.

This modelling provides estimates of the long-term effects on activity in the construction industry and other industries from changes to the productivity of the construction industry. Importantly, it also estimates the permanent, flow-on impacts to consumers from changes in construction industry productivity. Section 4 presents estimates of the economic impacts of the change in productivity from the Taskforce/ABCC era while section 5 presents analogous estimates for the FWBC era.

While all care, skill and consideration has been used in the preparation of this report, the findings refer to the terms of reference of Master Builders Australia Ltd and are designed to be used only for the specific purpose set out below. If you believe that your terms of reference are different from those set out below, or you wish to use this report or information contained within it for another purpose, please contact us.

The specific purpose of this 2013 report is to fully update the economic analysis performed in the 2007, 2008, 2009, 2010 and 2012 reports for new developments since February 2012.

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 Independent Economics up to the date of this report and so its findings may be affected by new information. The information in this report does not represent advice, whether express or inferred, as to the performance of any investment. Should you require clarification of any material, please contact us.

2 The impact of changes in workplace practices on building and construction industry productivity

This section provides an analysis of productivity trends in the building and construction industry, including the magnitude and sources of these trends. As mentioned in the introduction, this report analyses industry productivity across three time periods, which are:

- **the pre-Taskforce/ABCC era** – the period prior to the establishment of the Taskforce and ABCC (up to and including 2002);
- **the Taskforce/ABCC era** – the period of operation for the Taskforce and ABCC (between 2002 and mid-2012); and
- **the FWBC era** – from mid-2012 onwards, when the FWBC was established.

First, the workplace environment in each of the three eras is reviewed in section 2.1. Section 2.2 analyses historical productivity trends in the building and construction industry, and compares the performance of the industry to the economy as a whole. Finally, based on this evidence, section 2.3 draws conclusions about the effect of changes in work practices on productivity in the building and construction industry.

2.1 Workplace practices in the building and construction industry

This section discusses changes in the workplace environment in the building and construction industry in each of the three regulatory regimes. It assesses the expected effect of the regulatory arrangements on the industry's productivity. The industry environment and regulatory changes are analysed for each of the three regimes in turn.

2.1.1 Before the Taskforce and ABCC

In 2001, the Royal Commission into the Building and Construction Industry (Cole Royal Commission) was established to review the conduct and practices in the Australian building and construction industry. The final Cole Royal Commission Report⁷ was released in 2003 and concluded that there was widespread misconduct and poor work practices in the industry.

The Cole Royal Commission found that the industry's productivity performance was below that of the market sector average. For example, Tasman Economics⁸ found that, between 1988/89 and 1999/00, multifactor productivity grew by 15.3 per cent in the market sector. By comparison, multifactor productivity in the construction sector grew by only 4.3 per cent over the same period.

⁷ Royal Commissioner, the Honourable Terence Rhoderic Hudson Cole RFD QC, *Final Report of the Royal Commission into the Building and Construction Industry: Summary of Findings and Recommendations*, February 2003

⁸ Tasman Economics, *Productivity and the Building and Construction Industry*, Discussion Paper 17, prepared for the Royal Commission into the Building and Construction Industry, 2002

The Cole Royal Commission linked this poor productivity performance to the poor work practices in the industry. For example, the Cole Royal Commission found that:

- industry participants engaged in unlawful and inappropriate behaviour;
- pattern bargaining resulted in rigid employment structures including “commonality of wages and conditions, fixed hours of work, fixed rostered days off and limited flexibility”⁹; and
- there was “widespread application of, and surrender to, inappropriate industrial pressure”¹⁰.

Importantly, the Cole Royal Commission found that unions had assumed control of managing construction projects, rather than head contractors and major subcontractors, and that this was detrimental to the industry and overall economy. That is, while in all other industries it is clear that employers are responsible for managing their businesses, the reverse was true in the construction industry. The Cole Royal Commission identified that attitudinal change was required to solve this problem and that the “benefits to the industry and the Australian economy from improved productivity flowing from this cultural change are very significant”¹¹.

Based on its investigations, the Cole Royal Commission concluded that these problems occurred because of the unique structure of the building and construction industry. Head contractors had an “unwillingness and incapacity ... to respond to unlawful industrial conduct causing them loss”¹². Short term profitability considerations together with the importance of building a reputation for on-time delivery meant that contractors preferred to quickly resolve issues rather than become involved in long conflicts¹³. As such, contractors tended to concede to union demands for reasons of commercial expediency.

In addition, limited international competition in the construction industry means that unions have more scope to impose work practices that impede productivity. Lower productivity leads to higher costs for construction projects, and these are passed on to the clients of the construction industry – government and businesses – who in turn pass them on to households in the form of higher consumer prices and taxes.

The Cole Royal Commission concluded that the conditions in the Australian building and construction industry were unlike those in other industries.

*These findings demonstrate an industry which departs from the standards of commercial and industrial conduct exhibited in the rest of the Australian economy. They mark the industry as singular. They indicate an urgent need for structural and cultural reform.*¹⁴

Despite these unique features, the laws and regulations used to govern workplace relations in the building and construction industry were the same as in all other industries. The Cole Royal Commission found that the legal processes “available to enforce industrial or civil rights, and to

⁹ Royal Commissioner, the Honourable Terence Rhoderic Hudson Cole RFD QC, *Final Report of the Royal Commission into the Building and Construction Industry: Summary of Findings and Recommendations*, February 2003, p12

¹⁰ Ibid., p5.

¹¹ Ibid., p4.

¹² Ibid., p11.

¹³ Ibid., p11.

¹⁴ Ibid., p6

recover losses are slow, cumbersome and expensive”¹⁵, and that this had contributed to the atypical environment in the building and construction industry.

In response to these special circumstances in the building and construction industry, the Cole Royal Commission recommended that mechanisms be put in place to restore the rule of law, with significant penalties for those breaching the law. The Cole Royal Commission recommended that an “Act of special application to the building and construction industry”¹⁶ be put in place, as well as codes of practice for the industry. The Cole Royal Commission also recommended that an independent commission be established to monitor the conduct of the industry.

2.1.2 The Taskforce and ABCC era

In response to the recommendations of the Cole Royal Commission, laws and regulations governing the building and construction industry were introduced and strengthened. The Building Industry Taskforce (the Taskforce) was established in 2002¹⁷, and given increased responsibility and regulatory powers. In 2005, the *Building and Construction Industry Improvement Act 2005* (BCII Act) established the ABCC, among other things. The ABCC was provided with powers to monitor, investigate and enforce the laws and guidelines in the building and construction industry. These building industry-specific reforms built on the more general workplace relations reforms that were implemented across the economy in the years to 2006.

The main building industry-specific reforms associated with the Taskforce and ABCC are briefly listed below. These reforms are then discussed in more detail in the following section.

- The National Code of Practice for the Construction Industry (the National Code) and the associated Implementation Guidelines (Guidelines) were strengthened. The National Code and Guidelines seek to influence work practices in the building and construction industry by setting “employer and employee standards relating to the performance of building and construction work and to conditions for bidding for Commonwealth funded construction work”¹⁸.
- Broader forms of industrial action were made unlawful in the building and construction industry compared to other industries.
- The maximum penalties for unlawful conduct in the building and construction industry were trebled.
- The ABCC was given powers to compulsorily acquire information either through compelling a person to attend an examination and answer questions, or through obtaining documents relevant to an investigation.

¹⁵ Ibid., p13

¹⁶ Ibid., p13

¹⁷ The *Interim* Building Industry Task Force was set up in response to the first report of the Cole Royal Commission in November 2002. In April 2003, the operation of the Building Industry Task Force was extended, pending the establishment of the then proposed ABCC. In March 2004, it was announced that the taskforce would become a permanent body, and would operate until the ABCC was established. For more information, see the following link.
http://www.aph.gov.au/Parliamentary_Business/Bills_Legislation/bd/bd0405/05bd139

¹⁸ Parliamentary Library, *Building and Construction Industry Improvement Amendment (Transition to Fair Work) Bill 2011*, Bills Digest No. 80, 2011-12, November 2011, p4.

- The ABCC was able to initiate proceedings on matters which have already been settled between the parties.
- Greater restrictions were placed on the right of union representatives to enter construction sites.

The reforms respond to the issues identified in the Cole Royal Commission and address the problems that arise from the unique circumstances of the building and construction industry. Therefore, they are expected to have improved work practices and labour productivity in the construction industry. These gains have been quantified by analysing the data presented in section 2.2.

Despite the productivity gains associated with the Taskforce and the ABCC, the ABCC was abolished in mid-2012. The following section compares the building industry-specific policies associated with the Taskforce and ABCC with those related to their replacement, the FWBC. In doing so, it includes a more detailed discussion of the policies listed above. As discussed in the following section, the reforms associated with the FWBC are likely to result in an unwinding of the productivity gains achieved during the Taskforce and ABCC era.

2.1.3 The FWBC era

In mid-2012 the FWBC was established, replacing the ABCC. Compared to the Taskforce and ABCC era, the regulatory environment enforced by the FWBC is more lenient and penalties are lower. The jurisdiction of the FWBC has also been narrowed, and its powers of investigation weakened.

Despite the unique problems in the building and construction industry, as identified in section 2.1.1, these changes have been implemented with the aim of shifting the industry's regulations to much more closely resemble regulations in other industries. This represents a return to close to the situation in place in the pre-Taskforce and ABCC era. This return has occurred despite the following conclusion of the 2009 Wilcox report.

However, the ABCC's work is not yet done. Although I accept there has been a big improvement in building industry behaviour during recent years, some problems remain. It would be unfortunate if the inclusion of the ABCC in the OFWO¹⁹ led to a reversal of the progress that has been made.²⁰

Therefore, dismantling the reforms of the Taskforce and ABCC era is likely to allow the workplace environment to deteriorate towards the situation identified by the Cole Royal Commission, as discussed in section 2.1.1. This section seeks to identify the extent to which this deterioration is likely to occur, to assess the extent to which the productivity gains generated in the Taskforce and ABCC era are likely to be wound back.

This section first considers the extent to which the building industry code and guidelines have been returned to the pre-Taskforce/ABCC era. Following this, it examines the extent to which the functions and powers of the FWBC are weaker than those of the Taskforce/ABCC. It then considers whether there has been any change to the underlying circumstances necessitating building industry-

¹⁹ Office of the Fair Work Ombudsman

²⁰ Wilcox, M, *Transition to Fair Work Australia for the Building and Construction Industry*, March 2009, p14.

specific regulations. Finally, an assessment is made of the extent to which these factors indicate a return to the pre-Taskforce/ABCC workplace relations environment.

Weaker building industry code and guidelines

As noted in the previous section, the National Code and Guidelines seek to influence work practices by setting standards for building and construction work. Most importantly, if a contractor does not abide by the National Code in all of its projects, then it is unable to bid for Commonwealth-funded work. Since the Commonwealth Government is a large procurer of construction services, the National Code and Guidelines can assert considerable influence over the industry.

The establishment and enforcement of such Guidelines was a key recommendation of the Cole Royal Commission. Therefore, during the Taskforce and ABCC eras, the Guidelines were progressively strengthened. The Taskforce and ABCC had responsibility for enforcing the Guidelines.

However, from August 2009, “less stringent”²¹ Guidelines have operated. More importantly, wide-ranging changes were implemented in May 2012. Following these changes, the Guidelines “no longer try to impose formal requirements upon the construction industry that do not apply to employers and employees elsewhere in the labour market”²². Since February 2013, a new Code has applied which involves some further weakening of restrictions on right of entry requirements and enterprise bargaining²³.

State governments have expressed concern that the weakened National Code and Guidelines are likely to increase the cost of state construction projects.^{24, 25, 26} Therefore, the Victorian, NSW and Queensland governments have strengthened their own State Guidelines in 2013²⁷. However, it is unclear whether these guidelines are able to be applied by State governments, and so their impact on productivity cannot yet be assessed.²⁸

More limited function and weaker powers of the FWBC

On 1 June 2012, the ABCC was abolished and replaced by the FWBC. This change was brought about by the *Fair Work (Building Industry) Act 2012*, which reversed or modified many of the provisions in the BCII Act. The changes aim to remove the building-industry specific industrial law that was designed to address the problems that were specific to the building industry. As such, there has been a reversal of the industry reform implemented throughout the Taskforce and ABCC era.

There are several main areas in which the functions and powers of the ABCC and FWBC can be compared. These are summarised in Table 2.1 and discussed below.

²¹ Parliamentary Library, *Building and Construction Industry Improvement Amendment (Transition to Fair Work) Bill 2011*, Bills Digest No. 80, 2011-12, November 2011, p4.

²² Creighton, B; ‘Government procurement as a vehicle for workplace relations reform: the case for the national code of practice for the construction industry’, *Federal Law Review*, Vol. 40 (3), 2012, p364

²³ Gadens Lawyers, ‘Don’t be ‘blindsided’ by the new Building Code 2013’, www.gadens.com.au; viewed 16/08/2013.

²⁴ The Hon Robert Clark MP, *CCU to target work site conduct under revised construction guidelines* [Press Release], 20 May 2013

²⁵ Mike Baird MP, *Delivering value on infrastructure – construction guidelines now in force* [Press Release], 1 July 2013

²⁶ Jarrod Bleijie, *Feedback sought on construction code guidelines*, [Press Release], 4 March 2013

²⁷ Workplace Express, *Eastern States line up on construction*, 22 March 2013, www.workplaceexpress.com.au, viewed 16 July 2013.

²⁸ Corrs Chambers Westgarth, *Federal Court Rules on the Interaction Between the Victorian Construction Code and Implementation Guidelines and the Adverse Action Provisions*, 28 May 2013 www.corrs.com.au viewed 1 August 2013.

Table 2.1: Comparison of ABCC and FWBC regulatory regimes

Aspect	Pre Taskforce / ABCC	Taskforce / ABCC	FWBC
Unlawful industrial action definition	Same as all other industries	Building industry faces stronger regulations than other industries	Same as all other industries
Penalties	Same as all other industries	Building industry faces penalties three times higher than other industries	Same as all other industries
Powers to obtain information	Same as all other industries	Strong powers to acquire information: <ul style="list-style-type: none"> • able to compulsorily require a person to attend an examination and answer questions • able to ensure confidentiality of examinations 	Additional powers still exist but are restricted: <ul style="list-style-type: none"> • use of powers needs to be approved on a case-by-case basis • Independent Assessor can determine that the powers do not apply to particular projects • sunset clause means that powers lapse after three years and will be reviewed
Settled proceedings	Not Applicable	Able to initiate fresh proceedings on matters already settled between parties	Not able to initiate fresh proceedings on matters already settled between parties
Right of entry	Loose restrictions	Tighter restrictions	Loose restrictions
Jurisdiction (definition of building work)	Not Applicable	Broad coverage Includes pre-fabrication of made to order components, but excludes <ul style="list-style-type: none"> • mining and extractive activities • domestic building if fewer than four units 	Narrower coverage, excluding <ul style="list-style-type: none"> • off-site prefabrication on permanent manufacturing site • mining and extractive activities • domestic building if fewer than four units
Minister's role	Not Applicable	Minister not able to give directions about the policies, programs and priorities	Minister able to give directions about the policies, programs and priorities
Reporting	Not Applicable	Required to report on: <ul style="list-style-type: none"> • number and type of matters investigated • assistance to employees • compliance with Building Code 	Not required to report on: <ul style="list-style-type: none"> • number and type of matters investigated • assistance to employees • compliance with Building Code

Sources: Parliamentary Library, *Building and Construction Industry Improvement Amendment (Transition to Fair Work) Bill 2011*, Bills Digest No. 80, 2011-12, November 2011
Parliament of the Commonwealth of Australia, *Building and Construction Industry Improvement Amendment (Transition to Fair Work) Bill 2012*, Revised Explanatory Memorandum

The changes listed in Table 2.1 above all represent a dilution of the FWBCs powers and functions, shifting regulation in the building and construction industry back close to the pre-Taskforce and ABCC era. Of these changes, five stand out as key differences between the ABCC and the FWBC.

First, one of the most important differences is that the circumstances under which industrial action attracts penalties have been narrowed. Under the ABCC, the definition of unlawful industrial action applied to the building industry was more comprehensive than for other industries. This broader definition was removed with the introduction of the FWBC.²⁹

Second, under the ABCC, the building and construction industry faced higher penalties for breaching industrial law compared to other industries. This is no longer the case. When the FWBC was introduced, penalties were cut to 30 per cent of their previous levels. The maximum penalty for a body corporate was cut from \$110,000 to \$33,000 and for individuals it was cut from \$22,000 to \$6,600. (In December 2012 all penalties in Commonwealth statutes were increased,³⁰ but this does not mean that the building industry faces higher penalties than other industries.)

Third, the FWBC has a more limited ability to use its compulsory examination powers compared to the ABCC. The FWBC retains the ABCC's power to compulsorily obtain information. However, the use of these powers is more restricted under the FWBC.

In its 2009/10 annual report, the ABCC noted that “the use of the compliance powers has assisted investigations which otherwise would have stalled. Often witnesses are reluctant to assist the ABCC Inspectors voluntarily as they are fearful of retribution. In these circumstances, many witnesses prefer that they are subject to the compliance powers before they provide information”.³¹ Based on this observation, restrictions on these powers would be expected to hinder the effectiveness of the FWBC.

Despite this, the use of these powers experienced a sharp decline the following year, 2010/11, and remained low in 2011/12. This is shown in Table 2.2. The 2010/11 ABCC annual report attributes the sudden decline to “a change of investigative technique, a shift in agency emphasis and [sic] consistent communication to the industry by the ABCC and increased voluntary compliance by parties”³².

²⁹ Parliament of the Commonwealth of Australia, *Building and Construction Industry Improvement Amendment (Transition to Fair Work) Bill 2012*, Revised Explanatory Memorandum

³⁰ FWBC, *Penalties for Breaches of Workplace Relations Law Rise by 54.5 per cent*, January 2013, www.fwbc.gov.au, viewed 1 August 2013.

³¹ ABCC Annual report 2009/10, pg 43

³² ABCC Annual report 2010/11, pg 49

Table 2.2 Number of examinations undertaken by the ABCC and FWBC by type of examinee

	2006/07	2007/08	2008/09	2009/10	2010/11	2011/12*	2011/12*
						July '11 - May '12	Jun '12
Employee	15	36	39	23	2	2	0
Union	4	2	1	0	0	0	0
Management	1	15	20	14	4	1	1
Other	0	1	0	0	0	0	0
Total	20	54	60	37	6	3	1

Source: ABCC and FWBC Annual Reports

Note: * For the 2011/12 financial year, the ABCC published a report for the period from 1 July 2011 to 31 May 2012. The FWBC published an annual report for June 2012. In this annual report, the FWBC noted that it issued no new examination notices. The single examination it conducted in June 2012 was from an investigation that was continuing from the ABCC.

It is likely that the main factor driving the sharp reduction in the number of examinations is the “change of investigative technique” and “shift in agency emphasis”. This is because it is unlikely that such a large and sudden reduction in the number of examinations can be attributed entirely to “increased voluntary compliance”. If such cultural improvements were the primary driver, then similar reductions in examinations are also likely to have been observed in previous years, but this was not the case.

The sharp reduction in examinations observed from 2010/11 is likely to be carried through to the FWBC. As outlined above, the FWBC faces restrictions on the use of its powers to obtain information. This is likely to hinder its use of examination powers in its investigations. As a result, the effectiveness of the FWBC in enforcing the regulations is likely to be lower than for the ABCC.

Fourth, the FWBC cannot continue to participate in proceedings or initiate fresh proceedings on matters which have already been settled between the parties. In contrast, the ABCC was able to do so. This is an important change because, as discussed in section 2.1.1, the Cole Royal Commission concluded that head contractors in the building and construction industry tend to concede to union demands for reasons of short-term commercial expediency, even if there has been some unlawful conduct. Therefore, preventing the FWBC from continuing or initiating proceedings on matters which have been settled can allow unlawful practice and the associated losses to occur without penalty, which is detrimental to the productivity of the industry. Recognising this, the Law Council of Australia concluded that this change is likely to “significantly impact the ability of the independent regulator to enforce compliance with the relevant legislation in the building and construction industry.”³³

Fifth, the right for union representatives to enter work sites has been expanded. The Cole Royal Commission concluded that the ‘right of entry’ provisions were being abused and exploited by unions. Right of entry is intended to be exercised for the purpose of investigating a suspected breach of relevant awards or laws. However, unions were able to abuse this provision because there was no

³³ Law Council of Australia, Law Council raises concerns about dilution of building and construction industry regulator’s role [Press Release], 8 March 2012.

requirement that they specify the nature of the breach that they suspected. This resulted in “union officials acting with the apparent belief that their right of entry was effectively unlimited”³⁴, and meant that they could extend their influence over the work site.

During the Taskforce and ABCC era, the right of entry provisions were modified to prevent this abuse. Unions were required to establish the nature of their concern before gaining entry. In addition, the ABCC was notified when a union official intended to visit a work site, and was able to attend the inspection. As a result, the Wilcox report noted that the “quite remarkable transformation in the industry was most commonly attributed by respondents to those legislative changes which prevent union officials from accessing worksites unannounced and disrupting work and calling stoppages. Commonly, union officials justified such action by citing a spurious or marginal safety issue.”³⁵

Together with the introduction of the FWBC, these restrictions on right of entry have been wound back, first in 2012 and again in 2013. Importantly, union officials can now enter work sites for purposes as broad as “to hold discussions with potential members”³⁶. This open access to work sites is similar to the situation identified by the Cole Royal Commission, and therefore is likely to allow abuse of the right of entry to re-occur.

Therefore, the changes in these five main areas associated with the establishment of the FWBC represent virtually a full unwinding of the building industry regulations that were implemented during the Taskforce and ABCC era. The main remaining feature from the Taskforce and ABCC era is that the building and construction industry still has its own regulator. However, because it does not have the strong building industry-specific legislation and powers that were held by the Taskforce and ABCC, the simple existence of a building industry-specific regulator is unlikely to be able to contribute much to workplace practices in the industry.

Importantly, this unwinding of the building industry-specific regulations has occurred even though there has been no change to the unique underlying circumstances which necessitated the reforms. This is discussed below.

Unique circumstances in the building and construction industry unchanged

Together with change in the regulatory environment, developments in the underlying circumstances in the building and construction industry are central to understanding the effect of the FWBC on productivity. Given that the reforms implemented during the Taskforce and FWBC era have been largely wound back, if the circumstances necessitating these reforms remain, then it can be expected that the productivity gains generated during the Taskforce and ABCC era would be largely lost.

Two of the main factors contributing to poor work practices in the building and construction industry are still present. These factors were identified in section 2.1.1.

- Firstly, commercial pressures on head contractors are unlikely to have reduced since the Taskforce/ABCC era. They still require a focus on short-term project profitability and the need to maintain a reputation for on-time delivery. Therefore, in the current environment,

³⁴ Royal Commissioner, the Honourable Terence Rhoderic Hudson Cole RFD QC, *Final Report of the Royal Commission into the Building and Construction Industry: Summary of Findings and Recommendations*, February 2003

³⁵ Wilcox, M, *Transition to Fair Work Australia for the Building and Construction Industry*, March 2009, p51.

³⁶ Fair Work Ombudsman, Right of Entry Fact Sheet, www.fairwork.gov.au, viewed 7 August, 2013

contractors are still likely to concede to union demands rather than become involved in long disputes.

- Secondly, the construction industry faces limited international competition. Since unions have an industry-wide influence, this limited international competition still gives unions scope to exert pressure for work practices that inhibit productivity.

The question of whether permanent cultural change has been achieved by the ABCC is also important. In 2009, the Honourable Murray Wilcox QC reported on his consultations in the building and construction industry, commissioned by the Government. He found that, in 2009, unlawfulness and inappropriate conduct was still present in the industry.

I am satisfied there is still such a level of industrial unlawfulness in the building and construction industry, especially in Victoria and Western Australia, that it would be inadvisable not to empower the BCD³⁷ to undertake compulsory interrogation. The reality is that, without such a power, some types of contravention would be almost impossible to prove.³⁸

Considering the above, the unique underlying circumstances in the building and construction industry leading to unlawful behaviour and productivity losses are unlikely to have significantly changed since the time of the Cole Royal Commission.

This suggests that regulations and enforcement activities specific to the building industry are still required to achieve efficient work practices. By the same token, the return to the pre-Taskforce/ABCC regulatory environment is likely to lead to the reversal of the productivity gains achieved during the Taskforce/ABCC era.

³⁷ BCD refers to the 'Building and Construction Division' which went on to become the FWBC.

³⁸ Wilcox, M, *Transition to Fair Work Australia for the Building and Construction Industry*, March 2009, p3.

2.2 Productivity comparisons in the building and construction industry

The previous section reviewed the changes to the workplace relations environment and found that, while a significant improvement in building and construction industry productivity is expected to have occurred during the Taskforce and ABCC era, this is expected to be largely unwound during the FWBC era.

To test these expectations, this section provides an analysis of productivity trends in the building and construction industry over the three time periods considered in this report. The focus is on determining whether or not productivity in the industry has outperformed/underperformed productivity in the wider economy. Similar to our earlier reports, we perform several types of productivity comparisons.

- **Year-to-year** comparisons of building and construction industry productivity are made using data from the Australian Bureau of Statistics (ABS), the Productivity Commission and published academic research to determine whether there was any shift in construction industry productivity following the changes in workplace practices.
- The non-residential building sector and multi-unit residential sector (i.e. commercial construction) have been the focus of improved workplace practices because this is traditionally the higher cost side of the building and construction industry. Historically, the housing construction (domestic construction) sector of the industry can complete the same construction tasks at lower cost than the commercial construction sector. We use Rawlinsons data on construction costs to determine whether changes in workplace practices have affected the cost gap between **commercial construction and domestic construction**. For example, a narrowing of the cost gap may indicate that improved workplace practices have boosted productivity in commercial construction.
- Case studies of **individual projects**, completed in earlier reports by Econtech Pty Ltd and other sources, compare projects completed before and after changes in workplace practices to provide information on the impact of changed workplace practices on the productivity performance of individual projects.

For this 2013 update, we have fully updated our 2012 report for the latest data. This means that full information is now available for the first two eras analysed in this report: the era before the establishment of the Taskforce and ABCC and the era of the Taskforce and the ABCC. We also present the economic data that has been released since the introduction of the FWBC in mid-2012.

This section first provides an explanation of differences in productivity measures. Following this explanation, each of the different types of productivity comparisons listed above are discussed in turn. That is, subsection 2.2.1 examines year-to-year comparisons and subsection 2.2.2 compares commercial and domestic construction productivity. Subsection 2.2.3 reviews studies comparing the productivity of individual building and construction projects completed before and after changes to workplace practices. Subsection 2.2.4 analyses the impact of improved workplace practices on working days lost to industrial action.

Differences in productivity measures

There are a number of alternative approaches to measuring industry productivity. The most common measures are labour productivity, multifactor productivity and total factor productivity. For ease of exposition, the discussion on these three productivity measures is included below and follows the discussion outlined in the original 2007 Econtech Pty Ltd report.

- **Labour Productivity.** Labour productivity is the ratio of real output produced to the quantity of labour employed. Labour productivity is typically measured as output per person employed or per hour worked. Changes in labour productivity can be attributed to labour where they reflect improvements in education levels, labour efficiency, technology or work practices that makes labour more productive. Changes in labour productivity can also reflect changes in capital and intermediate inputs, in technical and organisational efficiency, as well as the influence of economies of scale and varying degrees of capacity utilisation.
- **Multifactor Productivity (MFP).** MFP is defined as the ratio of output to combined inputs of labour and capital. In principle, MFP is a more comprehensive productivity measure because it identifies the contribution of both capital and labour to output. In practice, labour input can be measured more accurately than capital input. Reflecting these competing considerations, both labour productivity and MFP continue to be used as measures of productivity.
- **Total Factor Productivity (TFP).** TFP is the ratio of output to the combined inputs of labour, capital and intermediate inputs (such as fuel, electricity and other material purchases). While this measure is the most comprehensive, often it cannot be calculated because there is insufficient data on intermediate inputs.

2.2.1 Year-to-year comparisons

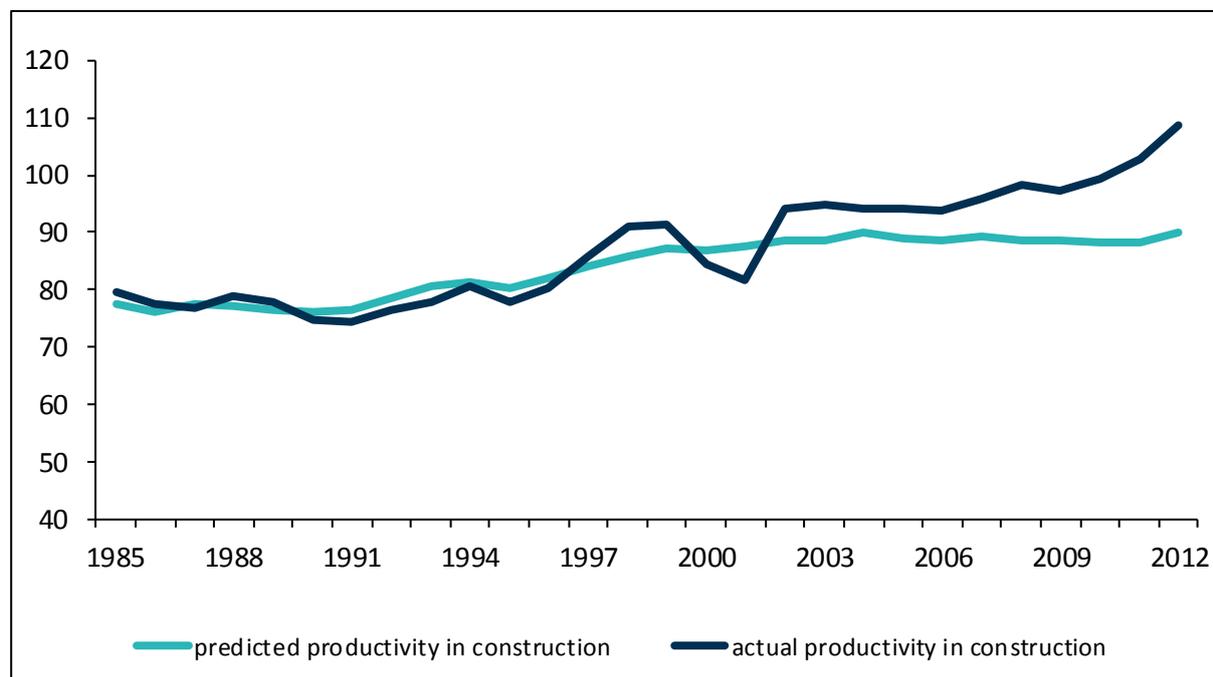
This section reviews trends in productivity in the construction industry over a number of years for each of the three productivity measures outlined above. It begins by analysing the aggregate construction industry labour productivity data from the ABS. This section then reviews and extends an analysis of multifactor productivity trends in the construction industry undertaken by the Productivity Commission. Finally, this section analyses total factor productivity in the construction industry, using published research. For each productivity indicator, the analysis is completed for:

- data up to and including 2002, the period prior to the establishment of the Taskforce/ABCC;
- data between 2002 and mid-2012, the period of operation for the Taskforce/ABCC; and
- data from mid-2012 onwards, when the FWBC was established.

Labour productivity

An analysis of the latest ABS data on building and construction industry labour productivity is presented below. Specifically, building and construction industry output and employment data are used to make year-to-year comparisons of industry labour productivity. Chart 2.1 shows actual productivity in the building and construction industry compared to predictions based on historical performance.

Chart 2.1: Actual construction industry labour productivity compared with a prediction based on an historical benchmark



Source: Independent Economics estimates based on ABS data

The historical productivity performance of the construction industry is assessed using data for the period prior to the establishment of the Taskforce/ABCC (from 1985 to 2002). For this period, regression analysis was used to establish the trend in productivity in the construction industry, relative to the trend in productivity for the economy as a whole. This analysis identifies whether there is a component of building and construction industry productivity that cannot be explained by factors driving productivity in the economy as a whole and trends in construction industry productivity prior to 2002 (i.e. in the pre Taskforce/ABCC era). This would assist in identifying whether or not improved workplace practices during the Taskforce/ABCC era have had a positive impact on productivity in the construction industry.

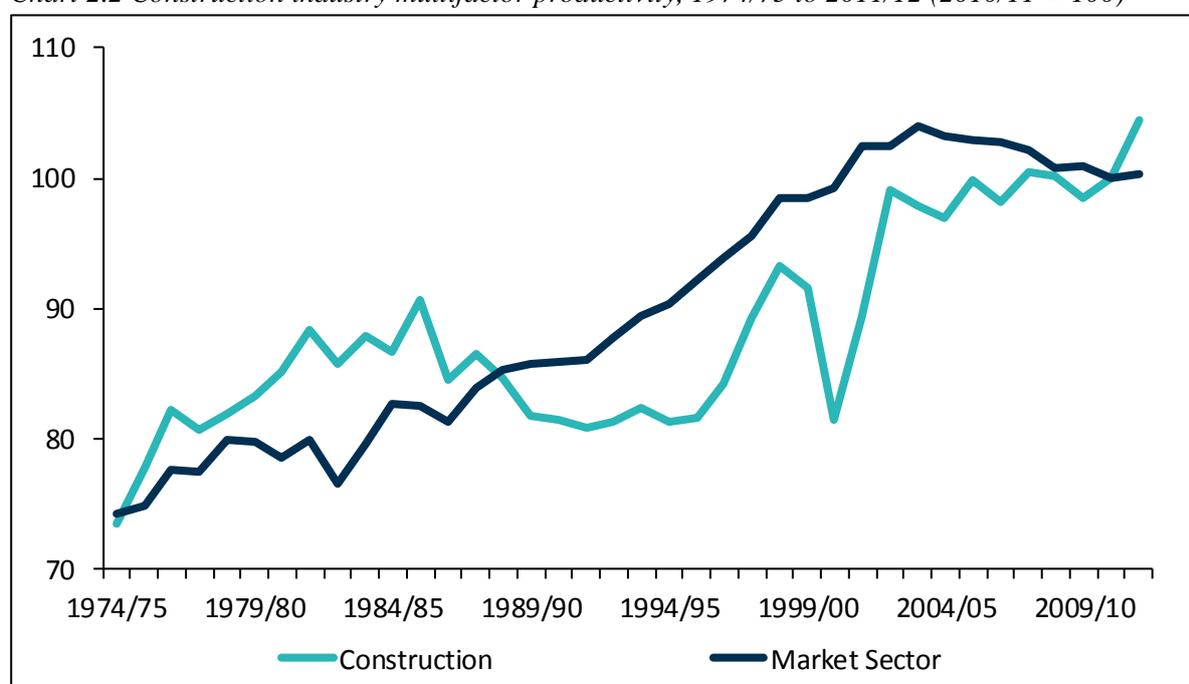
As can be seen in Chart 2.1, since 2002 actual construction industry labour productivity has consistently outperformed predictions based on past trends. In 2010, actual construction industry productivity was approximately 12.6 per cent higher than predictions based on its relative historical performance. This indicates that improved workplace practices have lifted labour productivity in the building and construction industry. Industry productivity outperformance was even higher in 2011 and 2012, at 16.4 per cent and 21.1 per cent, respectively. The additional labour productivity outperformance over the last two years is driven by a compositional shift within the building and construction industry towards engineering construction, which is less labour intensive. For example, several large LNG projects began construction during 2011 and 2012. Other measures of labour productivity that are not affected by these compositional effects, including the measures discussed in section 2.2.2 of this report, show that the productivity outperformance in the construction industry has stabilised, rather than expanded further, in recent years.

Unfortunately, labour productivity data for 2013, which would begin to reflect the operation of the FWBC, is not yet available. So an assessment of the FWBC's impact on this measure of labour productivity is not possible at this time.

Multifactor productivity

This section examines changes in multifactor productivity (MFP) in the construction industry using aggregate data from the Productivity Commission (PC) and the ABS. The PC calculates indices of productivity in 12 industry sectors based on data provided by the ABS. Specifically, the ABS provides estimates of multifactor productivity from 1985/86 onwards and the PC extends these estimates back to 1974/75 using published and unpublished ABS data. The data series were last updated by the PC in February 2009, with 2007/08 as the latest year of data. Since then, the ABS has released, annually, updated data on industry multifactor productivity. The latest multifactor productivity data available from the ABS is for 2011/12. Independent Economics has combined the PC and ABS data to develop estimates of multifactor productivity between 1974/75 and 2011/12 for the construction industry. Chart 2.2 compares this multifactor productivity in the construction industry with multifactor productivity in the market sector as a whole from 1974/75 to 2011/12.

Chart 2.2 Construction industry multifactor productivity, 1974/75 to 2011/12 (2010/11 = 100)



Source: Productivity Commission 2009, "Productivity Estimates and Trends", ABS Cat No. 5260.0.55.002, ABS Cat No. 5204.0 and Independent Economics estimates.

While productivity in the market sector has followed a fairly steady upward trend, productivity in the construction industry was fairly flat through the 1980s and 1990s. The PC found that multifactor productivity in the construction industry was no higher in 2000/01 than 20 years earlier³⁹. As shown in Chart 2.2, construction industry productivity is below the level seen in 1980/81 during several periods, including between 1988/89 and 1996/97.

However, construction industry productivity then strengthened considerably. The data shows construction industry productivity rising by 16.8 per cent in the ten years to 2011/12 (starting from a value of 89.4 in 2001/02 and escalating to 104.5 in 2011/12)⁴⁰. Over the same period, multifactor

³⁹ Productivity Commission, *Productivity Estimates to 2005-06*, December 2006

⁴⁰ The improvement in MFP in the final year of this data may reflect the higher share of engineering construction, in the same way that labour productivity was affected in the same year, as discussed above.

productivity in the market sector fell by 2.1 per cent. This confirms the strong construction industry productivity outperformance of the last decade already seen using labour productivity in Chart 2.1.

As noted in the 2012 report, a study by the Grattan Institute also found that the building and construction industry was one of only three industries that have enjoyed faster labour and multifactor productivity growth in the 2000s compared to the 1990s⁴¹. Administration and support services and arts and recreation services are the other two industries whose productivity performance has improved in the 2000s.

Similar to the case for labour productivity, data on multifactor productivity for 2012/13 is not yet available. Hence, an assessment of the impact of the FWBC on this multifactor productivity measure is not possible at this time.

Total factor productivity

The 2012 report discussed a study by Li and Liu which estimated total factor productivity for the Australian building and construction industry using ABS data⁴². The results of this research are summarised here for ease of reference; for further details please refer to the 2012 report.

Total factor productivity estimates from this research paper are available between 1990 and 2007. Similar to the analysis using labour productivity and multifactor productivity, growth in total factor productivity in the building and construction industry was faster in the five years to 2007, compared to growth in the five years to 2002. Between 2003 and 2007, total factor productivity in the Australian construction industry grew by 13.2 per cent, whereas the industry's productivity grew by only 1.4 per cent between 1998 and 2002.

2.2.2 Commercial versus domestic residential comparisons

Improved workplace practices (consisting of the establishment of the Taskforce, the ABCC and supporting industrial relations reforms) are expected to have their main impact on the non-house building side of the construction industry, rather than on the house building side. This is because the ABCC's jurisdiction does not cover housing construction of four dwellings or less (as well as the extraction of minerals, oil and gas). The jurisdiction of the FWBC is also focussed on the non-house building side of the construction industry.

The ABCC's and FWBC's mandate is on the non-house building side of this industry because this is where, traditionally, there have been more industrial disputes, poorer work practices and higher costs for specific tasks. The house building side, on the other hand, is considered to be more flexible – reflecting the involvement of many small, independent operators and the extensive use of piece rates for work performed.

So another way of testing the impact of the ABCC and FWBC is by examining whether it has led to any improvement in productivity on the non-house building side of the industry compared with the house building side. This can be assessed at a detailed level by comparing how the regulator has affected the relative performance of the two sides of the industry in undertaking the same tasks.

⁴¹ Eslake, Saul and Walsh, Marcus, *Australia's Productivity Challenge*, The Grattan Institute, Melbourne, February 2011

⁴² Yan Li and Chunlu Liu, *Malmquist indices of total factor productivity changes in the Australian construction industry*, Construction Management and Economics, 28:9, September 2010

Changes in the relative performance of the two sides of the industry can be assessed using quantity surveyors data. This data is used to investigate how the regulator has affected the cost comparison between the two sides of the industry for the same building tasks in the same locations. This report updates the analysis of the earlier reports by including the latest (January 2013) data available from Rawlinsons.

The cost comparison involves the following analysis. The Rawlinsons data is used to investigate movements in recent years in the cost comparison between commercial building and domestic residential building for the same building tasks in the same locations.

In making this comparison, the first point to clarify is the definitions of the two sides of the industry that are used in the Rawlinsons data. Commercial building includes larger-multi-unit dwellings, offices, retail, industrial and other buildings besides domestic residential buildings. It excludes engineering construction (roads, bridges, rail, telecommunications and other infrastructure). Domestic residential building includes all dwellings except larger multi-unit dwellings.

The building tasks used in this cost comparison of commercial building with domestic residential building are as follows:

- concrete to suspended slab;
- formwork to suspended slab;
- 10mm plasterboard wall;
- painting (sealer and two coats);
- hollow core door; and
- carpentry wall.

Table 2.3 shows the cost penalties for commercial building compared with domestic residential building for completing the same tasks, in the same states, for each year.

Table 2.3: Difference between the costs of tasks in commercial building and the same tasks in domestic residential building, in the same state, 2004 – 2013 (per cent)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change between 2004 and 2012	Change between 2012 and 2013
SA	9.2	7.3	6.6	6.6	6.1	6.1	5.2	5.1	5.0	5.0	-4.2	0.0
Qld	23.9	20.8	21.7	22.4	22.7	24.8	21.7	16.5	17.4	17.0	-6.4	-0.4
Vic.	22.7	24.0	21.8	15.1	15.7	15.7	15.2	14.2	14.2	14.1	-8.5	-0.1
WA	15.5	11.3	10.4	10.5	12.0	11.6	10.2	9.4	9.3	9.1	-6.2	-0.2
NSW	16.2	14.7	12.6	12.4	12.3	12.5	11.3	11.0	11.2	13.4	-4.9	2.2
Aust. Average	19.0	17.2	16.1	14.8	15.2	15.7	14.2	12.4	12.7	13.2	-6.3	0.5

Source: Rawlinsons Australian Construction Handbook, 2004 – 2013⁴³

Notes: (1) Australia Average is weighted according to turnover on a state-by-state basis.
(2) Dates indicate beginning of each calendar year, for example 2004 refers to January 2004.

Table 2.4: Average labour cost differences between commercial building and domestic residential building, 2004/2013 (per cent or percentage points)

	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	Change between 2004 and 2012	Change between 2012 and 2013
Total Cost Gap	19.0	17.2	16.1	14.8	15.2	15.7	14.2	12.4	12.7	13.2	-6.3	0.5
Labour Cost Gap	35.8	32.5	30.4	27.8	28.7	29.6	26.7	23.4	23.9	24.9	-11.8	0.9

Source: Independent Economics estimates.

⁴³ Rawlinsons is a construction cost consultancy in Australia and New Zealand. The Rawlinsons Australian Construction Handbook is the leading authority on construction costs in Australia.

As outlined in the introduction, this report follows the same methodology as was employed in the earlier reports since 2008. The analysis has simply been updated to incorporate the January 2013 Rawlinsons data. Specifically, Rawlinsons data is used to compare cost gaps between commercial and domestic construction in 2012 with the same cost gaps in 2004 to see whether the cost penalty in commercial construction has shrunk as a result of improved workplace practices⁴⁴. This base year was chosen because the Taskforce was established in October 2002 and the ABCC was established in 2005. The base year was also chosen to remove the effects of an apparent break in some of the data series. Hence, a narrowing of the cost gap over this period would suggest that improved workplace practices have had a positive effect on productivity.

In addition, the cost penalty in 2013 is compared with the cost penalty in 2012 to see whether the recent change in industry regulation has yet had an effect on cost penalties. As noted earlier, the ABCC was abolished on 31 May 2012 and the FWBC was established on 1 June 2012. The powers of the FWBC are weaker compared to the ABCC. These differences were discussed in section 2.1.

Table 2.3 confirms that, similar to the findings of the original 2007 Econtech report and other updates, the average costs of completing the same tasks in the same states have been generally higher in the commercial building sector than in the domestic residential building sector. However, as noted above, our interest is in whether this cost penalty for commercial building has shrunk since the introduction of improved workplace practices.

Between January 2004 and January 2012, Table 2.3 shows that the cost penalty for commercial building compared to domestic residential building fell in all mainland states, suggesting improved workplace practices. The biggest fall is in Victoria, where it is down from about 23 per cent to about 14 per cent. Victoria is the state where restrictive work practices in commercial building were generally acknowledged to be most pervasive⁴⁵.

January 2012 is the last data point which reflects the ABCC's operations, whilst January 2013 is the first data point which reflects the operations of the new industry regulator, the FWBC. Between January 2012 and January 2013, the cost gap in New South Wales widened by 2.2 percentage points, accounting for a smaller widening in the cost gap at the national level. In New South Wales, there was a large fall in the cost of concrete to suspended slab in domestic residential building.

The widening in the cost gap in New South Wales between 2012 and 2013, led to an increase in the cost penalty in Australia over the same time period. The cost penalty is estimated to be 13.2 per cent in 2013. This represents a small increase, of 0.5 percentage points, from the 2012 level. This increase is consistent with the expectation that the introduction of the FWBC is likely to gradually unwind the productivity gains generated in the FWBC era. Given that the full extent of the productivity gains under the Taskforce/ABCC developed gradually over several years, it can be expected that the full extent of the productivity losses under the FWBC are likely to develop over a similarly long timeframe. The FWBC began its operations on 1 June 2012. This means that, in January 2013, the FWBC had been in operation for only seven months.

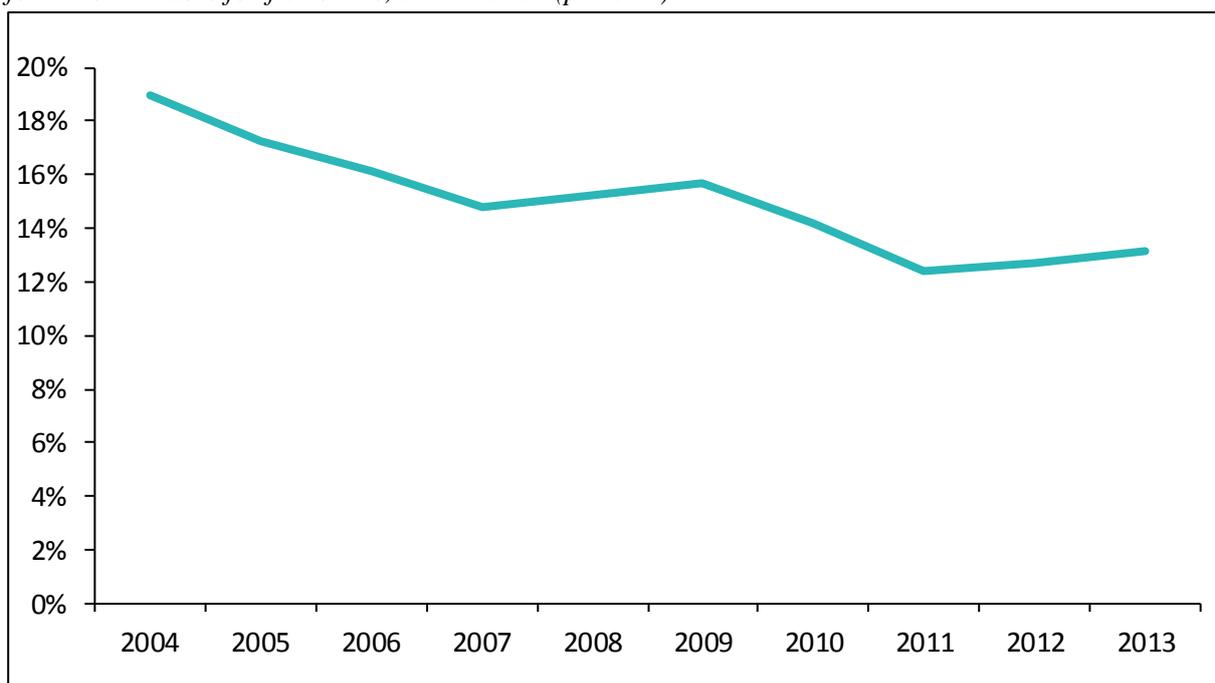
The gradual nature of the productivity gains in the Taskforce/ABCC era can be seen in Table 2.3 and Chart 2.3. Table 2.3 presented cost penalties for Australia as a whole, calculated as weighted

⁴⁴ Survey data refers to January of each year.

⁴⁵ Wilcox, *Transition to Fair Work Australia for the Building and Construction Industry*, April 2009

averages of the cost penalties for individual states,⁴⁶ while Chart 2.3 shows the Australian cost penalties alone. In January 2005, the ABCC had been in operation for approximately four months and the data showed only a small fall of 1.8 percentage points in the cost penalty. Over the period of operation of the Taskforce⁴⁷ and the ABCC, across Australia, the cost penalty for commercial building compared with domestic residential building continued to fall. The cost penalty was around 19 per cent in 2004, but fell gradually over the following years to be 12.7 per cent in 2012, or a fall of 6.3 percentage points.

Chart 2.3: Average cost differences between commercial building and domestic residential building for the same tasks for five states, 2004 – 2013 (per cent)



Source: Independent Economics estimates.

Many possible explanations for the fall in the cost penalty between 2004 and 2012 are ruled out by the close nature of the comparison used in estimating the penalty. In particular, the cost penalty is calculated for performing the same building tasks in the same locations. The only major aspect that is varied in the calculation is whether a task is undertaken as part of a commercial building project or as part of a domestic residential building project. Both types of building activity pay similar costs for materials for like-for-like projects.

This leaves a fall in the labour cost penalty (for commercial building) as the most plausible explanation for the fall in the total cost penalty. On this interpretation, Table 2.3 uses the fall in the total cost penalty for commercial building to estimate the fall in the labour cost penalty. It does this conversion using the average share of labour in total costs for the six building tasks. Labour cost shares for each type of building task listed earlier in this section are combined and come to

⁴⁶ Between this report and the 2012 reports the weights used to calculate this nationwide average have been updated to reflect more recent data.

⁴⁷ The Taskforce was established in October 2002 but it is reasonable to expect a lag before its activities started to make an impact. The data also relate to January of each year so that for 2004, the data relates to January 2004.

approximately 53 per cent⁴⁸. This results in an estimated fall from 2004 to 2012 in the labour cost gap for commercial building of 11.8 percentage points, as shown in Table 2.4. That is, using the Rawlinson's data, applying the labour share of 53 per cent to the estimated fall in the labour cost gap of 11.8 percentage points replicates the observed fall in the total cost gap of 6.3 percentage points.

In principle, this fall in the labour cost penalty for commercial building compared with domestic residential building could be due either to movements in relative productivity or wages between the two sectors. These two possible explanations are considered in turn.

Relative wages in commercial building compared with domestic residential building could have moved for two reasons. First, site allowances associated with non-residential construction have been restricted by the ABCC. However, site allowances are not included in the data for the costs of building tasks and so do not explain the fall in the cost penalty. Second, enterprise bargaining may have affected relative wages. However, enterprise bargaining easily predates our cost comparison, which begins in 2004.

This leaves post-2004 improvements in labour productivity in commercial building compared with domestic residential building as the most likely explanation for the fall in the commercial building labour cost penalty between 2004 and 2012. The timing of improvements is in line with activities of the Taskforce and the ABCC, prior to its abolition, in improving work practices and enforcing general industrial relations reforms in commercial building.

Therefore, this data suggests that there has been an improvement in labour productivity in commercial building compared with domestic residential building of at least 11.8 per cent as a result of improved workplace practices.

As Mitchell points out in his comment on the 2007 report⁴⁹, to the extent that the Rawlinsons classification blurs the desired distinction in categories, the cost gap and its movements will be understated. As noted earlier, the ABCC's jurisdiction includes housing construction of four dwellings or more. However, this type of small-scale commercial construction is included in the definition of domestic construction used by Rawlinsons. This means that a small sector of domestic construction would have also benefited from improved workplace practices and associated labour productivity boost. The inclusion of small-scale construction in the domestic construction category means that the cost gap would have narrowed further had this not been the case.

Thus, the simple estimate of the gain in productivity of 11.8 per cent is likely to be understated because a component of domestic construction (small scale construction) also benefits from a productivity boost.

Domestic residential building is less useful as a cost benchmark for engineering construction, which largely involves other, unrelated tasks. However, as noted in our earlier reports, a previous study has estimated that there is a similar cost advantage for engineering construction projects by comparing the construction of EastLink to CityLink. Specifically, a previous study showed a significant "advantage to EastLink by operating under the post-WorkChoices/ABCC environments" of 11.8 per cent. Thus it

⁴⁸ Information on labour cost shares are sourced from Rawlinsons.

⁴⁹ Mitchell, *An examination of the cost differentials methodology used in 'Economic Analysis of Building and Construction Industry Productivity' – the Econtech Report*, August 2007.

is reasonable to assume that the engineering cost improvement is likely to be at least equal to the estimate of the improvement in commercial building costs.

Hence, based on the evidence above, the relative labour productivity gain for the non-residential construction sector as a whole as a result of the Taskforce/ABCC and associated reforms is conservatively estimated at 11.8 per cent. If the estimate was adjusted to incorporate the cost of capital in determining the labour share of construction costs and if small-scale construction was excluded from the definition of domestic construction, then the estimated boost in productivity would be greater.

As discussed above, only early data is available following the introduction of the FWBC. This data is consistent with the expectation that the productivity loss from the FWBC is likely to occur gradually over several years.

2.2.3 Other supporting studies

Case studies and other research reports confirm the findings of the original 2007 report and earlier updates; that there has been a boost to building and construction productivity as a result of improved workplace practices during the era of the Taskforce and ABCC. This includes:

- case studies completed by Econtech as part of the 2007 report which estimated a 7 per cent (\$2.71 million) cost saving from a reduction in days lost to industrial disputes;
- research by the Allen Consulting group which estimated a 12.2 per cent gain in multifactor productivity in the five years to 2007⁵⁰;
- a study by Ken Phillips which estimated a 11.8 per cent saving in total construction costs for Eastlink because it was constructed under the ABCC and within the Workchoices environment⁵¹; and
- research by the John Holland Group which estimated that the construction industry has enjoyed a 10 per cent productivity dividend since the completion of the Cole Royal Commission⁵².

A more detailed discussion of the studies listed above, and other case studies, can be found in the 2008 and 2009 reports.

Recently, the Business Council of Australia commissioned the Allen Consulting Group to conduct an analysis of the potential impact of industrial relations developments in the New South Wales construction industry⁵³. The report examines a case study by Woodside Petroleum, which outlines the differences in the cost of constructing two similar LNG trains. One train (Train 4) was constructed between 2001 and 2005; thus the majority of construction was undertaken before the establishment of the ABCC. The other train (Train 5) was constructed between 2005 and 2008, and thus the majority

⁵⁰ The Allen Consulting Group, *The Economic Importance of the Construction Industry in Australia*, 2007, p18

⁵¹ Ken Phillips, *Industrial Relations and the struggle to build Victoria*, Institute of Public Affairs, Briefing Paper, November 2006

⁵² John Holland Group, *Preliminary Assessment of Economic benefits of industrial relations reform in the construction industry*, 2007

⁵³ The Allen Consulting Group, *Economic impact of construction industrial relations arrangements and investment in infrastructure – A New South Wales perspective*, 2013

of construction was undertaken under the ABCC. Train 5 lost 0.4 per cent of man hours to industrial action, while Train 4 lost 2.3 per cent. As noted in the Allens report, this case study suggests that the move to the ABCC-regime resulted in a two per cent reduction in labour costs.

However, as discussed in the following section, the number of days lost to industrial action is only one component of labour productivity. There are wider benefits from moving to the ABCC, including changes to work practices. For example, the 2007 Econtech case studies found that additional flexibility in rostering allowed for better management of resources in the building and construction industry. Hence, as noted by Allens, two per cent is the lowest estimate of the benefit from the ABCC regime.

The Allens report then estimates the economy-wide impact of a deterioration in industrial relations in the construction industry using a CGE model. Specifically, they use a CGE model to estimate the flow-on impacts on the New South Wales economy of two scenarios, a two per cent reduction in multifactor productivity and a two per cent increase in labour costs that are not funded by productivity gains. The report notes that increased industrial unrest may result in both a reduction in multifactor productivity and unfunded increase in labour costs. That is, it is possible that the effects modelled in the scenarios are additive rather than alternatives. Hence, to allow for the possibility that the effects are greater, scenarios for a ten per cent reduction in multifactor productivity and a ten per cent increase in wages that are unfunded were also modelled.

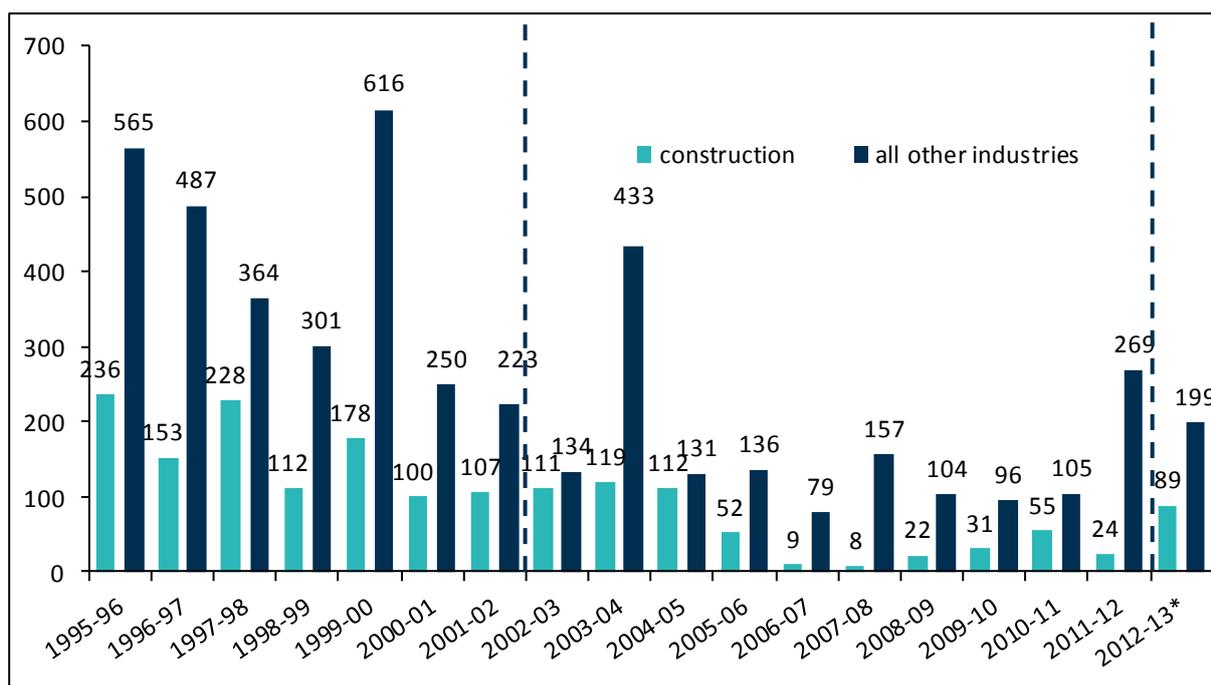
2.2.4 Days lost to industrial action

The previous sections outlined the impact of improved workplace practices on productivity indicators for the building and construction industry. This section analyses the impact of improved workplace practices on another general performance indicator, the number of work days lost to industrial action. Specifically, since improved workplace practices have been implemented, the building and construction industry has outperformed other sectors of the economy in reducing in the number of work days lost. This improvement can be shown at two different levels, using aggregate ABS data and using individual project data. This subsection focuses on aggregate ABS data. The analysis of individual project data can be found in the 2008 report.

To consider the effects of the recent change in industry regulation, it is useful to perform the analysis in financial year terms. This is because the ABCC was abolished at the end of May 2012 and the FWBC began operations on 1 June 2012. Thus, the 2012/13 financial year was the first full year of the FWBC's operations.

Chart 2.4 shows ABS data on the number of working days lost in the construction industry due to industrial disputes. The average number of working days lost each year for the period prior to the establishment of the Taskforce/ABCC (1995/96 to 2001/02) was 159,000. This gradually declined during the first five years of the Taskforce/ABCC era, and working days lost then remained at a low level from 2006/07 to 2011/12. By 2011/12, the number of working days was only 24,000, or 15 per cent of the annual average for 1995/96 to 2001/02.

Chart 2.4: Working days lost in construction due to industrial disputes ('000)



Source: ABS Cat No. 6321.0.55.001

Note: * Independent Economics' estimate for June 2013 is included in the data for 2012/13

As a comparison, the number of working days lost to industrial disputes in other sectors of the economy is also presented in Chart 2.4. The number of working days lost to industrial disputes in all other industries also fell, from an average of 401,000 days between 1995/96 and 2001/02, to 269,000 days in 2011/12. However, this also implies that the construction industry has outperformed other industries, because its working days lost have fallen to only 15 per cent of the earlier level (as noted above) whereas in other industries the fall is to 67 per cent of earlier levels. This outperformance of the construction industry during the Taskforce/ABCC era was also seen in the earlier analysis of labour productivity trends.

The FWBC took over from the ABCC in June 2012. Data for industrial disputes is available for the September and December quarters of 2012 and the March quarter of 2013. An estimate for the June quarter of 2013 has been made by assuming that the growth rate for the full financial year is the same as the growth rate in the first three quarters of the financial year. This assumption is applied for both the construction industry and the economy in aggregate.

With the replacement of the ABCC with the FWBC, working days lost to industrial disputes in the building and construction industry jumped from 24,000 in 2011/12 to an estimated 89,000 in 2012/13. Hence, more than one half of the improvement in lost working days achieved in the first five years of the Taskforce/ABCC era has already been relinquished in the first year of the FWBC era. In fact, in 2012/13, the working days lost in construction was the highest since 2004/05.

The increase in work days lost to industrial dispute is mainly due to industrial action at:

- Lend Lease sites in July 2012;
- Grocon sites (mainly in Melbourne) during late August and early September 2012;
- Queensland Children's Hospital between August and October 2012;

- Little Creatures Brewery in October and November 2012; and
- Werribee Water Treatment Plant in February 2013.

In contrast to the construction industry, following a high reading in 2011/12, the number of work days lost in all other industries fell in 2012/13. All other industries lost 199,000 work days to industrial disputes in 2012/13.

This sharp increase in work days lost to industrial disputes in only the first year of operation of the FWBC is consistent with the expected reversal of the productivity benefits achieved during the Taskforce/ABCC era that was discussed in section 2.1.

2.3 Conclusions – the impact of changes in workplace practices on building and construction industry productivity

This section considers the changes in the workplace relations environment examined in section 2.1 together with the data presented in section 2.2. First, it uses the information to evaluate the impact of the ABCC, Taskforce and industrial relations reforms in the years to 2006 on productivity in the building and construction industry. Following this, the expected impact of the FWBC on productivity in the building and construction industry is evaluated.

2.3.1 Productivity gains in the Taskforce and ABCC era

All of the evidence discussed in section 2.1 and 2.2 continues to support the conclusion of the original 2007 Econtech report and earlier updates, that there has been a significant gain in construction industry productivity during the Taskforce and ABCC era. The question then becomes to what extent has improved workplace practices contributed to this improvement.

As shown in section 2.2, each of the updated productivity indicators continue to provide strong evidence that during the period of operation of the Taskforce and ABCC (between 2002 and mid-2012) there were significant improvements in labour productivity. This is consistent with the findings of the original 2007 Econtech report and earlier updates. Specifically, the latest data on construction industry productivity shows the following.

- ABS data shows that, in 2012, construction industry labour productivity has outperformed predictions based on its historical performance relative to other industries by **21.1 per cent**. That is, a productivity outperformance is identified after allowing for factors driving productivity in the economy as a whole and trends in construction industry productivity prior to 2002 (the year improved workplace practices began).
- The Productivity Commission's analysis of ABS data has found that multifactor productivity in the construction industry was no higher in 2000/01 than 20 years earlier⁵⁴. In contrast, the latest ABS data on productivity shows that construction industry multifactor productivity accelerated to rise by **16.8 per cent** in the ten years to 2011/12.
- Academic research on total factor productivity shows that productivity in the construction industry grew by **13.2 per cent**, between 2003 and 2007, whereas productivity grew by only 1.4 per cent between 1998 and 2002.
- Rawlinsons data to January 2012 shows that the cost penalty for completing the same tasks in the same region for commercial construction compared to domestic construction shrunk. The boost to productivity in the commercial construction sector, as estimated by the narrowing in the cost gap, is conservatively estimated at **11.8 per cent** between 2004 and 2012. This estimate is considerably higher once other factors are taken into account.

⁵⁴ Productivity Commission, *Productivity Estimates to 2005-06*, December 2006.

- Case studies undertaken as part of the original 2007 Econtech report demonstrate that improved workplace practices have led to better management of resources in the building and construction industry. This, in turn, has boosted productivity in the building and construction industry. Case studies by industry participants have also found that improved workplace practices have contributed to cost savings for major projects.

While the productivity indicators listed above are not directly comparable, they all indicate that the significant productivity gains in construction industry productivity appear around 2002/03. This supports the interpretation that it was the activities of the Taskforce (established in late 2002) and, more importantly, the ABCC (established in October 2005) that made a major difference. That is, while general industrial relations reforms provided a more productivity-friendly environment, it was the ABCC (with its enforcement powers) which made a significant impact on building and construction industry productivity.

In summary, the productivity and cost difference data suggest that effective monitoring and enforcement of general industrial relations reforms, and those that related specifically to the building and construction sector, were necessary before the reforms could lead to labour productivity improvements. As such, it is considered that separate attribution of labour productivity improvements to the ABCC and industrial relations reforms is not possible, because they both need to operate together to be effective.

The latest data continues to point to this conclusion. It shows that, in the Taskforce/ABCC era, the construction industry's productivity has outperformed other sectors of the economy as a result of improved workplace practices. As reported above, the estimated gain ranges between 10 and 21.1 per cent, depending on the measure and the source of information that is used. However, in line with earlier reports, for modelling purposes we conservatively assume a smaller gain of 9.4 per cent. Besides providing consistency and comparability with our earlier reports, this conservative approach avoids any possible overestimation of the productivity outperformance of the construction industry as a result of improved workplace practices.

2.3.2 Productivity losses in the FWBC era

The changed workplace relations environment associated with the replacing the ABCC with the FWBC represent an almost complete reversal of the successful reforms implemented in the Taskforce/ABCC era. As discussed below, this has the potential to fully reverse the productivity gains made during the Taskforce/ABCC era.

As discussed in section 2.3.1, the Taskforce and ABCC have been successful in improving the productivity of the industry by effectively monitoring and enforcing general industrial relations reforms as well as those related specifically to the building and construction sector. These reforms were implemented to address specific problems that were seen in the building and construction industry, and not in other industries.

Compared to the ABCC, the FWBC is limited in its ability to achieve this same outcome. Firstly, the strong building-industry specific regulations and penalties have been removed. In addition, the ability of the FWBC to monitor and enforce the regulations is limited because its use of compulsory examination powers is restricted, and in practice its use of these powers has reduced to very low levels. The FWBC is also unable to participate in proceedings for disputes already settled between

the parties. Finally, union officials' right of entry has been expanded, allowing them significant access to work sites. Therefore, the regulatory changes associated with the FWBC, which were examined in detail in section 2.1.3, indicate that the workplace relations regulations applying to the building and construction industry have been weakened and returned to the pre-Taskforce and ABCC era.

Importantly, this unwinding of the building industry-specific regulations has occurred even though there has been no change to the unique underlying circumstances which necessitated the reforms. Commercial pressures still mean that contractors are likely to concede to union demands rather than become involved in long disputes. Limited international competition still means that unions have more scope than in some other industries to exert pressure for work practices that impede productivity.

Hence, replacing the ABCC with the FWBC has meant that the regulatory environment has largely been returned to that of the pre-Taskforce/ABCC era, when regulation of the workplace in the building and construction industry was similar to that of other industries. This runs counter to the recommendations of the Cole Royal Commission. Likewise, it does not heed the evidence in our earlier reports that the industry-specific regulation by the Taskforce and the ABCC has led to a substantial boost to building and construction industry productivity.

Because the building industry-specific nature of regulation in the Taskforce/ABCC era has been almost completely removed, it is reasonable to expect that most or all of the productivity gains achieved during the Taskforce/ABCC era will also be lost. This would justify an assumption that 100 per cent of the productivity gains will be lost in the FWBC era.

Because of the long-run nature of the modelling, it is based on the eventual impacts on productivity of the change from the Taskforce/ABCC era to the FWBC era. However, just as the productivity gains of the Taskforce/ABCC era developed gradually over several years, those gains are likely to be lost over a similar timeframe in the FWBC era. The fact that more than one half of the improvement in working days lost in the Taskforce/ABCC era has already been relinquished in the first year of operation of the FWBC era is not a good sign. However, several years more data will be needed before the full loss of the productivity gains can be confirmed. In the meantime, this report adopts the conservative assumption that only 75 per cent of the productivity gains will be lost eventually. That is, it is assumed that replacing the ABCC with the FWBC will result in the productivity gains generated by the Taskforce and ABCC being wound back by 75 per cent.

The main remaining feature of the Taskforce/ABCC era is that there is still an industry-specific regulator in the form of the FWBC. However, this is likely to be of little benefit in preserving the productivity gains of Taskforce/ABCC era. This is because the FWBC largely lacks the support of the industry-specific approach to regulation that was recommended by the Cole Royal Commission and successfully exercised by the Taskforce/ABCC.

3 Modelling the impact of changes to workplace practices

This section provides details of the modelling approach used to estimate the economy-wide impacts of:

- the improved workplace practices as a result of the ABCC, Taskforce and industrial relations reforms in the years to 2006; and
- the partial unwinding of these improved workplace practices due to the abolition of the ABCC and establishment of the FWBC.

The section is structured as follows. Section 3.1 summarises Independent Economics' previous studies in this area. Section 3.2 outlines the scenarios that were simulated using the Independent CGE model to quantify the economic effect of the changes in workplace practices in the building and construction industry. Section 3.3 outlines the main data inputs that are used to build these scenarios and describes how these inputs were derived. Section 3.4 discusses the main features of the economic model (the Independent CGE model) that was used to estimate the economic impact of changes in workplace practices.

3.1 Previous studies

In 2003, Econtech prepared a study for the then Department of Employment and Workplace Relations (DEWR) that analysed the cost differences for the same standard building tasks between commercial buildings and domestic residential buildings. This report and its conclusions (outlined below) on building and construction industry productivity were accepted by DEWR.

- The report, using Rawlinson's data, showed that building tasks – such as laying a concrete slab, building a brick wall, painting and carpentry work – cost more for commercial buildings than for domestic residential housing. The difference was mainly attributed to differences in work practices between the commercial and domestic residential building sector.
- The report found that the productivity performance of Australia's building and construction industry lagged behind international best practice. If the cost gap between commercial and domestic construction were removed, Australia's performance would still have been behind international benchmarks.

The 2003 Econtech Report went on to model the economy-wide benefits of reducing the cost gap through reform to work practices in the commercial building sector.

While the 2003 Report estimated the potential productivity gains from workplace reform in the construction industry, by 2007/08 the reform process was well established. Hence, in 2007 the ABCC commissioned Econtech to estimate the actual productivity gains that can be attributed to the activities of the ABCC and its predecessor the Taskforce. This 2007 report was then updated in 2008, 2009, 2010 and 2012.

Each report consistently showed that there had been a gain in construction industry productivity of about 10 per cent, due to the activities of the Taskforce and the ABCC in conjunction with related industrial relations reforms. Similar to the 2003 report, each subsequent report modelled the economy-wide benefits of this gain in construction industry productivity from improved workplace practices.

The 2008, 2009, 2010 and 2012 reports considered the impact of workplace reform on construction industry productivity from three different angles. It compared construction industry productivity between different years, between the non-residential and residential sides of the building industry, and between individual projects undertaken before and after the establishment of the ABCC.

This report updates the economic analysis in the earlier reports to incorporate the latest data and other studies completed in the intervening time on building and construction industry productivity. In addition, this report uses an enhanced version of the Independent Economics' Computable General Equilibrium (CGE) model that was first used in the 2012 report. While the enhanced model includes significant refinements, its estimates are comparable with those estimates presented in earlier reports; this is discussed further in section 4. Finally, in this report, an additional scenario has also been added that estimates the economic impacts of a loss in productivity in the FWBC era.

The following sections present the methodology and model used to estimate the economic impacts of changed workplace practices within the building and construction industry.

3.2 Scenarios

The Independent CGE model of the Australian economy is used to estimate the long-term, economy-wide impact of changes to workplace practices. To do this, the following three scenarios were developed.

- A “Baseline Scenario” provides a snapshot of the Australian economy representing the workplace practices in place before the Taskforce/ABCC era.
- An “ABCC Scenario” provides a snapshot of the Australian economy with higher productivity in the construction industry due to better workplace practices resulting from the ABCC, Taskforce and industrial relations reforms in the years to 2006. Specifically, productivity in the construction industry is 9.4 per cent higher than in the baseline scenario. This scenario is the same scenario that has been modelled in previous updates of this report. As explained in Section 2.3, it has been adopted for this report after considering the latest economic data, case studies and other research.
- An “FWBC Scenario” provides a snapshot of the Australian economy where 75 per cent of the productivity boost achieved in the Taskforce/ABCC era is unwound in the FWBC era. As explained in Section 2.3, this conservative assumption has been adopted following analysis of the workplace relations changes associated with abolishing the ABCC and establishing the FWBC, as well as the latest data.

The modelling results for these three scenarios are used as follows to estimate the economy-wide impacts of the various regulatory eras in the building and construction industry.

- The impact on the Australian economy of improved workplace practices during the Taskforce/ABCC era is determined by the differences in key economic outcomes between the ABCC scenario and the Baseline scenario. Results for the ABCC scenario are generally presented as percentage deviations from the Baseline scenario.
- The impact on the Australian economy of replacing the ABCC with the FWBC is determined by the differences in key economic outcomes between the FWBC scenario and the ABCC scenario. Results for the FWBC scenario are generally presented as percentage deviations from the ABCC scenario.

The main inputs for each of the scenarios are discussed in detail below.

3.3 Model inputs

As noted above, for the ABCC scenario it is assumed productivity in the construction industry as a whole is higher by 9.4 per cent relative to the baseline scenario. This matches the assumption used in the original 2007 Econtech report and previous updates in 2008, 2009, 2010 and 2012.

As in previous reports, this gain in productivity is concentrated in the various subsectors of the industry where the ABCC has jurisdiction, which are non-residential building construction, engineering construction and multi-unit residential building. Specifically, as shown in Table 3.1, it combines productivity gains of 12.3 per cent in non-residential construction and 4.5 per cent in residential building (to reflect the productivity gain in multi-unit residential building). This is consistent with the overall industry productivity gain of 9.4 per cent.

Table 3.1: Simulated gains in labour productivity (per cent) for the ABCC scenario compared to the baseline scenario

	ABCC Scenario		
	2 sectors	3 sectors	4 sectors
Non-residential construction	12.3%	17.9%	
Engineering construction			16.5%
Non-residential building			20.5%
Residential building	4.5%	0.0%	0.0%
Construction services		7.0%	7.0%
Total building and construction	9.4%	9.4%	9.4%

Source: Independent Economics estimates based on total estimated productivity improvements and current labour cost relativities between the construction sub-sectors.

The model used in the 2012 report and this report, the Independent CGE model, uses the ABS' latest industrial classification, ANZSIC 2006. This extends the construction industry detail to separately identify four sub sectors of the construction industry, rather than two. Hence, the productivity gains must be disaggregated, in a consistent manner, into these four sub sectors. This disaggregation of the productivity gains is also shown in Table 3.1. Specifically, the ABCC scenario models a 16.5 per cent productivity gain in engineering construction, a 20.5 per cent gain in non-residential building, no direct gain in residential building and a 7.0 per cent productivity gain in construction services. This is consistent with the overall productivity gain of 9.4 per cent, but this overall gain is distributed between the four sub sectors in a way that reflects the ABCC's jurisdiction.

The productivity gain in the construction services sector of 7.0 per cent is higher than for residential construction but lower than for non-residential construction. This reflects the pervasive nature of the construction services sector combined with the narrower jurisdiction of the ABCC. In principle, construction services covers services such as site preparation, electrical, plumbing and plastering services, irrespective of whether these services are provided by general construction firm employees or by independent contractors. Thus, the construction services industry covers a range of construction services delivered across the entire construction industry, including residential building, non-residential building and engineering construction. Thus, its modelled productivity gain of 7.0 per cent lies between the lower gain of 4.5 per cent for the residential side of the industry and the higher gain of 17.9 per cent for the non-residential side.

In addition, while there is no direct productivity gain in residential construction, the sector benefits indirectly because it uses construction services, which experience a productivity gain. This indirect benefit is equivalent to a 4.5 per cent gain in productivity for the residential construction industry as a whole. This gain is attributable to multi-unit residential building, which fell within the jurisdiction of the Taskforce/ABCC, rather than to house construction, which did not.

As explained in section 2.3, for the FWBC scenario we adopt the conservative assumption that 75 per cent of the productivity gain assumed in the ABCC scenario is unwound. As noted above, the ABCC scenario assumes a productivity gain of 9.4 per cent compared to the baseline scenario. A reversal of 75 per cent of this gain would therefore represent a productivity loss of 7.1 per cent, when expressed as a percentage of the productivity level of the baseline scenario. However, when re-expressed as a percentage of the higher level of productivity in the ABCC scenario, the loss in productivity is slightly lower at 6.5 per cent.

Table 3.2 shows how the overall productivity loss of 6.5 per cent in the FWBC scenario is distributed between the four construction sub sectors identified in the Independent CGE model.

Table 3.2. Simulated losses in labour productivity (per cent) for the FWBC scenario relative to the ABCC scenario

	FWBC Scenario 4 sectors
Non-residential construction	
Engineering construction	-10.6%
Non-residential building	-12.8%
Residential building	0.0%
Construction services	-4.9%
Total building and construction	-6.5%

Source: Independent Economics estimates based on total estimated productivity improvements and current labour cost relativities between the construction sub-sectors.

In the FWBC scenario, a 10.6 per cent productivity loss in engineering construction, a 12.8 per cent loss in non-residential building, no direct loss in residential construction and a 4.9 per cent productivity loss in construction services is consistent with the overall productivity loss of 6.5 per cent and this pattern is consistent with the FWBC's jurisdiction.

3.4 The Independent CGE model

The economy-wide effects of changes to workplace practices were estimated using the Independent CGE model. It is a long-term model of the Australian economy that models a long-run equilibrium (after approximately 5 to 10 years). In other words, it estimates the long-term impacts of changes to workplace practices after the economy has fully adjusted.

The Independent CGE model has the following features that are important for this report.

- The model uses the most up-to-date ABS industry classification, ANZSIC 2006, and distinguishes 120 industries.
- As noted above, the model separately identifies four sectors within the building and construction industry: residential building; non-residential building; engineering construction; and construction trade services. Importantly, modelling the residential construction industry separately from the other construction industries means that the jurisdiction of the ABCC and FWBC can be more closely identified. Improved workplace practices have been concentrated in non-residential construction and multi-unit residential building.
- The model uses recent Input-Output (IO) tables from the Australian Bureau of Statistics (ABS). Specifically, the 2007/08 IO tables released by the ABS in late 2011 are used. The IO tables provide the most detailed information that is available on the structure of the Australian economy.
- While the data underlying the model is based on the structure of the Australian economy in 2007/08, the model has been updated to provide a snapshot of the economy in a normalised 2012/13. This includes allowing for growth in wages, productivity and population since 2007/08 as well as normalised commodity prices.
- Each industry in the model can use 43 types of labour, nine types of capital, land and natural resources, whereas in a basic CGE model only one type of labour and capital are used. Importantly, two types of structures are separately identified: building and structures; and dwellings. These are modelled separately from other types of capital (such as motor vehicles, machinery and computers). Each industry's mix of primary factors is separately chosen depending on relative prices and the industry's production technology. This is of particular importance in this project, as it allows for a more robust estimate of the impact of reform on the building and construction industry, which produces building and structures and dwellings. In addition, the model accounts for the use of fixed factors in production, such as residential land in the provision of housing services.
- Consumer welfare (household living standards) is estimated robustly, based on the equivalent variation measure used in welfare economics. A robust measure of household living standards is of particular importance as policies should be assessed based on their impact on households.

As noted above, the model estimates the long-term effects of changes to workplace practices, after the economy has fully responded. The merit of economic policies should be judged on their long-term, as

opposed to short-term, impacts. The long-term assumptions of the Independent CGE model are as follows.

- Profit maximisation: the representative business in each industry chooses how to produce (primary factors, intermediate inputs) and how much to produce to maximise profit subject to constraints such as prices and a production function.
- Utility maximisation: a representative household chooses a consumption bundle to maximise utility, which depends on the consumption of products and leisure time, subject to a budget constraint.
- Labour market equilibrium: in the long term the labour market is assumed to clear, so that an economic shock will have no lasting effects on unemployment.
- External balance: in the long term, external balance is assumed to be achieved by adjustment of the real exchange rate, so that trade shocks have no lasting effect on external balance.
- Budget balance: the budget is balanced because in the long run fiscal policy must be sustainable. The policy instrument which adjusts to ensure the budget is balanced, otherwise known as the swing policy instrument, is labour income tax.
- Private saving: in the long run the level of private sector saving and associated asset accumulation must be sustainable.

4 Economic impact of improved workplace practices during the Taskforce/ABCC era

The previous section described the approach to modelling the flow-on effects to the broader economy of changes to workplace practices in the building and construction industry. This section presents these economy-wide impacts flowing from the improvement in workplace practices under the Taskforce/ABCC. The next section presents the economy-wide impacts flowing from expected productivity-lowering workplace practices under the FWBC.

Section 3 set out the modelling inputs for the Taskforce/ABCC era and how these inputs were derived. In summary, there is an assumed 9.4 per cent gain in productivity in the building and construction industry, and this gain is distributed across the four subsectors of the industry in a way that reflects the jurisdiction of the ABCC. The economy-wide effects of this productivity gain are simulated using the Independent CGE model. This section presents the results of this modelling at three different levels, as follows.

- Section 4.1 describes the detailed economic impacts on the building and construction industry of improved workplace practices during Taskforce/ABCC era.
- Section 4.2 describes the wider industry impacts of improved workplace practices in the building and construction industry during Taskforce/ABCC era.
- Section 4.3 presents the macroeconomic impacts of improved workplace practices in the building and construction industry during Taskforce/ABCC era.

The ABCC Scenario provides a snapshot of the Australian economy with the improved workplace practices in place. This scenario is the same policy scenario that has been presented in previous versions of this report. As explained in Section 2, it has been developed by considering various economic data, case studies and other research.

Importantly, the results presented in this section refer to permanent effects on the levels, not growth rates, of indicators relative to what they would otherwise be. This means, for example, that a gain of 0.8 per cent in the level of GDP is interpreted as the gain in the level of GDP relative to what it would otherwise be in the same year, and not the annual growth rate. That is, it compares the level of GDP at a point in time under the (ABCC) scenario with the level of GDP at the same point in time under the baseline scenario.

4.1 Building and construction industry effects

This section presents the economic impacts on the building and construction industry of labour productivity gains in the industry stemming from improved workplace practices as a result of the ABCC, Taskforce and industrial relations reforms in the years to 2006.

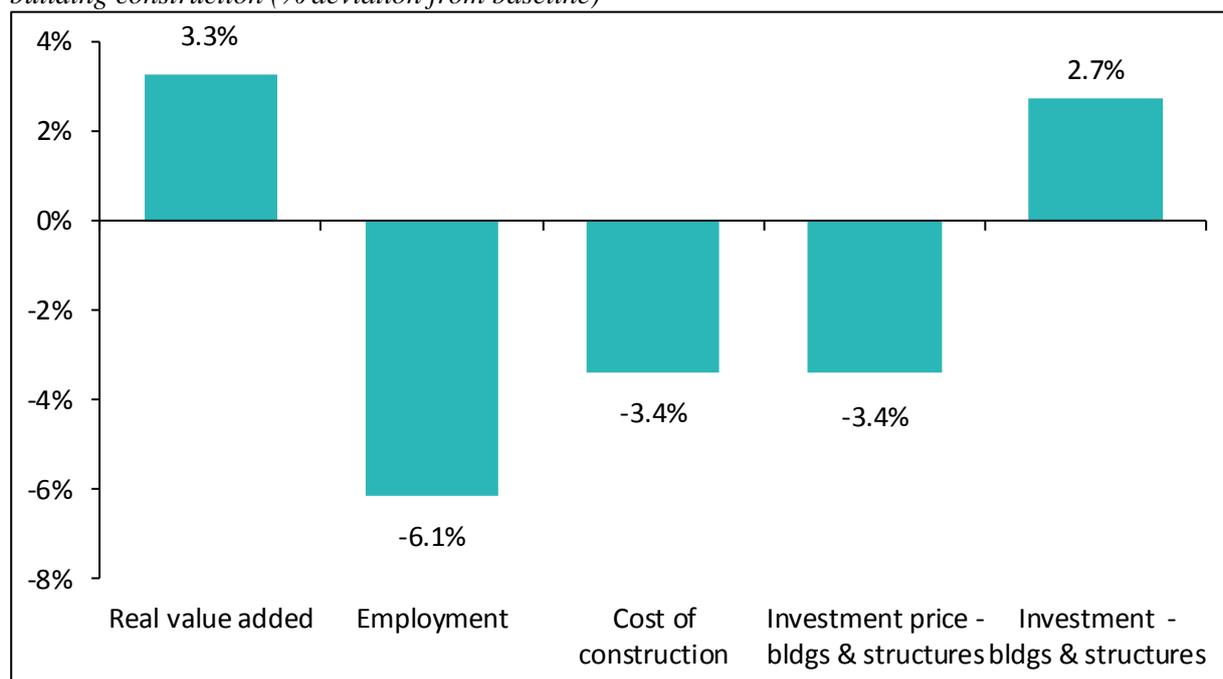
The analysis of productivity gains from improved workplace practices in section 3 indicated that the productivity gains are concentrated in the non-residential building, engineering and multi-unit side of the construction industry. Therefore, in considering the effects on the construction industry itself, it is

important to distinguish between non-residential building construction, engineering construction, residential construction and construction services. This section considers each of these in turn.

Non-residential building

The effects on non-residential building are shown in Chart 4.1. These effects are driven mainly by an assumed increase in labour efficiency of 20.5 per cent for non-residential building construction in the long-term, relative to the situation in the absence of the reforms, as shown in Table 3.1.

Chart 4.1. Effect of improved workplace practices during the Taskforce/ABCC era on non-residential building construction (% deviation from baseline)



Source: the Independent CGE model simulations

Lower non-residential building construction costs, together with lower engineering construction costs, combine to lower the overall cost of business investment in buildings and structures by 3.4 per cent (as seen in Chart 4.1). As discussed later in this subsection, the reduction in engineering construction costs, like the reduction in non-residential building costs, is a result of higher labour productivity from improved workplace practices.

Cheaper buildings and structures stimulate a lift in real investment by business in this type of capital of 2.7 per cent. Even assuming that there is no response by general government in its level of investment in building and structures, the business response results in a long-term gain in total non-residential building construction activity of 3.3 per cent, as seen in Chart 4.1.

Employment in non-residential building is affected by three separate factors.

- The assumed gain in labour efficiency of 20.5 per cent reduces employment by a similar percentage, for an unchanged level of activity (“labour saving effect”).
- The rise in activity of 3.3 per cent adds a similar percentage to employment (“output effect”).

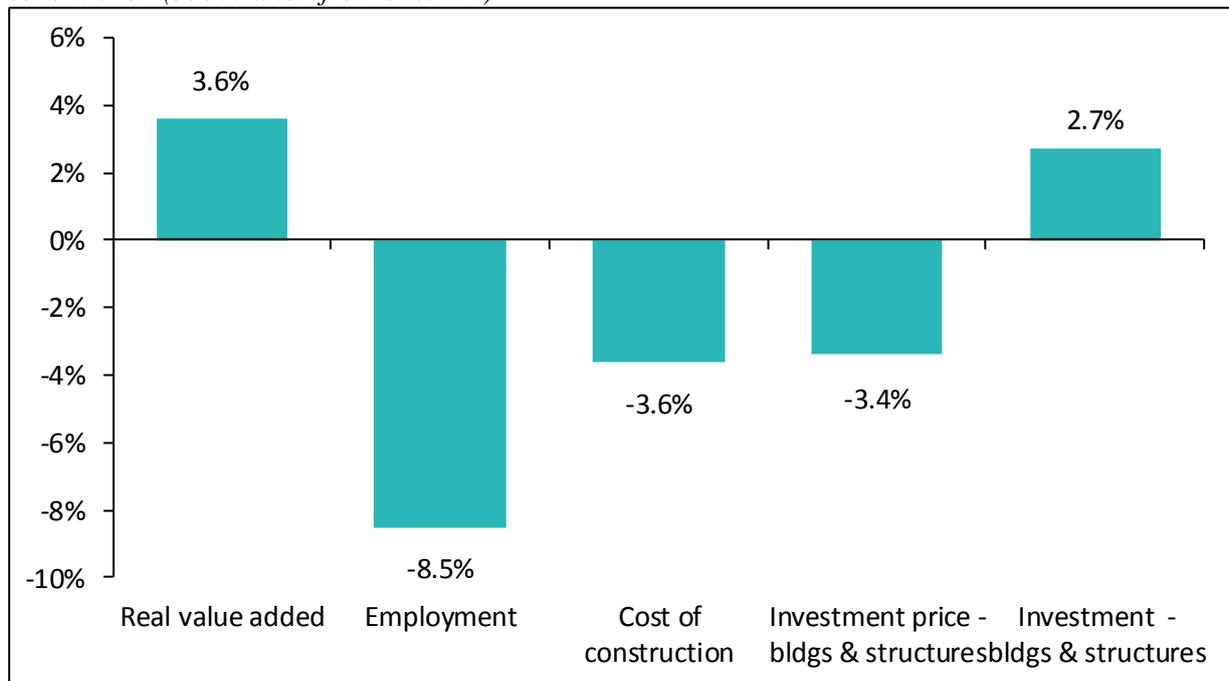
- The gain in labour efficiency makes labour cheaper, inducing some substitution towards labour and away from other inputs, such as capital and land (“substitution effect”).

The negative effect on employment from the labour saving effect dominates the positive effects of the output and substitution effects, leaving a net loss of 6.1 per cent in non-residential building employment in the long-term. Importantly, there are fully offsetting employment gains in other sectors of the economy. However, there would be short-term adjustment costs from job shifting from non-residential building to other industries, even though there is no long-term loss in national employment.

Engineering construction

Similar to the non-residential building construction industry, the engineering construction industry enjoys a direct labour productivity boost of 16.5 per cent. The flow-on impacts of this gain in efficiency are shown in Chart 4.2 below.

Chart 4.2. Effect of improved workplace practices during the Taskforce/ABCC era on engineering construction (% deviation from baseline)



Source: the Independent CGE model simulations

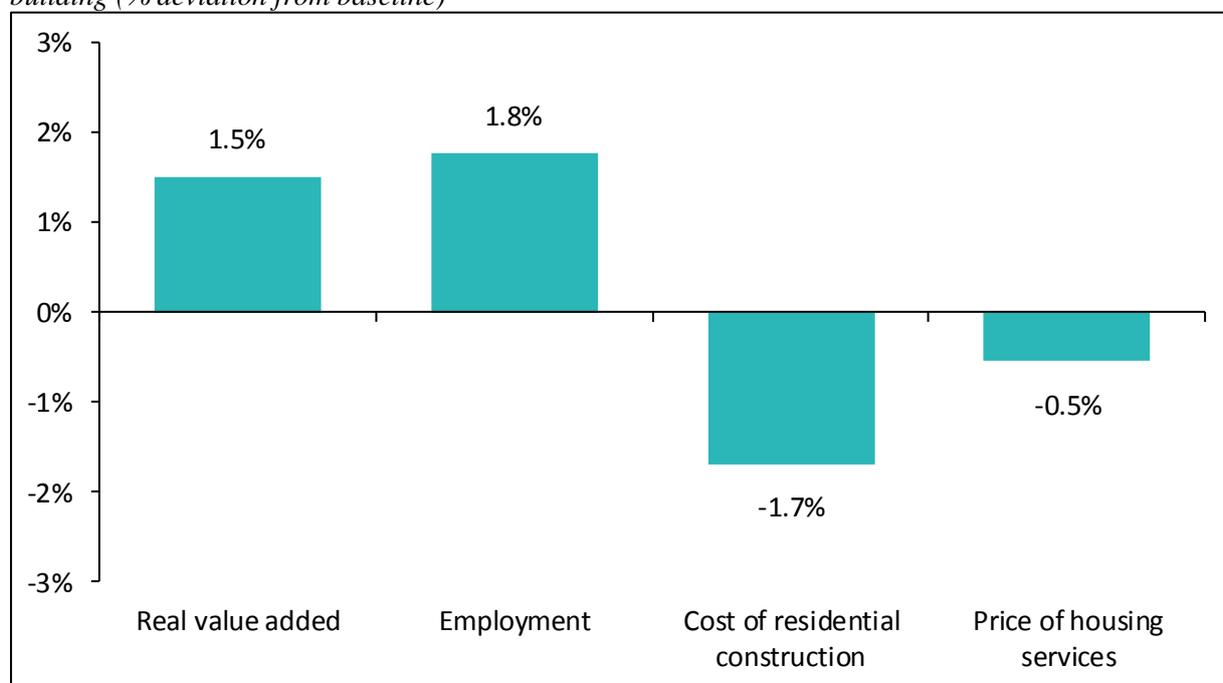
Similar to non-residential building construction, this gain in efficiency leads to a reduction in engineering construction costs of 3.6 per cent. As noted earlier, lower engineering construction costs, combined with lower non-residential building construction costs, lower the overall cost of business investment in buildings and structures by 3.4 per cent. As also noted earlier, cheaper building and structures, in turn, stimulates a lift in real investment by business in this type of capital of 2.7 per cent. It is assumed that there is no response by general government in its level of investment in engineering construction. Even so, the business response results in a long-term gain in engineering construction activity of 3.6 per cent, as seen in Chart 4.2. This is a permanent gain in engineering construction activity compared to the situation without improved workplace practices.

Similar to non-residential building, higher labour efficiency in engineering construction affects employment in three separate ways (labour saving, output and substitution effects) and the positive output and substitution effects offset only part of the negative labour saving effect. This leaves net employment losses of 8.5 per cent in engineering construction, which are fully offset in other sectors of the economy.

Residential building

Chart 4.3 shows the estimated long-term effects on residential construction. As discussed in section 3, productivity gains are expected to have been achieved for multi-unit residential complexes, but not for houses, during the Taskforce/ABCC era. Thus, the overall fall in costs for residential construction shown in Chart 4.3, of 1.7 per cent, is more muted than for non-residential building construction and engineering construction.

Chart 4.3 Effect of improved workplace practices during the Taskforce/ABCC era on residential building (% deviation from baseline)



Source: the Independent CGE model simulations

This flows through to a smaller percentage reduction in the price of housing services of 0.5 per cent, consistent with the fact that production of housing services relies not only on residential buildings, but also on residential land and intermediate inputs.

Lower prices for housing services leads to an increase in the demand for residential buildings, boosting residential construction activity. Indeed, Chart 4.3 shows a long-term increase in residential construction activity of 1.5 per cent relative to what it would otherwise be.

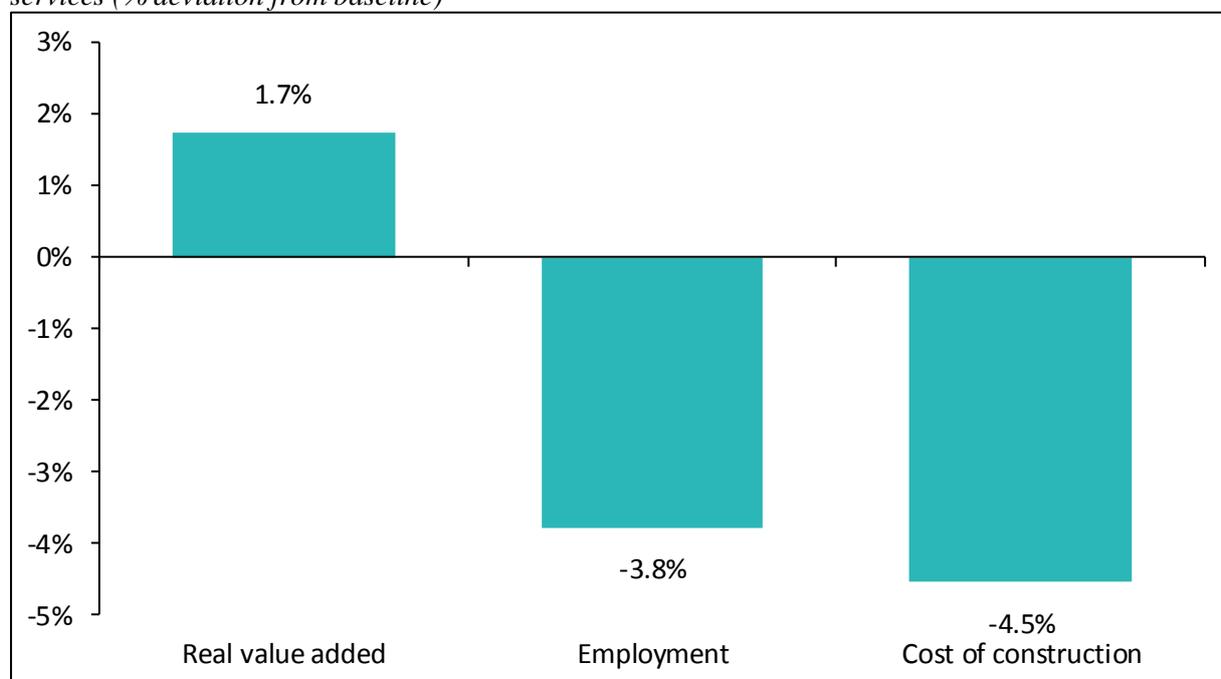
Interestingly, unlike for non-residential construction, where there are employment losses, for residential building there is an employment gain. As discussed above, large productivity gains in non-residential construction (including both non-residential building and engineering construction) reduce demand for construction workers on that side of the construction industry. This leads to wages for construction workers being lower than otherwise, which stimulates demand for construction workers

on the other side of the construction industry, in residential building. Thus, construction workers migrate from non-residential construction to residential building. Chart 4.3 shows the estimated employment gain in residential building of 1.8 per cent.

Construction services

As discussed in section 3, construction services covers services such as site preparation, electrical, plumbing and plastering services, irrespective of whether these services are provided by general construction firm employees or by independent contractors. Thus, the construction services industry covers a range of construction services delivered across the entire construction industry, including in residential building, non-residential building and engineering construction. Consequently, the effects of the ABCC scenario on the construction services industry are similar to the effects on the construction industry as a whole. These effects are presented in Chart 4.4

Chart 4.4. Effect of improved workplace practices during the Taskforce/ABCC era on construction services (% deviation from baseline)



Source: the Independent CGE model simulations

There is a gain in activity in the construction services industry of 1.7 per cent, as it shares in the gains in activity in the other three subsectors of the construction industry. Employment is lower by 3.8 per cent, reflecting the larger falls in employment in non-residential construction partly offset by the smaller gain in employment in residential building. As noted earlier, this employment loss is fully offset by employment gains in other sectors of the economy, but it is also accompanied by short term adjustment costs as workers move to the other industries.

Total construction industry

Overall, the productivity boost in the building and construction industry as a result of improved workplace practices boosts activity. The lift in activity varies across the four subsectors of the construction industry in the following way:

- 3.3 per cent gain for non-residential building;
- 3.6 per cent gain for engineering construction;
- 1.5 per cent gain for residential building; and
- 1.7 per cent for construction services.

At the same time, these permanent long-term gains in construction activity will have been accompanied by short-term adjustment costs, due to job shifting from construction to other industries.

Note that the losses in construction industry employment are relative to the employment level that would have occurred if there were no reforms (as in the Baseline Scenario). This does not mean that there has been a fall in construction employment during the reform process. Indeed, because of other factors, construction employment has grown strongly in most years during the reform process, and was much higher at the end of the Taskforce/ABCC era than it was at the beginning.

4.2 Wider industry effects

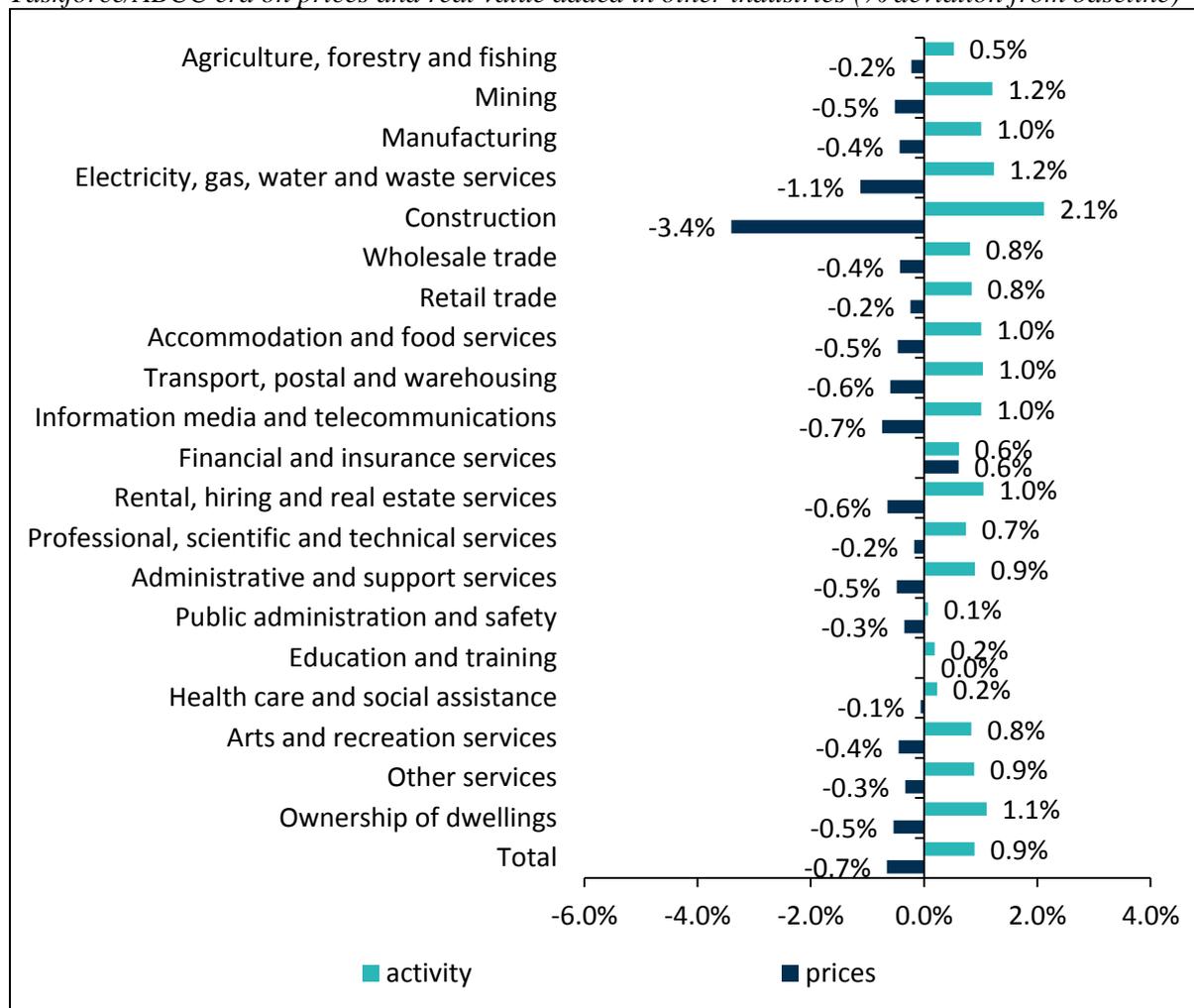
The change in activity in the building and construction industry is expected to affect activity in other industries. This section outlines the simulated production impacts on other industries of improved workplace practices in the building and construction industry as a result of the ABCC, Taskforce and industrial relations reforms in the years to 2006. The impacts on activity refer to the impact on real value added and are presented in Chart 4.5.

As discussed in Section 4.1, higher labour productivity flows through to reduce the price of dwellings by around 0.5 per cent (also shown in Chart 4.5). This stimulates a long-term rise in demand for housing services (“ownership of dwellings”) of 1.1 per cent, relative to what it otherwise would be, as also shown in Chart 4.5.

The detailed effects within the construction industry itself were discussed in Section 4.1. These effects add up to an average fall in construction costs of 3.4 per cent and a rise in activity of 2.1 per cent, as shown in Chart 4.5. These are average effects only. As explained above, the percentage gains in production are lower for residential building and higher for non-residential building.

As discussed in the previous section, the lower prices for construction flowing from productivity gains reduce the overall cost of investment in buildings and structures by 3.4 per cent. This is of particular benefit to sectors that are large users of buildings and structures. Chart 4.5 shows that, outside of the construction industry, the electricity, gas, water & waste industry and the information, media & telecommunication services industry receive the largest cost savings, and they reduce their prices by 1.1 and 0.7 per cent respectively. These price reductions lead to significant gains in activity.

Chart 4.5. Effect of improved workplace practices in the construction industry during the Taskforce/ABCC era on prices and real value added in other industries (% deviation from baseline)



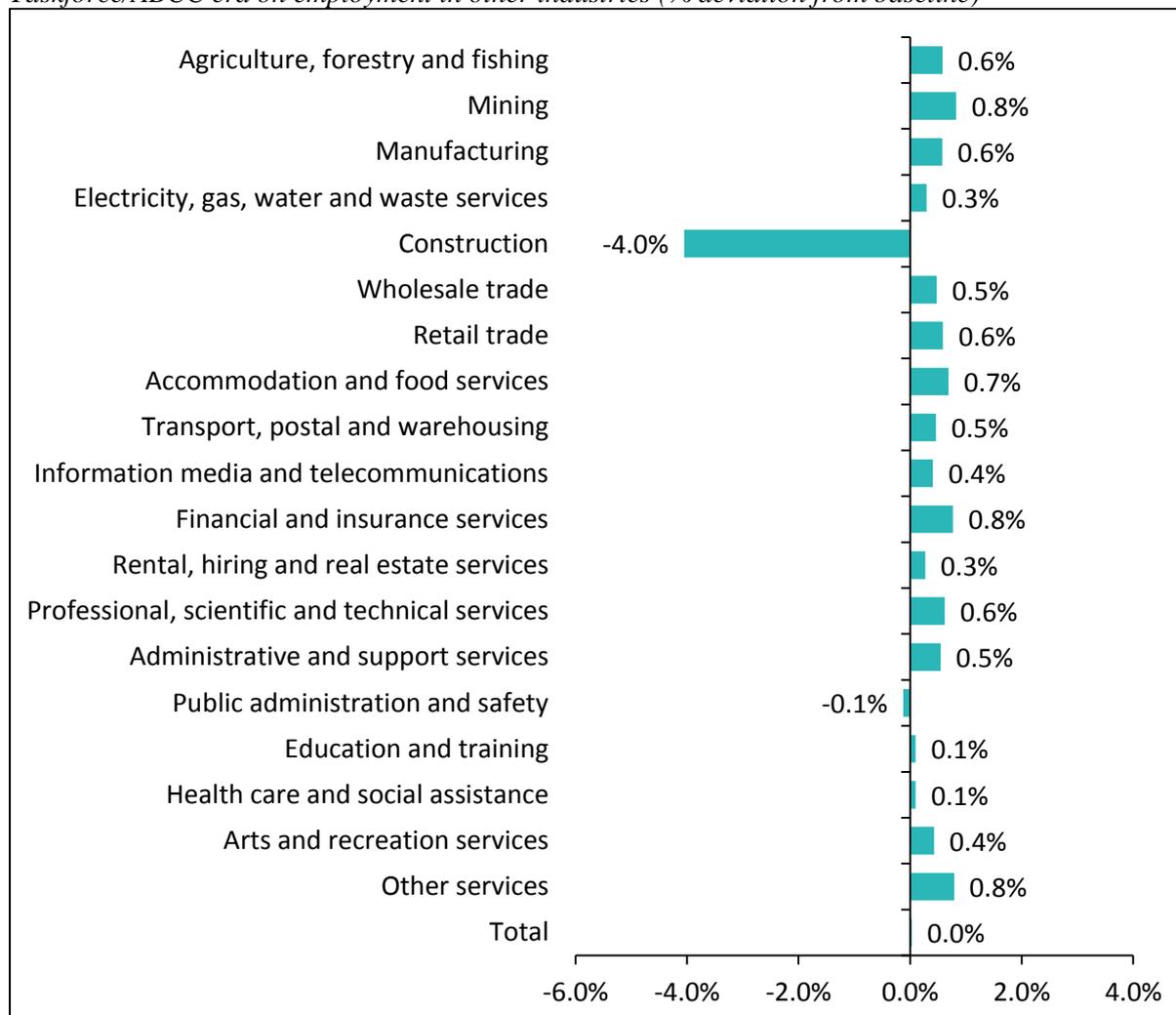
Source: the Independent CGE simulations

For the economy as a whole, production costs and output prices are down by 0.7 per cent, while production volumes are up by 0.9 per cent, relative to what they would otherwise be. The long-term production gains are widespread but are largest in the mining industry and the electricity, gas, water & waste services industry.

Chart 4.6 shows the pattern of industry job shifting induced by higher productivity in the construction sector. While employment in construction is down, the effect of this on national employment is offset by employment gains in other industries. The biggest employment gains are in the industries of mining, other services and finance and insurance services (where employment in each industry increases by 0.8 per cent). This is a direct effect of the gains in production in these industries.

As discussed in Section 4.1, employment in the construction industry itself is expected to be 4.0 per cent lower than would otherwise be the case, with the negative labour saving effect only partly offset by the positive output and substitution effects in this industry. Minor reductions are also expected in employment in the public administration and safety industry as government substitutes away from labour towards relatively cheaper capital.

Chart 4.6. Effect of improved workplace practices in the construction industry during the Taskforce/ABCC era on employment in other industries (% deviation from baseline)



Source: the Independent CGE simulations

Chart 4.6 also shows that, overall, there is no change in the level of employment in the economy. As explained in Section 3.4, in the long-term the labour market clears and unemployment converges to its natural rate.

4.3 National Macroeconomic effects

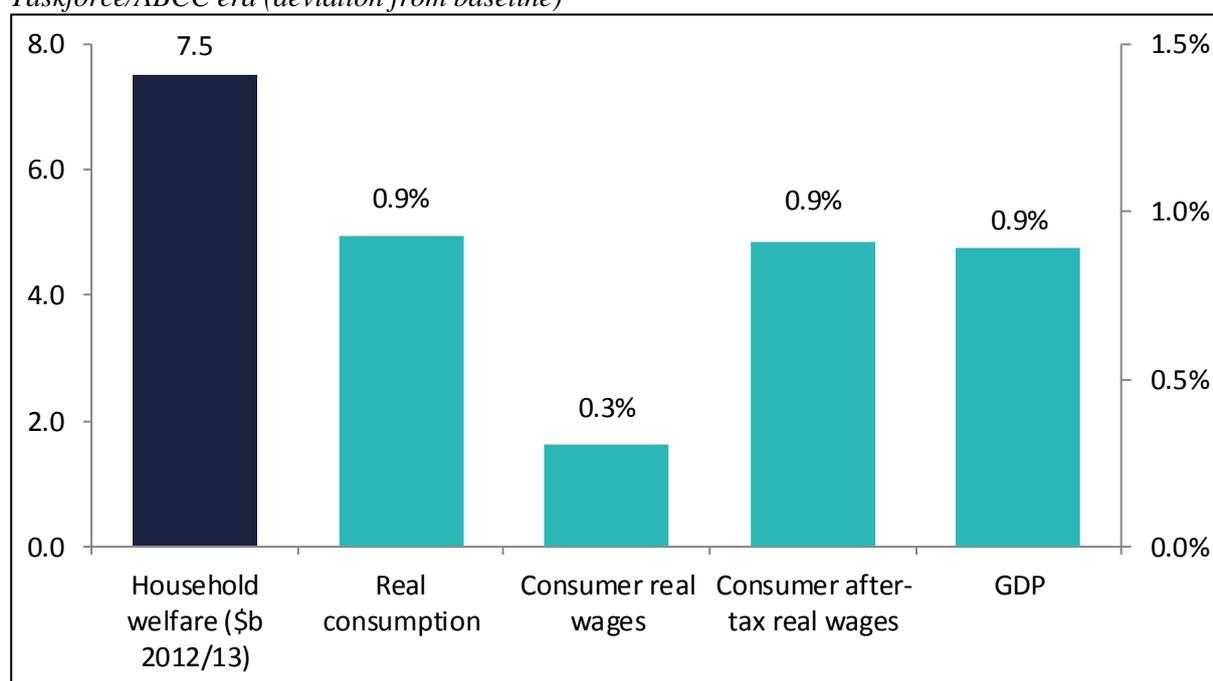
As explained in the previous sections, higher construction productivity leads to lower construction prices. This flows through to savings in production costs across the economy, because all industries are reliant on construction to some extent as part of their business investment. As shown in Chart 4.5, the average saving in production costs is reflected in a reduction in economy-wide production prices of 0.7 per cent.

This cost saving is shared across the economy, as both the private and government sectors are significant users of commercial building and engineering construction. Importantly, consumers reap the benefits of this through a gain in their real after-tax wage. This gain is distributed through two channels, a lift in the real wage and cut to personal income tax rates.

In the private sector, the cost savings to each industry from lower costs for buildings and engineering construction flows through to households in the form of lower consumer prices. This is reflected in the gain of 0.3 per cent in consumer real wages seen in Chart 4.7.

In the government sector, lower construction costs mean that the same level of public investment in schools, hospitals, roads and other infrastructure can be provided at a lower cost. This budget saving is assumed to be passed on to households in the form of a cut in personal income tax, which is the model’s swing fiscal policy instrument, as discussed in section 3.4. This tax cut boosts the gain in consumer real wages from 0.3 per cent on a pre-tax basis, to 0.9 per cent on a post-tax basis, as seen in Chart 4.7.

Chart 4.7. National macro-economic effects of improved workplace practices during the Taskforce/ABCC era (deviation from baseline)



Source: Independent CGE model simulations

In short, there is a lift in the real consumer after-tax wage, because labour in the construction industry has become more productive as a result of improved workplace practices during the Taskforce and ABCC era, and this productivity boost flows through to the wider economy and ultimately to consumers.

Chart 4.7 also shows the effects of higher construction productivity on other economy-wide indicators. The gain of 0.9 per cent in consumer real after-tax wages leads to a gain in real private consumption of 0.9 per cent. That is, a higher real wage leads to higher living standards.

This gain in living standards is more rigorously measured as an annual gain in consumer welfare. The Independent CGE model provides estimates of the effect of higher productivity on annual economic welfare by using the equivalent variation measure from welfare economics. This is a rigorous measure of the gain in real consumption. Chart 4.7 shows that the higher construction productivity leads to an increase in consumer living standards (the annual economic welfare gain) of \$7.5 billion in current (2012/13) dollars.

After allowing for economic growth over the last year, this is similar to the consumer gain estimated in the 2012 report of \$6.3 billion in 2011/12 terms⁵⁵. The estimate of consumer gains is similar across reports, since each report has consistently modelled a productivity gain of the same magnitude (9.4 per cent) and from the same source (improved workplace practices in the building and construction industry).

Policies should be assessed on the basis of their impact on households. Consumer welfare, as opposed to GDP, is the most robust way of measuring how households are affected by various policies. The findings of this report for the impact on households are consistent with the original 2007 Econtech report and earlier updates and continue to support the argument that improved workplace practices in the building and construction industry are in the public interest.

Chart 4.7 also shows a 0.9 per cent increase in the level of GDP in the long-term, relative to what it otherwise would have been in the absence of the reforms. This gain was reported earlier in Chart 4.5 as the gain in real value added for all industries added together. Activity gains for individual industries can be seen in the same Chart.

⁵⁵ An additional factor raising the estimated gain in living standards in this report compared to the 2012 report is the improved modelling approach which now includes the value that consumers place on their leisure time.

5 Economic impact of less productive workplace practices during the FWBC era

The previous section described the industry and economy wide impacts of the productivity benefits in the construction industry from improved workplace practices during the Taskforce/ABCC era. This section discusses the industry and economy wide impacts of a partial unwinding of these productivity benefits, due to the changes associated with replacing the ABCC with the FWBC. This section is presented in the same format as Section 4.

- Section 5.1 describes the detailed economic impacts on the building and construction industry of replacing the ABCC with the FWBC.
- Section 5.2 describes the wider industry impacts of replacing the ABCC with the FWBC.
- Section 5.3 presents the macroeconomic impacts of replacing the ABCC with the FWBC.

The FWBC scenario has been designed based on the analysis in section 2 of changes to workplace relations regulations and the available data. This resulted in the conservative assumption in section 3 that 75 per cent of the productivity gains achieved in the Taskforce/ABCC era are unwound in the FWBC era.

Importantly, the results presented in this section refer to the permanent effects on levels, not growth rates, of indicators as a result replacing the ABCC with the FWBC. This means, for example, that a reduction of 0.8 per cent in the level of GDP is interpreted as the reduction in GDP relative to what it would otherwise be, and not the annual growth rate. That is, it compares the level of GDP at a point in time under the FWBC scenario with the level of GDP at the equivalent point in time under the ABCC scenario.

The effect of the less productive workplace practices presented in this section can be compared to the effect of the more productive workplace practices presented in the previous section. The FWBC scenario models a 75 per cent loss of the productivity gains generated during the Taskforce/ABCC era. Thus, it turns out that the magnitude of the economic losses in the FWBC scenario is around 75 per cent of the economic gains estimated in the previous section for the Taskforce/ABCC era.

5.1 Building and construction industry effects

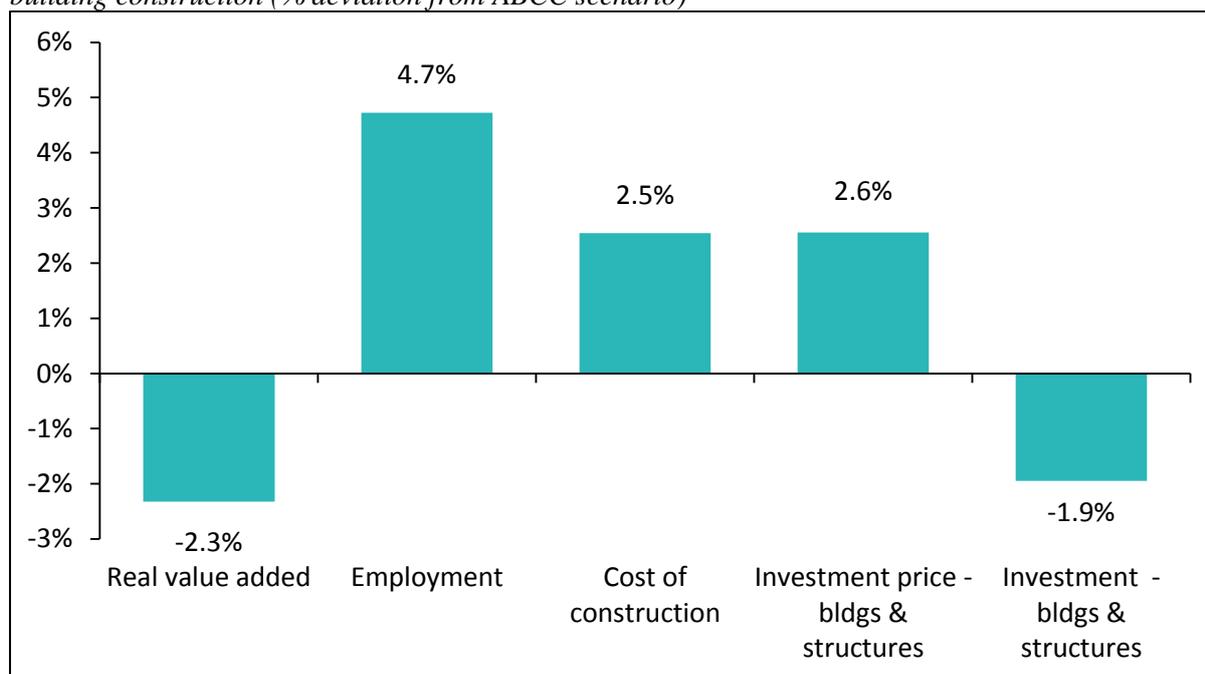
This section presents the economic impacts on the building and construction industry of the labour productivity loss in the industry stemming from abolishing the ABCC and replacing it with the FWBC.

Similar to section 4, we consider, in turn, the economic impacts on the four subsectors of non-residential building construction, engineering construction, residential building construction and construction services.

Non-residential building

The effects on non-residential building construction are shown in Chart 5.1. As shown in Table 3.2, these effects are driven mainly by an assumed decrease in labour efficiency of 12.8 per cent for non-residential building construction in the long-term, relative to the scenario where the ABCC remains in place.

Chart 5.1. Effects of less productive workplace practices during the FWBC era on non-residential building construction (% deviation from ABCC scenario)



Source: the Independent CGE model simulations

Higher non-residential building construction costs, together with higher engineering construction costs, combine to increase the overall cost of business investment in buildings and structures by 2.6 per cent (as seen in Chart 5.1). As discussed later in this subsection, the increase in engineering construction costs, like the increase in non-residential building costs, is a result of lower labour productivity due to replacing the ABCC with the FWBC.

More expensive buildings and structures result in a reduction in real investment by business in this type of capital of 1.9 per cent. Even assuming that there is no response by general government in its level of investment in building and structures, the business response results in a long-term reduction in total non-residential building construction activity of 2.3 per cent, as seen in Chart 5.1.

Employment in non-residential building is affected by three separate factors.

- The assumed loss in labour productivity of 12.8 per cent means that the number of employees required for an unchanged level of activity is higher (“labour *dis*-saving effect”).
- The reduction in activity of 2.3 per cent subtracts a similar percentage from employment (“output effect”).

- The reduction in labour efficiency makes labour more expensive, inducing some substitution away from labour towards capital and land (“substitution effect”).

The positive effect on non-residential building employment from the labour *dis*-saving effect dominates the negative effects of the output and substitution effects, leaving a net gain of 4.7 per cent in non-residential building employment in the long-term. Importantly, in the long-term, this additional employment in the construction sector is fully offset by lower employment in other industries. However, there would be short-term adjustment costs from job shifting to non-residential building from other industries.

Engineering construction

The engineering construction industry is expected to see a direct labour productivity loss of 10.6 per cent in the FWBC era. The flow-on impacts of this reduction in productivity are shown in Chart 5.2 below.

Chart 5.2. Effects of less productive workplace practices during the FWBC era on engineering construction (% deviation from ABCC scenario)



Source: the Independent CGE model simulations

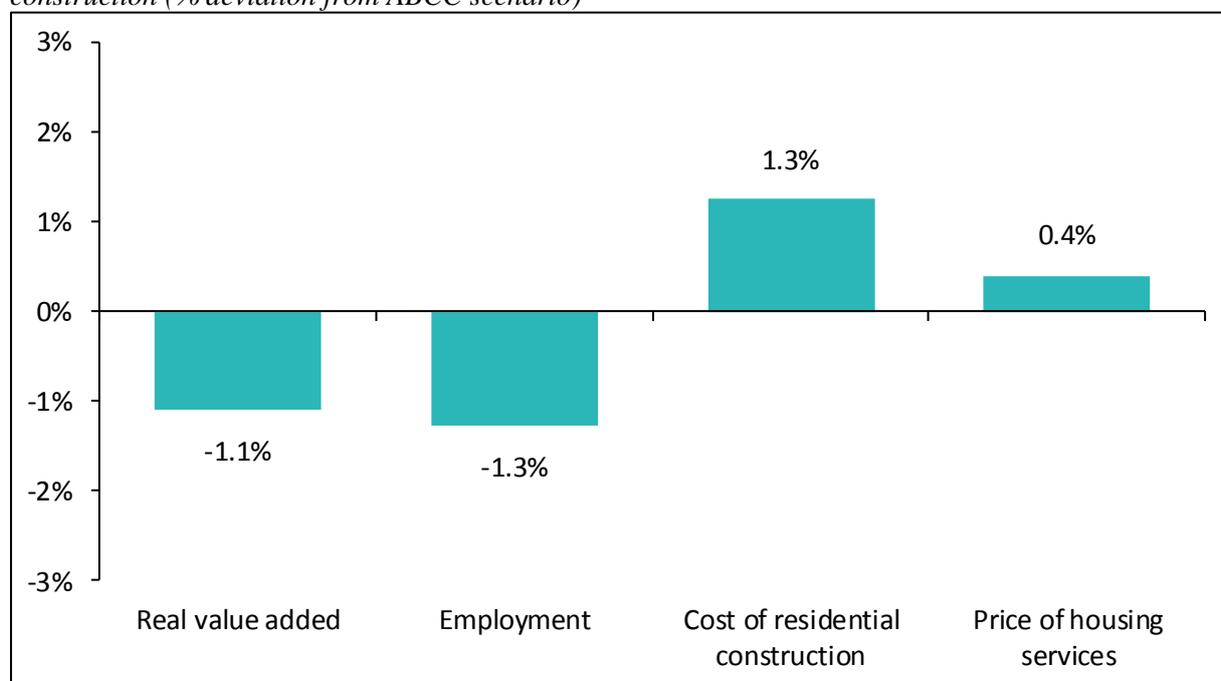
Similar to non-residential building construction, this reduction in labour efficiency leads to an increase in engineering construction costs of 2.7 per cent. As noted earlier, higher engineering construction costs, combined with higher non-residential building construction costs, increase the overall cost of business investment in buildings and structures by 2.6 per cent. As also noted earlier, more expensive building and structures, in turn, results in lower real investment by business in this type of capital by 1.9 per cent. It is assumed that there is no response by general government in its level of investment in engineering construction. Even so, the business response results in a long-term fall in engineering construction activity of 2.5 per cent, as seen in Chart 5.2. This is a permanent loss in engineering construction activity compared to the ABCC scenario.

Similar to non-residential building construction, higher labour efficiency in engineering construction affects employment in three separate ways (labour *dis*-saving, output and substitution effects) and the negative output and substitution effects offset only part of the positive labour *dis*-saving effect. This leaves a net employment gain of 6.8 per cent in engineering construction, which is fully offset in other sectors of the economy.

Residential building

Chart 5.3 shows the estimated long-term effects on residential construction. As discussed in section 3, productivity losses are expected for multi-unit residential complexes, but not for houses, as a result of replacing the ABCC with the FWBC. Thus, the overall increase in costs for residential construction shown in Chart 5.3, of 1.3 per cent, is more muted than for non-residential building construction and engineering construction.

Chart 5.3 Effects of less productive workplace practices during the FWBC era on residential construction (% deviation from ABCC scenario)



Source: the Independent CGE model simulations

This flows through to a smaller percentage increase in the price of housing services of 0.4 per cent, consistent with the fact that production of housing services relies not only on residential buildings, but also on residential land and intermediate inputs.

Higher prices for housing services leads to a decrease in the demand for residential buildings, reducing residential construction activity. Indeed, Chart 5.3 shows a long-term decrease in residential construction activity of 1.1 per cent relative to what it would have been under the ABCC.

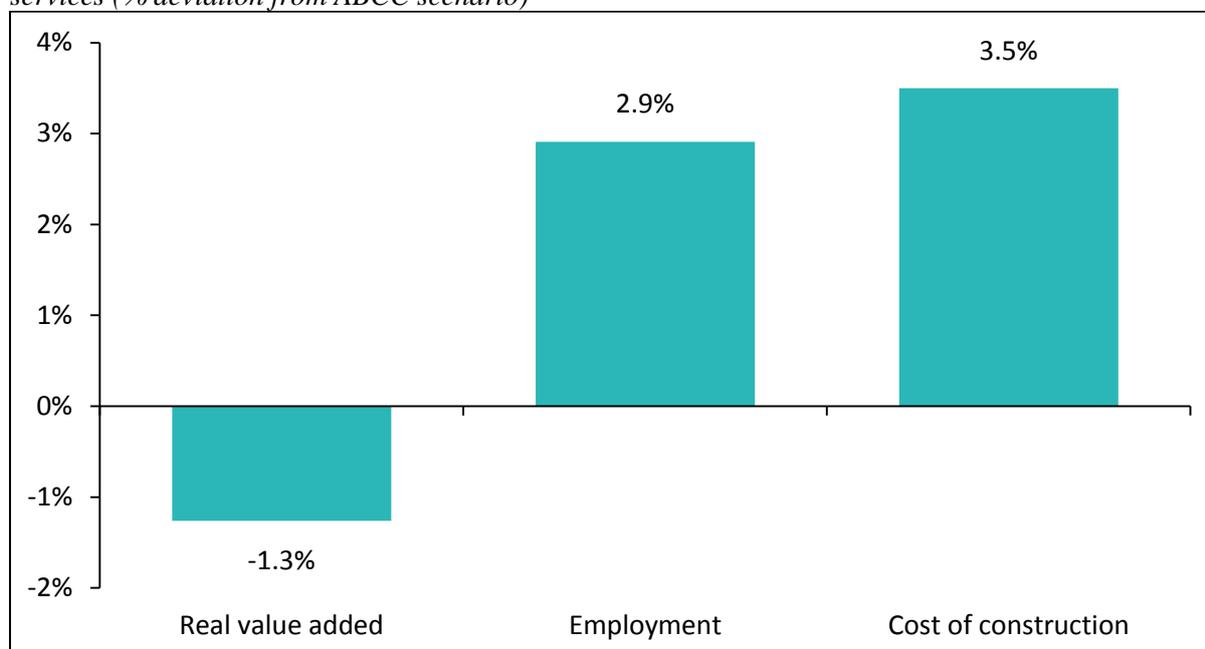
Interestingly, unlike for non-residential construction, where there are employment gains, for residential building there is an employment loss. As discussed above, large productivity losses in non-residential construction (including both non-residential building and engineering construction) increase demand for construction workers on that side of the construction industry. This leads to a strengthening of wages for construction workers, which reduces demand for construction workers on

the other side of the construction industry, in residential building. Thus, construction workers migrate from residential building to non-residential construction. Chart 5.3 shows the estimated employment loss in residential building of 1.3 per cent.

Construction services

As discussed in section 3, construction services covers services such as site preparation, electrical, plumbing and plastering services, irrespective of whether these services are provided by general construction firm employees or by independent contractors. Thus, the construction services industry covers a range of construction services delivered across the entire construction industry, including in residential building, non-residential building and engineering construction. Consequently, the effects of the FWBC scenario on the construction services industry are similar to the effects on the construction industry as a whole. These effects are presented in Chart 5.4

Chart 5.4. Effects of less productive workplace practices during the FWBC era on construction services (% deviation from ABCC scenario)



Source: the Independent CGE model simulations

There is a loss in activity in the construction services industry of 1.3 per cent, as it shares in the losses in activity in the other three subsectors of the construction industry. Employment is higher by 2.9 per cent, reflecting the larger gains in employment in non-residential construction partly offset by the smaller loss in employment in residential building. As noted earlier, this employment gain is fully offset by employment losses in other sectors of the economy. Further, there would be short-term adjustment costs from job shifting to non-residential building from other industries.

Total construction industry

Overall, the productivity loss in the building and construction industry as a result of replacing the ABCC with the FWBC reduces activity in the sector. However, the fall in activity varies across the four subsectors of the construction industry in the following way:

- 2.3 per cent loss for non-residential building;

- 2.5 per cent loss for engineering construction;
- 1.1 per cent loss for residential building and
- 1.3 per cent loss for construction services.

5.2 Wider industry effects

The change in activity in the building and construction industry is expected to affect activity in other industries. This section outlines the simulated production impacts on other industries of replacing the ABCC with the FWBC in the building and construction industry. The impacts on activity refer to the impacts on real value added and are presented in Chart 5.5.

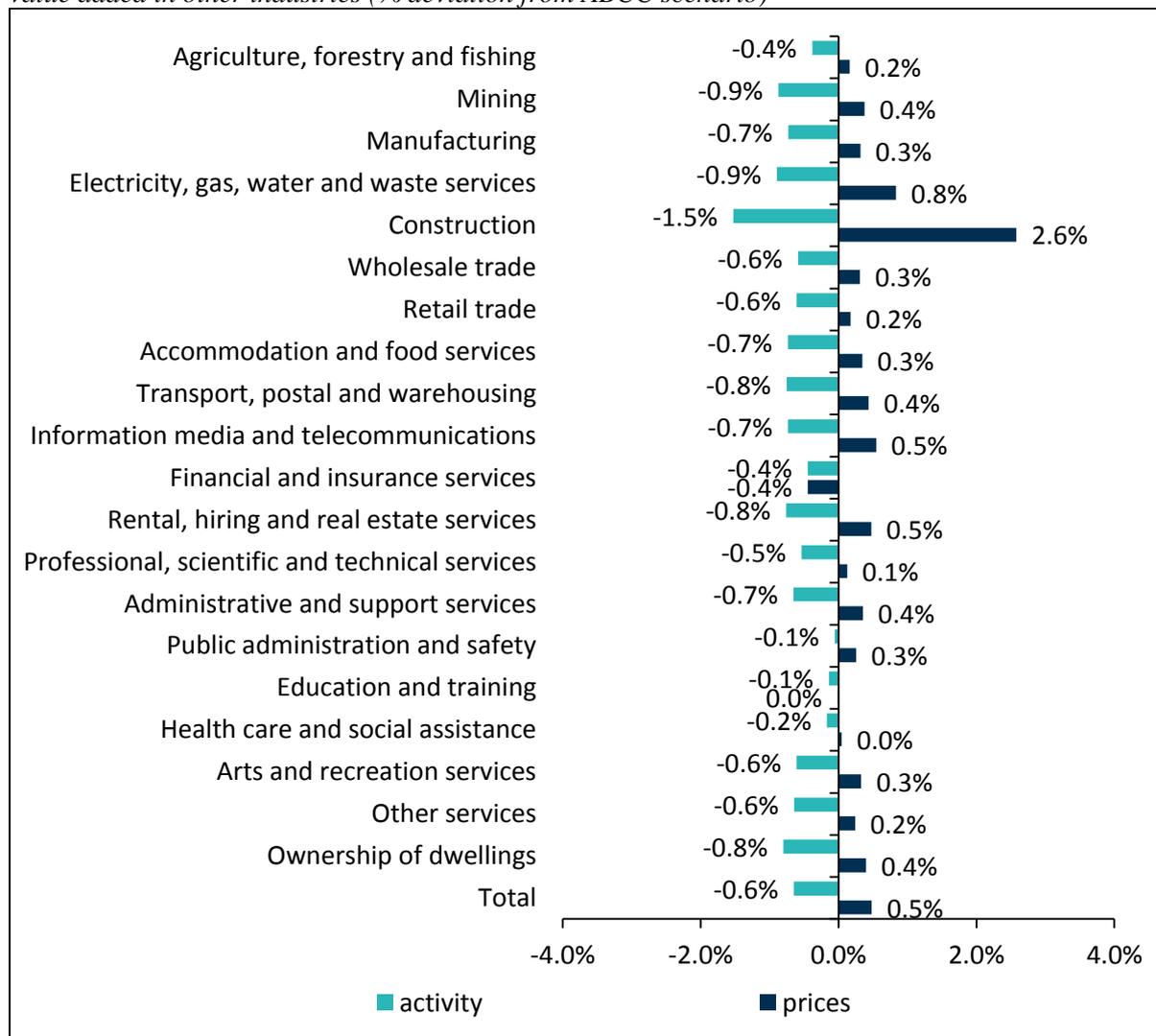
As discussed in Section 5.1, lower labour productivity flows through to raise the cost of dwellings by around 0.4 per cent (also shown in Chart 5.5). This leads to a long-term reduction in the level of demand for housing services (“ownership of dwellings”) of 0.8 per cent, relative to what it would be under the ABCC scenario, as also shown in Chart 5.5.

The detailed effects within the construction industry itself were discussed in Section 5.1. These effects lead to an average increase in construction costs of 2.6 per cent and a fall in construction activity of 1.5 per cent, as shown in Chart 5.5. These are average effects only. As explained above, the percentage losses in production are lower for residential building and higher for non-residential construction.

As discussed in the previous section, the higher prices for construction as a result of the lower productivity push up the overall cost of investment in buildings and structures by 2.6 per cent. This is particularly costly to sectors that are large users of buildings and structures. Chart 5.5 shows that the electricity, gas, water & waste industry and the information, media & telecommunication services industry see cost increases that cause price rises of 0.8 per cent and 0.5 per cent respectively. These higher prices lead to significant reductions in demand for production.

For the economy as a whole, production costs are up 0.5 per cent, while production volumes are down 0.6 per cent, relative to what they would be under the ABCC scenario. The long-term production losses are widespread but the largest reductions outside the construction industry are in the mining industry and the electricity, gas, water & waste services industry.

Chart 5.5. Effects of less productive workplace practices during the FWBC era on prices and real value added in other industries (% deviation from ABCC scenario)



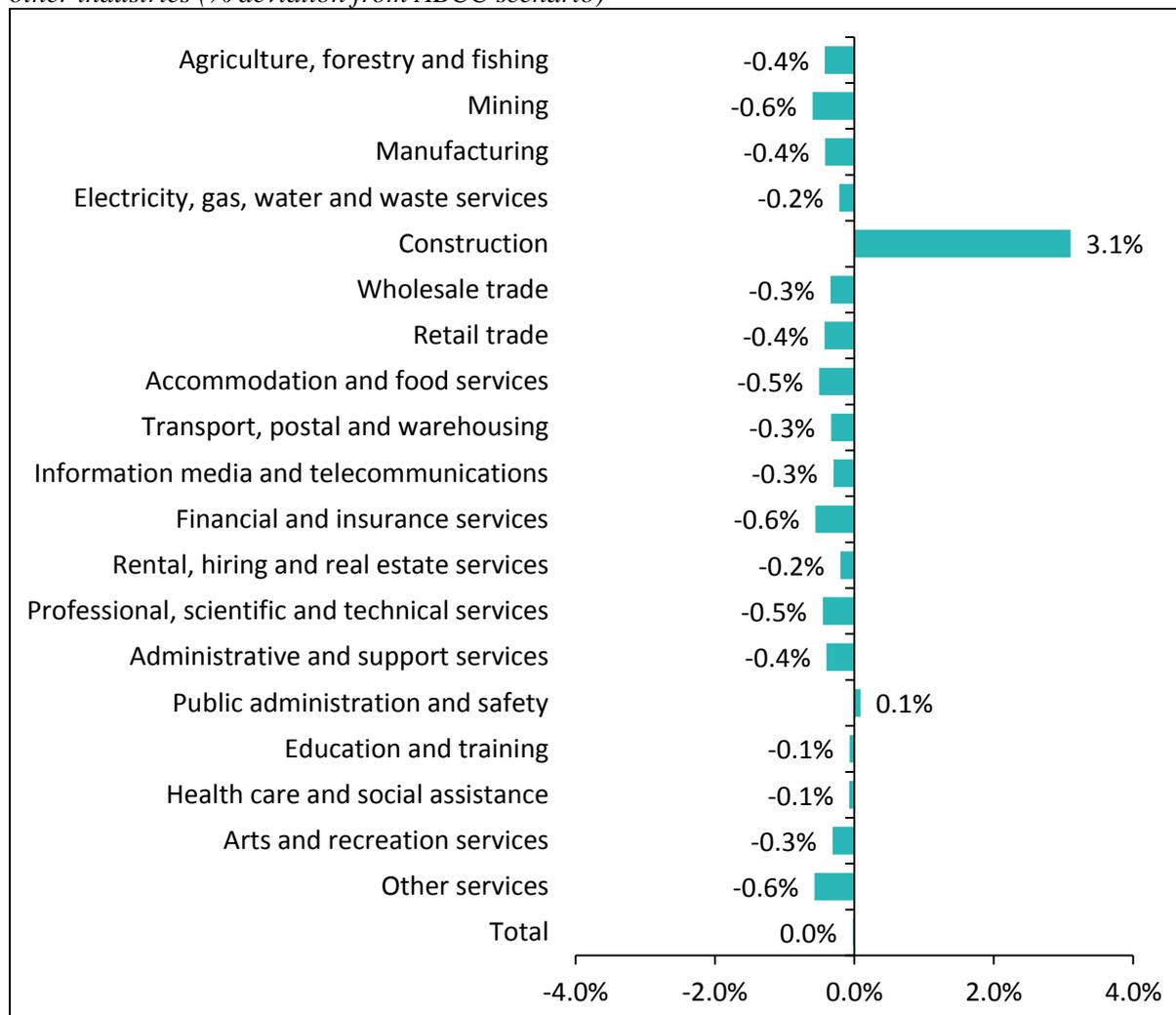
Source: the Independent CGE simulations

Chart 5.6 shows the pattern of industry job shifting induced by lower productivity in the construction sector. While employment in construction increases by 3.1 per cent, the effect of this on national employment is offset by employment losses in other industries. The biggest reductions in employment are in the industries of mining, other services and finance and insurance services (of 0.6 per cent in each case). This is a direct effect of the lower production levels in these industries.

As discussed in Section 5.1, employment in the construction industry itself is expected to be higher than otherwise, with the positive labour *dis*-saving effect only partly offset by the negative output and substitution effects in this industry. A minor increase is also expected in employment in the public administration and safety industry as government substitute towards labour as capital has become relatively more expensive.

Chart 5.6 also shows that, overall, there is no change in the level of employment in the economy. As explained in Section 3.4, national unemployment is not affected in the long-term because wage adjustments allow the labour market to clear.

Chart 5.6. Effects of less productive workplace practices during the FWBC era on employment in other industries (% deviation from ABCC scenario)



Source: the Independent CGE simulations

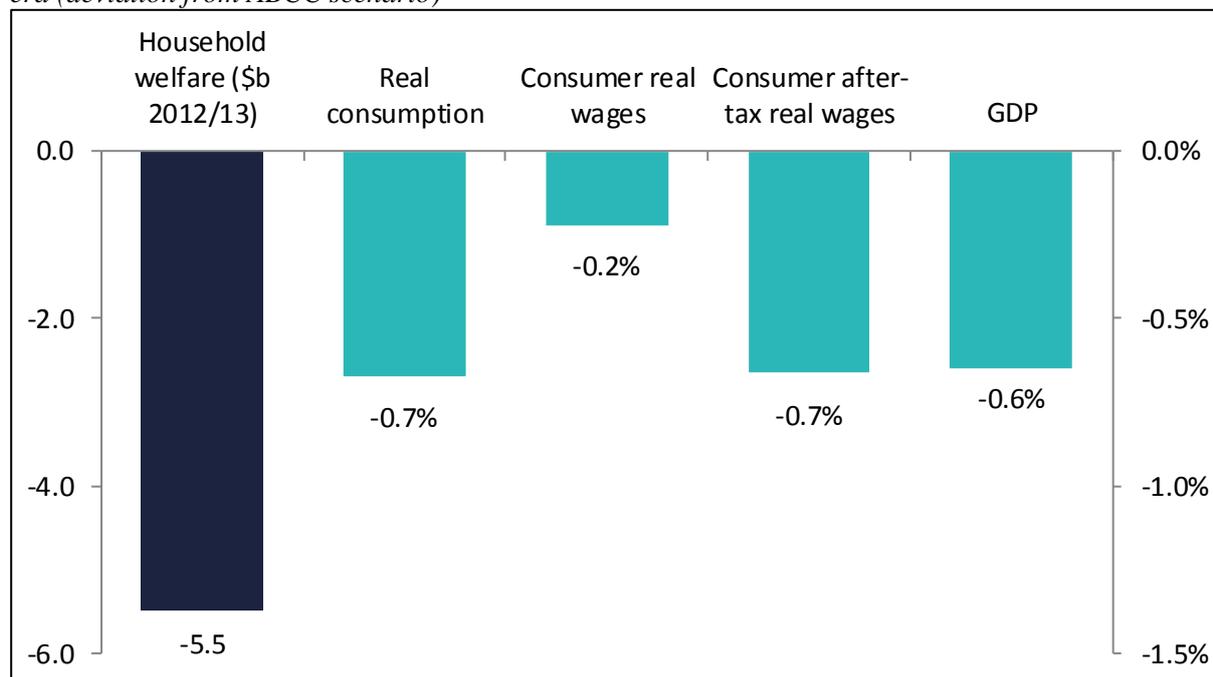
5.3 National Macroeconomic effects

As explained in the previous sections, lower productivity in the construction industry leads to higher construction costs and prices. This flows through to higher production costs across the economy, because all industries are reliant on construction to some extent as part of their business investment. As shown in Chart 5.5, the average increase in production costs is reflected in a rise in the economy-wide price of production by 0.5 per cent.

This cost increase is borne across the economy, as both the private and government sectors are significant users of commercial building or engineering construction. Importantly, consumers lose out through a fall in their real after-tax wage. This fall is distributed through two channels, a reduction in the real wage and increases to personal income tax rates.

In the private sector, the cost increases to each industry from higher costs for buildings and engineering construction flows through to households in the form of higher consumer prices. This is reflected in the 0.2 per cent lower consumer real wages seen in Chart 5.7.

Chart 5.7. National macro-economic effects of less productive workplace practices during the FWBC era (deviation from ABCC scenario)



Source: the Independent CGE model simulations

In the government sector, higher construction costs mean that the same level of public investment in schools, hospitals, roads and other infrastructure can now only be provided at a higher cost. This sees the government's budget position deteriorate, and it is assumed this is passed on to households in the form of higher personal income tax rates, which is the model's swing fiscal policy instrument, as discussed in section 3.4. This tax hike adds to the reduction in the consumer real wage from 0.2 per cent on a pre-tax basis, to 0.7 per cent on a post-tax basis, as seen in Chart 5.7.

In short, there is a fall in the real consumer after-tax wage, because labour in the construction industry has become less productive as a result of replacing the ABCC with the FWBC, and this productivity loss flows through to the wider economy and ultimately to consumers.

Chart 5.7 also shows the effects of lower construction productivity on other economy-wide indicators. The fall of 0.7 per cent in consumer real after-tax wages leads to a loss in real private consumption of 0.7 per cent. That is, a lower real wage leads to lower living standards.

This loss in living standards is more rigorously measured as an annual loss in consumer welfare. The Independent CGE model provides estimates of the change in annual economic welfare by using the equivalent variation measure from welfare economics. This rigorously measures the loss in real consumption. Chart 5.7 shows that lower construction productivity leads to a fall in consumer living standards (the annual economic welfare loss) of \$5.5 billion in current (2012/13) dollars.

Chart 5.7 also shows a 0.6 per cent reduction in the level of GDP in the long-term, relative to what it otherwise would have been if the ABCC had not been replaced by the FWBC. This loss was reported earlier in Chart 5.5 as the loss in real value added for all industries added together. Activity losses for individual industries can be seen in the same chart.

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Appendix A: Independent CGE Model

Computable General Equilibrium (CGE) models provide a powerful tool for simulating the economic impacts of changes in government economic policies, industry developments, and the world economy. They show impacts on economic activity, employment, trade and investment at the level of individual industries, impacts on households and impacts on the economy as a whole.

The Independent CGE Model is Independent Economics' CGE model of the Australian economy, first developed in early 2012. It includes a number of notable features that set it apart from other models of the Australian economy.

- The model uses recent data from the Australian Bureau of Statistics (ABS). The starting point was calibrating the model to the 2007/08 Input-Output (IO) tables from the ABS, which were released in late 2011. The model is then updated in the baseline scenario to a normalised version of the Australian economy in 2012/13. This includes allowing for growth in wages, prices, productivity and employment from 2007/08 to 2012/13, as well as normalised commodity prices.
- The model is based on the most up-to-date ABS industry classification, ANZSIC 2006, which replaces ANZSIC 1993. The 111 industries originally in the ABS data have been extended so that the model distinguishes 120 industries.
- The model incorporates a sophisticated modelling of production in each industry. Production in a standard CGE involves at least three factors of production - labour, capital and intermediate inputs. The Independent CGE model extends this to distinguish 43 types of labour, nine types of capital, land and natural resources. The model also allows for different degrees of substitutability between these different inputs.
- The model provides a valid measure of changes in consumer welfare or living standards based on the equivalent variation, so that policy changes can be correctly evaluated in terms of the public interest.

This appendix explains the main features of the Independent CGE Model, starting with its general features, which are common to most long-run CGE models. Then, the overall structure of the model is described, including the different sources of supply and the end users in the model. Following this, the behaviour of each of the agents in the model is outlined – industries, households, government and then the foreign sector. The final section explains the baseline scenario and validation procedures undertaken in ensuring that the model meets high professional standards.

A.1 General features

The Independent CGE Model makes a number of general assumptions that are consistent with its long-term time horizon. Many of these features are shared with other long-run CGE models.

Long-term model

The Independent CGE Model is a long-term model, meaning that results refer to the ongoing effects on the economy after it has fully adjusted to economic shocks. In keeping with this, all markets are assumed to have reached equilibrium. This includes key markets such as the labour market, where the real wage adjusts so that labour demand from industries is equal to labour supply from households. In addition, the behaviour of households and government is consistent with the inter-temporal budget constraints that they face. This involves levels of household saving and foreign capital inflow that are consistent with stocks of assets growing at the same rate as real GDP.

The long-term time horizon is fitting because economic policies should be judged against their lasting effects on the economy, not just their effects in the first one or two years.

Optimising behaviour

Industries and households in the Independent CGE Model choose the best possible outcome, while still remaining within the constraints of their budgets.

- **Profit maximisation:** the representative business in each industry chooses how to produce (with a mix of primary factors and intermediate inputs) and how much to produce to maximise its profit subject to the prices of its inputs and outputs.
- **Utility maximisation:** A representative household chooses their consumption levels of leisure and each of the 120 goods and services in a way that maximises their well-being (or utility), subject to a budget constraint.

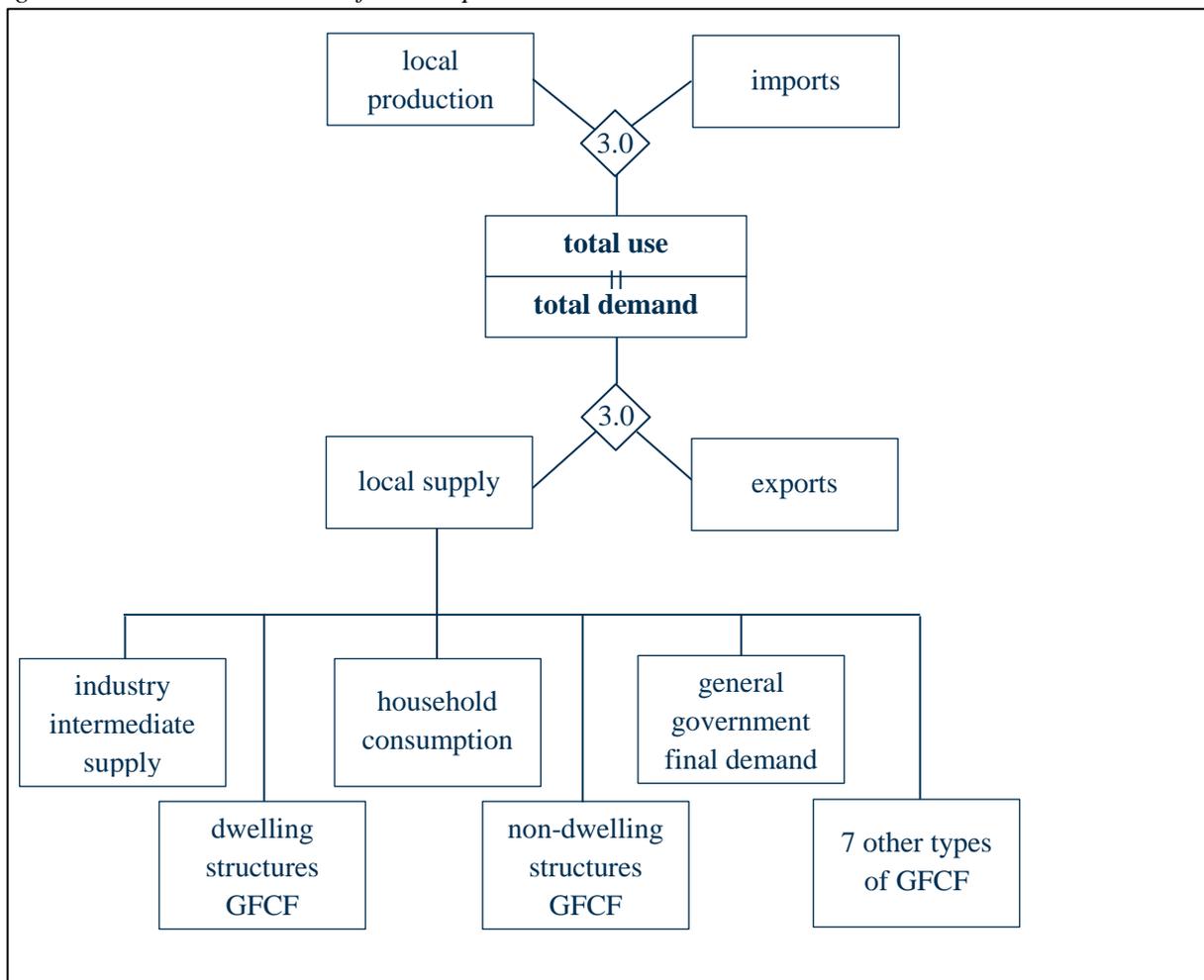
Budget constraints

In a sustainable equilibrium, governments and households must meet their budget constraints. For simplicity, we assume that the government budget is balanced in the long run. Given its expenditure requirement, the government chooses its level of taxation consistent with achieving this outcome. In the private sector, a sustainable outcome is one in which household saving is sufficient to generate growth in household assets in line with growth in real GDP.

A.2 Trade and demand

This section discusses the overall structure of the Independent CGE Model. The connection between total use and total demand is shown in Diagram A.1.

Diagram A.1 Trade and demand for each product



Note: GFCF is Gross Fixed Capital Formation, or investment.

As shown in Diagram A.1, total supply in the Independent CGE Model is made up of locally produced and imported varieties of each good. Local production competes with imports so that if imports become cheaper relative to the locally-produced equivalent, domestic users will purchase more imports and less locally produced goods and services. This substitution is modelled using a Constant Elasticity of Substitution (CES) function, where the elasticity of substitution has been set at 3.0. That is, if the price of imports relative to local production is 1 per cent lower, then the quantity used of imports relative to local production will be 3.0 per cent higher.

The value of 3.0 for the elasticity has been chosen after considering the economic literature for Australia. For example, Zhang and Verikios have estimated the elasticity of substitution between locally produced and imported goods for a number of countries, including Australia, using data from 1997, 1998 and 2002. Their estimates for this elasticity in industries for which Australia is a large importer suggest an overall substitutability of around 3.0.

In each industry, the representative firm chooses the amount to supply to the export market and the amount to supply to the domestic market. Some CGE models unrealistically assume that a firm can switch between supplying the domestic and export markets without incurring a cost. However, there are a number of inherent costs involved in export activities, such as the costs of establishing and maintaining a client base in foreign countries and/or of producing goods that satisfy foreign tastes. In line with this, the Independent CGE model takes into account that firms cannot costlessly switch between supplying the domestic and export markets. It does this using a constant elasticity of transformation (CET) function, with an elasticity of 3.0. That is, if the price received for exports relative to the price received in the domestic market is 1 per cent higher, then the quantity that firms supply to the export market relative to the quantity supplied to the domestic market will be 3.0 per cent higher. This represents a relatively high level of sensitivity to export prices, but is still less sensitive than models that assume that exports and domestic supply are perfect transformates.

Total supply must equal total demand in a long-run equilibrium. In the Independent CGE Model, local production and imports supply the 13 different categories of demand that are shown in Diagram A.1.

- Industries demand intermediate inputs.
- Industries also make decisions about their nine different types of capital— including stocks of dwellings structures, non-dwellings structures and seven other types of produced capital. In turn, these capital stocks determine the gross fixed capital formation (GFCF or investment) required to maintain sustainable growth in these assets.
- Households demand consumption goods and services.
- The general government sector demands final goods and services on behalf of households.
- The foreign sector demands exports from Australia.

The following sections describe the behaviour of each of these agents in the model – industries, households, the government and the foreign sector.

A.3 Industry production

Production in each of the 120 industries in the Independent CGE Model is modelled in a sophisticated way that identifies a large set of inputs used by industries.

It is a standard practice in a CGE model to at least distinguish between labour and capital as primary factors. Krusell et al. (1997) go further and distinguish between capital structures and capital equipment, as well as between skilled labour and unskilled labour. In the Independent CGE model, we adopt their idea of distinguishing between capital equipment and capital structures. The model also identifies industry use of labour by skill level and occupation.

Fraser and Waschik (2010) note that the GTAP7 Dataset distinguishes the primary factors of land, skilled labour, unskilled labour, capital and natural resources. Hertel et al. (2008) discuss land use in CGE models. Land and natural resources can be regarded as location-specific fixed factors which earn economic rents, setting them apart from mobile factors such as labour and capital. In each

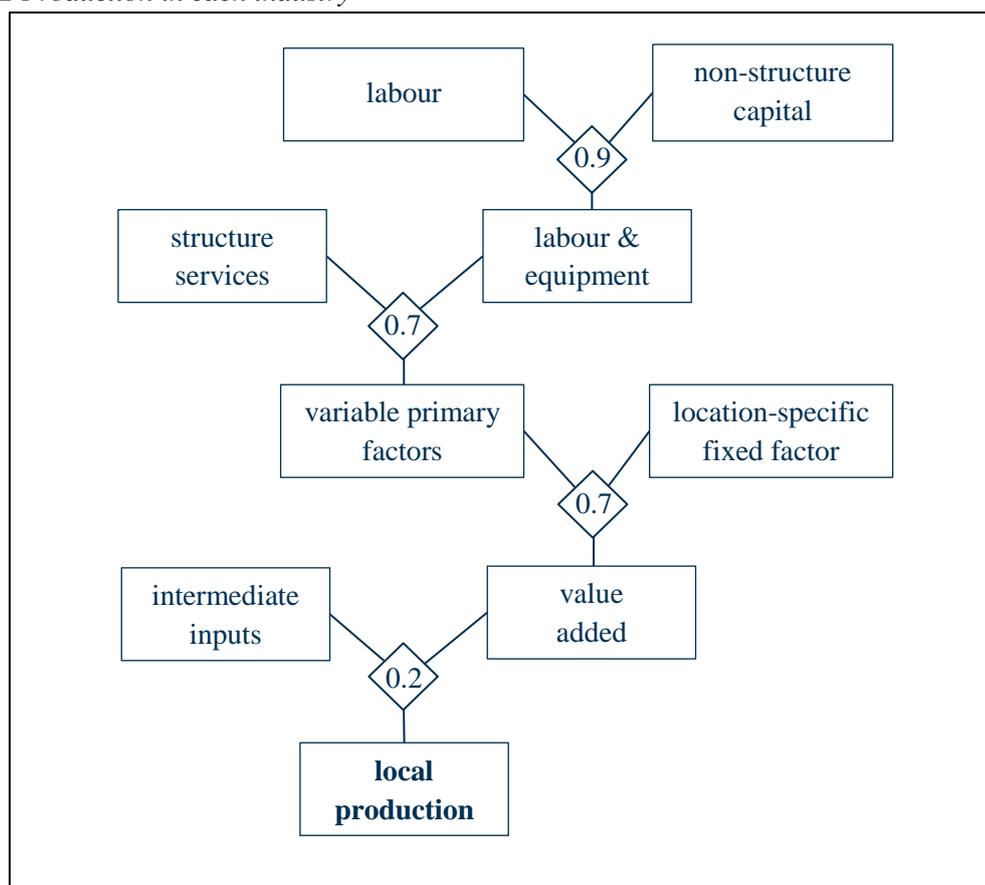
industry in the Independent CGE model, there are three fixed factors to capture economic rents. These fixed factors are land and two industry-specific fixed factors, one of which is fixed in supply in Australia (location specific) and the other which is fixed in supply globally (or firm-specific).

Each industry other than Dwelling Services in the Independent CGE model can use 43 different types of labour, nine types of produced capital and three fixed factors. It combines these primary factors with intermediate inputs purchased from other industries. The structure of the production decisions is shown in Diagram A.2.

Each industry can change the mix of primary factors that it uses as their relative prices change. Some types of primary factors are more substitutable with other factors, and other types of primary factors are less substitutable. To reflect this, the nesting structure of production decisions in the Independent CGE Model is set up in a way that allows for a high degree of flexibility.

Diagram A.2 below shows an overview of the production technology used by firms in each industry in the Independent CGE model. The full production technology is illustrated in the set of three diagrams including Diagram A.2 below, along with Diagrams A.3, A.4 and A.5 which are presented later.

Diagram A.2 Production in each industry



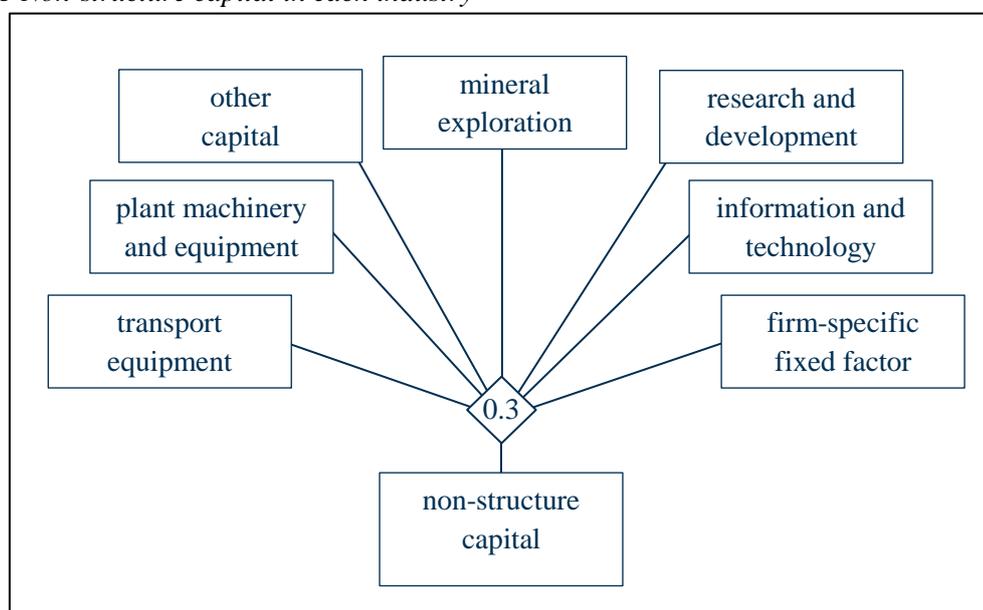
Labour and non-structure capital are modelled to be relatively substitutable with each other. As the non-structure capital bundle becomes more expensive, an industry may choose to use more labour instead. The elasticity of substitution for labour and non-structure capital measures the per cent increase in the ratio of labour to non-structure capital for a 1 per cent decrease in the ratio of their

prices. Gunning et al. (2007) review the CGE modelling literature, showing that the consensus for this elasticity appears to be between 0.7 and 1.0. Following this, we set the elasticity of substitution between labour and non-structure capital at 0.9.

A.3.1 Non-structure Capital

Non-structure capital is itself a combination of seven different types of capital, as shown in Diagram A.3. The representative firm in each industry chooses a different combination of the seven types of non-structure capital, and substitutes between each type as their relative prices change. The elasticity of substitution is set relatively low, at 0.3, reflecting the limited substitution possibilities between the different capital types. This implies that, when the cost of one capital type is higher by 1 per cent, relative to the overall cost of non-structure capital, firms will use 0.3 per cent less of this capital type, relative to their overall use of non-structure capital.

Diagram A.3 Non-structure capital in each industry



Of the seven different types of non-structure capital, six are produced (all types except the firm-specific fixed factor). Each of these types of capital is produced using different inputs. Firms can vary their use of each produced capital asset, through investment, as its return changes. Firms are able to attract funds to invest in the stock of each type capital as long as the return that can be earned is at least as high as the return that could be earned on the global market.

However, the other type of non-structure capital, the firm-specific fixed-factor, is not produced. Income from the firm-specific fixed factor reflects the rents generated by intangible assets such as brand names, patents and market power. This firm-specific fixed factor is assumed to be owned by multi-national firms, who can allocate the factor between its Australian and international operations. Although the amount of this factor globally available to multinational firms is fixed, firms can choose to change the amount that they use within Australia to generate rents. Firms will allocate their fixed factor to Australia as long as the after-tax rate of return earned in Australia is at least as high as the return that could be earned in the rest of the world.

A.3.2 Labour

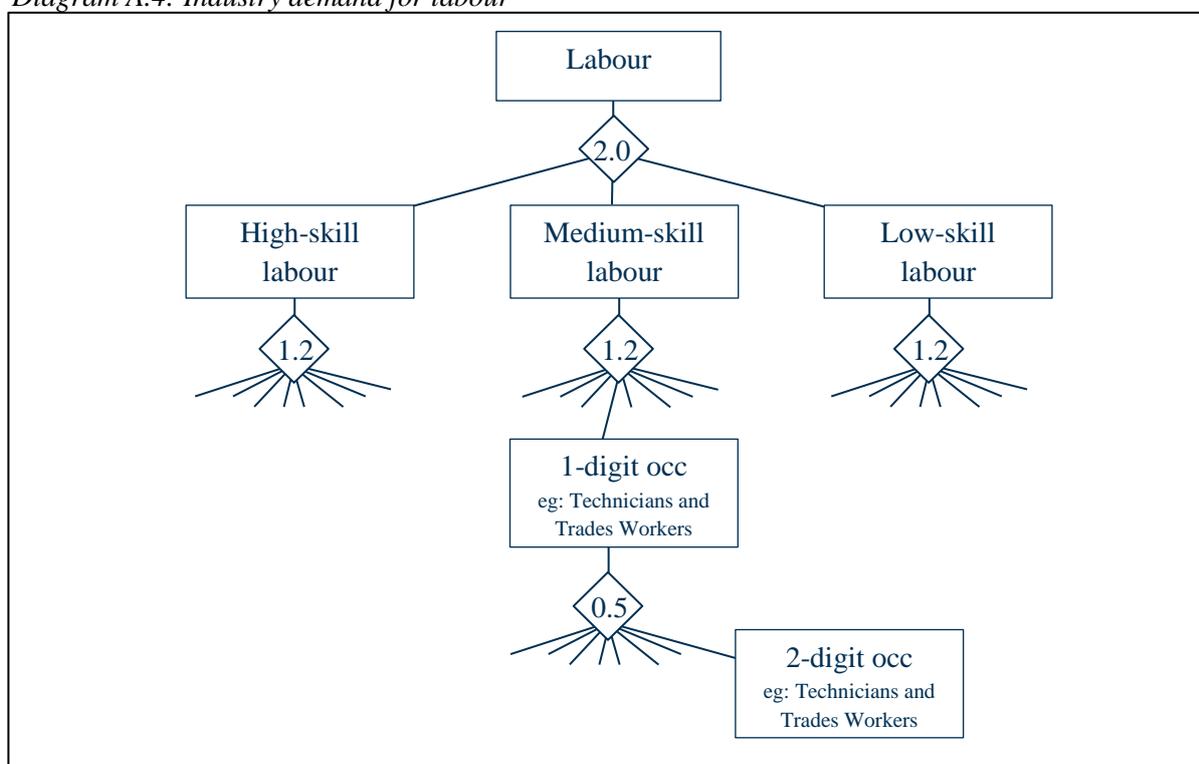
The Independent CGE model includes detailed modelling of the labour market. Specifically, it distinguishes industry use of labour according to 43 different occupations. The modelling approach in the Independent CGE model takes into account three main features of the labour market.

- Firstly, different industries demand different kinds of labour, depending on their skill level and occupation. For example, the Automotive and Engineering Trades Workers make up a relatively large share of employment in manufacturing industries, compared to their share of employment in the finance industry.
- Secondly, to a certain extent, industries are able to substitute between the types of labour that they use.
- Thirdly, through training and education (including formal and informal learning), individuals are able to adjust their skills and occupations in response to industry demand.

The initial pattern of employment in each industry is based on a number of ABS data sources showing employment by occupation by industry. Specifically, detailed data from the recent census is used to enhance data from the Labour Force Survey to estimate the pattern of employment in each of the 120 industries in the model.

The Independent CGE model uses a three-tiered system to model labour demand. This is represented in the following diagram, and then discussed below.

Diagram A.4: Industry demand for labour



Generally, the modelling of industry demand for each occupation takes into account that while industries can substitute relatively easily between broad skill levels, they are less able to substitute

between more detailed types of occupations. In addition, the parameters used in the model take into account that the occupational pattern of labour supply can respond to labour demand from industry. This is discussed below.

As shown in Diagram A.4 above, an industry first distinguishes between the different skill levels that it requires. These skill levels are defined as broad groupings of the 1-digit ANZSCO occupations.

- **High Skill Labour:** Managers and Professionals
- **Medium Skill Labour:** Technicians and Trades Workers, Community and Personal Service Workers, and Clerical and Administrative workers
- **Low Skill Labour:** Sales Workers, Machinery Operators and Drivers and Labourers

The econometric literature provides evidence that the elasticity of substitution between broad skill categories is relatively high. If it is cost-effective to do so, firms can substitute low, medium or high skilled labour relatively easily. This does not imply that the workers need to be substituted one for one. For example, the work of a team of Low Skill Workers might instead be undertaken by a smaller team of Medium Skill Workers. A firm's choice between lower and higher skilled workers will depend on the wages paid to each type of worker, and their relative productivities. However, industries will always need to use some combination of the three types of workers. The elasticity of substitution for the broad skill types is set at 2.0 – that is if the wage for high skill labour relative to the other types of labour is higher by 1 per cent, then demand for high skill labour is 2.0 per cent lower.

This level of substitutability is slightly higher than estimates from Katz and Murphy (1992) and Acemoglu and Autor (2010). This is to allow for flexibility in the supply side of the labour market. For example, if industries increase their demand for high-skilled labour, then households are likely to respond by undertaking more education or training so that they can supply this kind of labour.

After the amount of high, medium and low skilled labour is chosen, industries then choose the amount of labour from each broad (1-digit) occupation to employ. To recognise that industries are less able to substitute workers at this 1-digit occupational level, a lower elasticity of substitution is used, of 1.2. For example, if the wage for Clerical and Administrative workers relative to other medium skill occupations is higher by 1 per cent, then the demand for Clerical and Administrative workers relative to other medium skill occupations is lower by 1.2 per cent.

This elasticity is set relatively high to mimic the responsiveness of labour supply to changes in industry demand. Supply side responses are likely to have a relatively large effect at this level, because retraining from a Clerical and Administrative worker to a Community and Personal Service worker in response to industry demand is likely to be easier than retraining from a medium skill worker to a high skill worker.

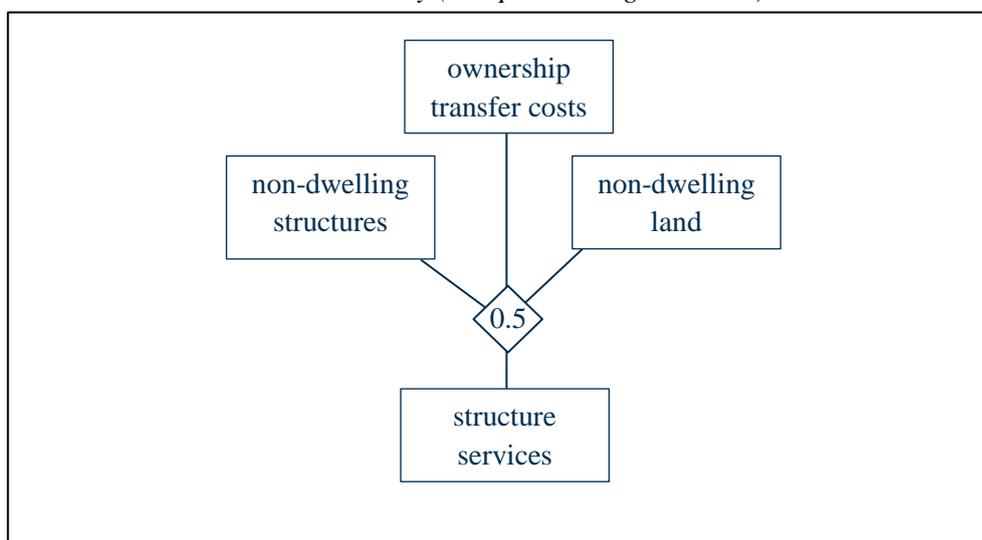
Finally, industries distinguish between more specialised fields of skills that it requires, as represented by the 2-digit ANZSCO occupations. These 43 different occupations represent skills which are closely associated with work in particular industries. The modelling takes into account that it is relatively difficult for firm's to substitute between different types of labour at this detailed occupational level. Therefore, the elasticity of substitution between these one digit occupations is set lower, at 0.5.

Both labour demand and labour supply have an influence on the wage paid to each occupation. The wage is determined in the labour markets in the Independent CGE model. If demand for a particular occupation is larger than supply, then the wage will be bid upwards. Likewise, if demand for a particular occupation is smaller than supply, then the wage will be bid downwards. The wage continues to adjust until demand for labour equals the supply of labour in the long run.

A.3.3 Structure services

Diagram A.5 shows that structure services is itself modelled as a bundle of different factors of production. Firms can substitute between using non-dwelling structures (which includes commercial buildings and engineering structures such as roads and bridges), non-dwelling land and ownership transfer costs. As shown in Diagram A.5, the elasticity of substitution between non-dwelling structures, non-dwelling land and ownership transfer costs is 0.5. This is based on the literature survey and assessment of Zhao (2010, p. 31-32, 51).

Diagram A.5 Structure Services in each industry (except Dwellings Services)



The amount of non-dwelling structures and ownership transfer costs used by an industry can be varied, through investment in the capital stock. Firms are able to attract funds to invest in the capital stock as long as the return that can be earned is at least as high as the return that could be earned on the global market. The amount of non-dwelling land used by any particular industry can also be varied. However, the overall quantity of land available to the whole economy is fixed. Non-dwelling land is allocated to its most productive use through a market, where the rental price of land adjusts to reflect its marginal product.

A.3.4 Location-specific fixed factors

The next tier in each industry's production decision models the choice between variable primary factors and location-specific fixed factors, as shown in Diagram A.2. Variable primary factors are inputs for which firms vary their level of use over the long-run – labour & equipment and structure services. On the other hand, location-specific fixed factors are inputs that are fixed in supply to any particular industry, such as natural resources. Each industry uses a different type of location-specific fixed factor. For example, each industry within the mining sector will use a different type of natural resource – the coal industry requires coal resources and the iron-ore industry requires iron-ore resources. In the banking sector, a location-specific fixed factor generates rents associated with the large networks required. These fixed factors generate location-specific economic rents, which are unable to be obtained unless they are exploited within Australia. Fixed factors are used in combination with variable primary factors, where the elasticity of substitution is set at 0.7, similar to the substitutability between structure services and labour & equipment.

A.3.5 Intermediate inputs

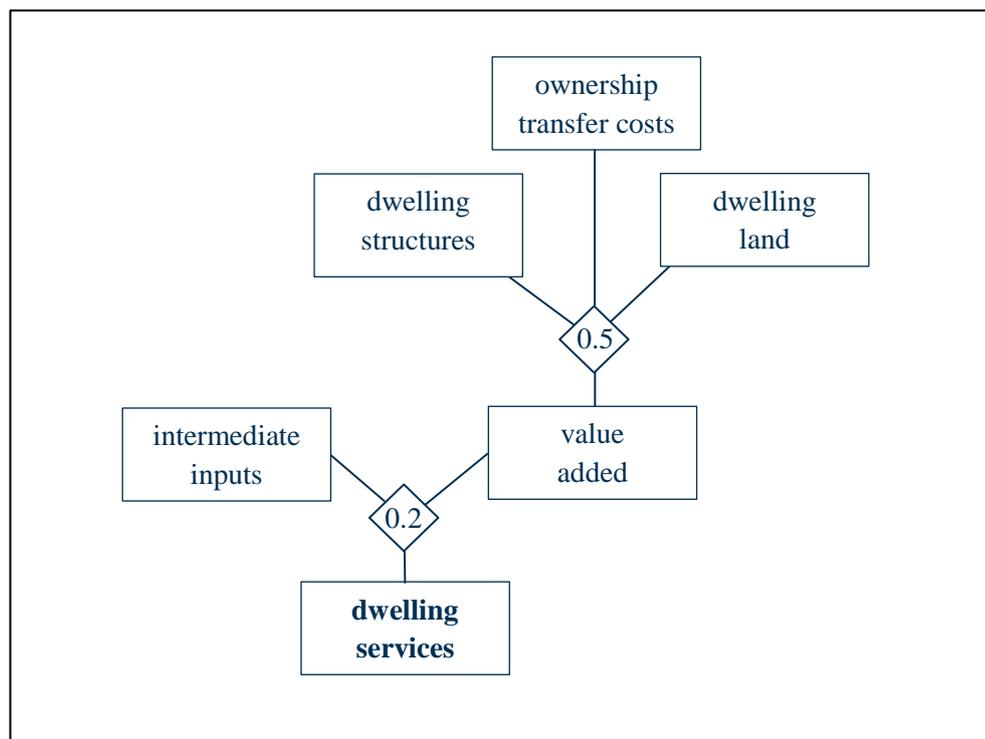
Finally, each industry combines the bundle of their primary factors, or value added, with intermediate inputs, which are the goods and services it purchases from other industries. Industries are assumed to use intermediate inputs and value added in variable proportions, but with a low elasticity of substitution of 0.2, as shown in Diagram A.2.

A.3.6 Dwellings Services

The Dwellings Services sector in the Independent CGE Model follows a similar structure as other industries, but uses primary factors specific to the industry – dwelling structures and dwelling land. The production technology for the Dwellings sector is shown in Diagram A.6 below, which reflects the more limited range of inputs that are used in this sector.

The Dwelling Services industry uses inputs which are similar to the factors of production used to create structure services in the other industries in the Independent CGE model. However, the structures and land used in the Dwelling services industry are different to those used in other industries. Specifically, dwelling structures are produced by the Residential Construction industry, whereas the non-dwelling structures used by other industries are produced by another two industries – the Non-residential Building Construction industry and the Heavy and Civil Engineering Construction industry. In addition, the land used by the Dwelling services industry can only be used within this industry, and is not available to other industries. This means that changes affecting inputs into dwelling services can be modelled separately to changes that affect the rest of the economy.

Diagram A.6 Production of Dwelling Services



As shown in Diagram A.6, the elasticity of substitution between dwelling structures, dwelling land and ownership transfer costs (from moving house) is 0.5. This is based on the literature survey and assessment of Zhao (2010, p. 31-32, 51).

A.4 Households

Households in the Independent CGE model derive well-being (or utility) from leisure and their consumption of the 120 different goods and services included in the model. However, as described in Section 2, households cannot spend more than their income. After taking into account tax and saving at a sustainable rate, households divide their full income between leisure and consumption, and then divide their consumption between the 120 goods and services. They do so in a way that maximises their utility. This behaviour is explained below, and illustrated in Diagram A.7.

Household full income is the amount of income that they would earn if they spent all of their available time working, and took no leisure. Full income is made up of the following components.

- Full labour income is the after-tax labour income that would be earned if households spent all of their time working. The wage is determined in the labour market, where it adjusts so that the demand for labour equals the amount supplied in the long run. Households value their time at the real after-tax wage that could be earned. The labour income tax rate is set by government policy, and all other taxes are built into the price of goods and services.
- Households generate income from owning a certain amount of the capital and fixed factor assets identified in the model. These include: the six types of capital that make up non-structure capital (not including firm-specific fixed factors), dwellings and non-dwellings

structures, ownership transfer costs, land and location-specific fixed factors. Households are able to earn the rates of return demanded by global capital markets on these assets.

- Households also receive income through government transfers, including cash benefits and transfers related to franking credits.

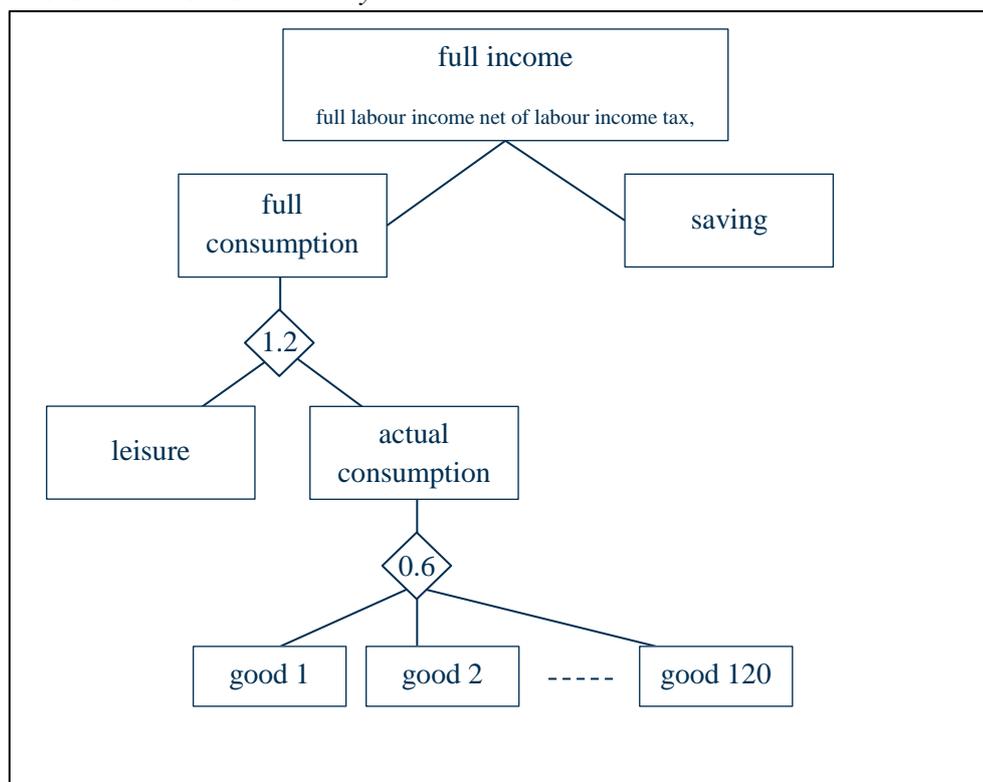
Household saving must be enough to maintain sustainable growth in the assets owned by households i.e. the domestically-owned capital stock. This sustainable rate of growth is the same as the long-run real GDP growth rate, which is consistent with the long-run time horizon of the Independent CGE model. After saving enough to cover this growth in their capital stock, the remainder of full income is spent on ‘full consumption’ – which includes the consumption of leisure and of goods and services.

The Independent CGE model uses a nested Constant Elasticity of Substitution (CES) utility function to describe the utility that households derive from leisure and their consumption bundle. This means that households make price-sensitive decisions in two tiers. The first tier describes their choice between leisure and consumption, and the second tier describes their choices about their mix of consumption goods and services. These two tiers are discussed below.

After meeting their savings target, households decide how much of their time to spend in leisure, and how much to spend working. The cost of taking leisure is the amount that would have been earned if the time were instead spent working – which is the real after-tax wage. If the real after-tax wage is higher, then the cost of taking leisure is higher, and households are expected to reduce their consumption of leisure and raise their labour supply. The parameters used in the Independent CGE model reflect an elasticity of labour supply similar to that used by de Mooij and Devereux (2011), of around 0.2. If the real after-tax wage increases by 1 per cent, then labour supply increases by 0.2 per cent. This outcome reflects the net impact of a higher wage on labour supply, through both the substitution effect (where a higher wage rate encourages households to take less leisure and supply more labour) and the income effect (where higher income levels encourage households to take more leisure and supply less labour). In the Independent CGE model, households substitute between leisure and consumption in the first tier of the nested CES utility function. An elasticity of substitution of 1.2 is used in this tier to implement the assumption that the uncompensated elasticity of labour supply is 0.2, as shown in Diagram A.7.

The amount that households spend on actual consumption is determined by the income generated from their chosen level of labour supply (net of labour income taxes), plus income from other sources and saving. As mentioned above, households make price-sensitive decisions about the goods and services they consume. If the price of one good becomes higher relative to the price of others, then households will substitute away from consuming that good. The elasticity of substitution governs how readily households would be willing to substitute between goods and services when their relative prices change. The elasticity of substitution in consumption in the Independent CGE Model is 0.6.

Diagram A.7 Household choices and utility



A.4.1 Measuring household living standards

Since household decisions are modelled using a consistent utility function, the Independent CGE model is able to provide valid measures of changes in consumer welfare, or living standards, from economic shocks or policy changes. The measure used is the equivalent variation, from welfare economics. This is the income transfer that would need to be given to households before the economic shock or policy change to enable the same level of utility as they would have after the change.

A.5 Government

Given the policy choices of the government, it will have certain expenditure requirements. Therefore, it is assumed that real government expenditure is not influenced by changes in the economy – that is real expenditure is exogenous. However, the model user can specify a change in government spending policies. For example, government spending on Defence-specific industries can be increased. In addition, since only real government expenditure is exogenous, if prices change, then nominal government expenditure changes accordingly.

Cash benefits paid to households are an additional government expenditure. These cash benefits are modelled as lump-sum transfers to households which are proportional to labour income. Franking credits are also modelled as transfers to households. These are the credits that households receive against personal income tax payments because their income from owning assets has already been taxed through business income tax.

The government collects tax revenue to finance its expenditure. In the Independent CGE model, it collects indirect taxes, business income tax, labour income tax, mining royalties and mining resource rent tax.

In the long-run, the government must have a sustainable budget position. For simplicity, in the Independent CGE model it is assumed that the government has a balanced budget.

When an economic shock is applied to the model, the government's budget position is affected, as changes in economic activity and prices affect government expenditure requirements and tax collections. Therefore, a swing fiscal policy instrument must be nominated, which adjusts so that the budget is always in balance. In the Independent CGE Model, either the tax rate on labour income or cash benefits can be used for this purpose.

A.6 Foreign sector

The modelling of Australia's relationship with the foreign sector recognises Australia's position as a small economy. This is the case for both trade and capital flows, which are now considered in turn.

Australia is a price taker for imports, meaning that changes in the Australian economy do not influence the foreign-currency price of imports. Likewise, Australia is also close to being a price taker for exports, with a standard value for the export price elasticity of demand of -12. For the following industries, where Australia has some market power or product differentiation (e.g. tourism services) a lower value of -6 is used:

- Sheep, grains, beef, dairy;
- Coal;
- Iron ore;
- Accommodation;
- Food and beverage service;
- Air and space transport; and
- Education.

Under the small country assumption, Australia can access the world market for funds, so long as the rate of return that is achieved matches the given rate required on the world capital market. That is, the after tax required rate of return on capital is determined overseas and is not influenced by changes in the domestic economy.

Australian ownership of the capital stocks is determined by their initial asset holdings. As discussed in Section A.4, the rate of growth in Australian-owned assets is assumed to be fixed, at a rate that implies sustainable growth in the initial locally-owned asset stock. Since foreign investors are willing to invest funds as long as the rate of return is at a given level, any change in the capital stock is met by a change in foreign-owned capital.

Foreign ownership of the capital stock must also be in a sustainable long-run equilibrium. The annual inflow of investment funds, recorded on the capital account in the balance of payments, is an amount that ensures that the foreign-owned capital stock grows at a sustainable rate – the long-run rate of real GDP growth. The payments to service this borrowing, an outflow on the current account, is equal to the required return on the foreign-owned assets.

Together, the inflow on the capital account and the outflow on the current account imply a certain trade balance if external balance is to be achieved. Exchange rate adjustments ensure that this balance occurs.

A.7 Baseline scenario and validation

This section first explains the construction of the baseline scenario and then outlines the validation procedures undertaken in ensuring that the model is robust.

The model uses a variety of recent data, but the main source is the detailed Input-Output (IO) tables from the ABS, giving the model a detailed picture of the Australian economy. Specifically, the 2007/08 IO tables released in late 2011 are used, which means that the model also uses the contemporary ABS industry classification, ANZSIC 2006. The model is calibrated so that it exactly reproduces this 2007/08 data.

The next step is to simulate a baseline scenario for use as a point of reference. This involves two aspects, uprating the economy from 2007/08 to 2012/13 and normalising the economy to a sustainable position. That is, the baseline scenario provides a normalised, or sustainable, version of the 2012/13 economy.

Uprating the economy from 2007/08 to 2012/13 involves simulating the model after adjusting the model's inputs for the effects of economic developments from 2007/08 to 2012/13. This includes allowing for growth in wages, import prices, productivity and employment from 2007/08 to 2012/13.

Normalising the economy involves taking into account the differences between the structure of the economy in 2007/08, compared to an economy in a long-run sustainable equilibrium.

- In 2007/08 capital inflow was well above a sustainable level, as the share of foreign liabilities in the capital stock was on the rise. In the normalised economy, capital inflow is set at the sustainable level, so that foreign liabilities grow at the same rate as the economy. This external balance is achieved through flexible adjustment of the exchange rate, as described in section A.6.
- In 2007/08 business investment was well above a sustainable level (reaching a peak as a share of GDP), as capital-output ratios were on the rise. In the normalised economy, business investment is set so that the stocks of capital grow at the same rate as real GDP.

The model has also been tested to ensure that it observes a number of widely-accepted balance and neutrality properties for CGE models.

- GDP by expenditure (the sum of household consumption, gross fixed capital formation, general government final demand and exports, less imports) always equals GDP by income (the sum of value added across all industries). This is true for both nominal and real GDP in all simulations, which is a useful check on the consistency of the model's coding.
- Walras' Law states that if all but one market is in equilibrium, then the last market must also be in equilibrium. This is the case in the Independent CGE Model. All markets other than the labour market are in equilibrium because the model equations are set up to achieve this. On

the other hand, equilibrium in the labour market is not explicitly modelled. Rather, the balance between labour demand and supply is monitored in simulation results. Exact balance is always achieved, meaning that Walras' Law holds precisely, which is an important test of the internal consistency of a CGE model.

- The Independent CGE Model observes price neutrality. In all CGE models, one price must be fixed exogenously as the numeraire, to provide an anchor for the price level. This is because the price level is usually considered to be determined by monetary policy, which is outside the scope of a CGE model. Just as it is argued that the real economy should be neutral to monetary policy in the long run, real outcomes from CGE models should be unaffected by a shock to the level of the numeraire. The numeraire in the Independent CGE model is the wage. When it is increased by one per cent, all prices in the model increase by exactly one per cent, and all real variables are unaffected, in accordance with the expected price neutrality property.
- The Independent CGE Model also observes real neutrality. This means that when all of the exogenous real variables are one per cent higher, all of the endogenous real variables are also one per cent higher. The exogenous real variables in the Independent CGE Model are: employment; real general government final demand; the fixed factors available to each industry; the real assets owned by the household sector; and the size of the economy in the rest of the world.