Centre of Full Employment and Equity

An examination of the cost differentials methodology used in 'Economic Analysis of Building and Construction Industry Productivity' – the Econtech Report

Professor William Mitchell
Professor of Economics
Director, Centre of Full Employment and Equity
The University of Newcastle
NSW 2308
Australia

August 2007

Centre of Full Employment and Equity
The University of Newcastle
http://e1.newcastle.edu.au/coffee
Telephone: +61-2-4921 7283
E-mail: coffee@newcastle.edu.au

1. Executive summary – main conclusions

1. In July 2007, the Office of the Australian Building and Construction Commissioner (ABCC) issued a report prepared for them by the Canberra-based economic consulting company Econtech which carried the title *Economic Analysis of Building and Construction Industry Productivity.*

2. Econtech's Report finds that the cost differentials between commercial and domestic construction have been substantially reduced in the last few years following the creation of the Building Industry Taskforce and its successor, the more formal ABCC and the introduction of Work Choices. They conclude that this must reflect that: (a) labour productivity has risen in Non-Residential construction; (b) that the rise in labour productivity has been the consequence of the elimination of restrictive work practices; and (c) that these developments were directly the result of the creation of the ABCC and the introduction of Work Choices. They conclude that the creation of the ABCC and the introduction of Work Choices were beneficial pieces of legislation.

3. The major conclusions of the Econtech Report are totally dependent on the initial analysis of the cost movements in the relativities between commercial and residential construction. Even though their later analysis can be heavily criticised on a number of grounds it is the cost analysis that is worthy of closer examination.

4. As a consequence, the Construction, Forestry, Mining and Energy Union commissioned a briefing document from this author with the following Term of Reference:

   - To examine the validity of the cost comparisons and conclusions made by Econtech (2007).

   The brief for this Report was thus narrow and focused on evaluating the Econtech (2007) report in terms of its analysis of cost differentials in the Australian construction industry between what they term commercial construction and domestic construction.

5. The first principle of quality control in applied economic research, which is standard practice in academic circles, is that the empirical results in a published study have to be capable of replication by a third party. Transparency of method and data sources is the key in this regard. This principle provides some security in the knowledge generation process such that one can determine whether the published empirical results are robust and also allows reviewers to form an assessment of the validity of the tools, techniques and methods employed to generate the empirical results.

6. Econtech (2007) violates this basic principle governing quality economic research. In estimating cost differentials between commercial and residential construction, Econtech (2007) provides no transparency in their published work and replication of their results is impossible. There are several dimensions of this failure which are outlined in the Report. They include:

   a. Failure to specify the exact demarcation between commercial construction and domestic construction. The data used blurs the distinction by including small-scale construction within domestic construction;

   b. Failure to specify the exact nature of the building tasks being used to estimate the cost differentials;

c. Failure to specify the exact way in which their composite unit for each capital city was constructed;

d. Failure to adequately consider other factors which might reasonably impact on cost movements;

7. A summary cost measure was constructed in this Report for the building tasks identified by Econtech as the basis of their comparison. The measure was computed from Rawlinsons' data that was presumably used by Econtech. The composite unit was expressed as a square metre of building activity. Notwithstanding the limitations of this particular data and the difficulties in clearly demarcating commercial construction from domestic construction using this particular component of the Rawlinsons' database, the results achieved present a different picture to those presented in the Econtech Report. Overall, this particular data is incapable of producing a cost differential decline as stark as that published by Econtech. Significantly, there is no evidence in the data that a structural shock (in the form of an institutional change such as the introduction of the ABCC) has fundamentally shifted the mean of this data, which would be the conclusion one would draw from Econtech's analysis.

8. To derive a more objective and transparent estimate of the costs of domestic residential construction relative to commercial construction we used other data provided in the Rawlinsons Australian Construction Handbook, specifically that published in the *Estimating Elemental Costs of Buildings* section. An estimate of the average $ per square metre construction cost was computed for each of the building groups and sub-types for which data is provided. The classifications are comprehensive and cover 170 different types of buildings in the following broad groupings: Administration, Civic; Banks; Educational, Hospitals, Health; Hotels, motels, clubs; Industrial; Offices; Parking; Recreational; Religious; Residential – single-unit; Residential – multi-unit; and Retail. Commercial construction was defined as all the broad groups bar single-unit residential, which was allocated to domestic. All other residential construction (multi-unit etc) was allocated to commercial.

9. The results derived from this exercise, which are totally transparent and capable of replication, would appear to contrary to the conclusions published in the Econtech Report. For Australia overall, irrespective of which weighting method is used there has been no noticeable shift in the difference between commercial construction and domestic residential construction costs over the 12 years since 1990. If the creation of the ABCC had have had the stunning effect depicted by the Econtech Report then the 2007 estimates of the difference between commercial construction and domestic residential construction costs should have dropped significantly on the 1995 estimates.

10. Additional data from the Australian Bureau of Statistics was examined to provide further understanding as to the movements in construction costs in Australia. The movement in the implicit price deflators relating to construction were examined from 1994 for Residential building, Non-residential building, Non-residential construction, and Total construction. All deflators have moved in the same direction. Significantly, there is no sign of any "external event" effect in recent years (such as the introduction of the ABCC) affecting the behaviour of any of the deflators. So the ABS data provides some reinforcement to the results summarised in Points 7 and 8.

11. I conclude that the lack of transparency in the Econtech analysis and the impossibility of it being replicated by a third party is evidence of poor research quality. Using transparent (though qualified) methods, which are capable of replication, I can find no evidence to support the stark results presented by Econtech.

12. I have also found no evidence to support the hypothesis that a sudden "event" (postulated by Econtech to be the introduction of the Work Choices and the creation of the ABCC) has altered the time series behaviour of the underlying data published by Rawlinsons.

2. Background and Term of Reference

In July 2007, the Office of the Australian Building and Construction Commissioner (ABCC) issued a report prepared for them by the Canberra-based economic consulting company Econtech which carried the title *Economic Analysis of Building and Construction Industry Productivity* (hereafter Econtech, 2007).

Econtech (2007) was a follow up study to an earlier report (Econtech, 2003) which the company had prepared for the Department of Employment and Workplace Relations that had 'analysed the cost differences for the same standard building tasks between commercial buildings and domestic residential buildings' (Econtech, 2007: i) based on the data provided by the quantity surveying firm, Rawlinsons.

The Rawlinson's Australian Construction Handbook is considered to be a reliable and authoritative source of data on movements in construction costs in Australia and this status is taken as given in this discussion. It is important to note however, that the Handbook data is intended to serve as a guide to construction costs to facilitate contract dispute resolution in the construction industry and to enhance cost control and construction planning (Rawlinsons, 2007: v). It is not designed to be used to estimate labour productivity. There are other data sources that are more suitable for that purpose.

Econtech (2003) found that 'building task such as laying a concrete slab, building a brick wall, painting and carpentry work cost an average of 10 per cent more for commercial buildings than domestic residential housing' (Econtech, 2007: i). The conclusion drawn from this analysis was that 'this difference was mainly attributed to differences in work practices between the commercial and domestic residential building sectors' (Econtech, 2007: i).

At the time, the Construction, Forestry, Mining and Energy Union (CFMEU) commissioned a report to evaluate the Government-sponsored Econtech (2003) study. The so-called Toner (2003) study was strongly critical of the Econtech (2003) methodology and its conclusions. Toner (2003: 3) found the Econtech (2003) 'estimates of productivity differentials between the Residential and other two sectors to be unfounded and the gap between Australian and international best practice productivity also to be overstated.' Toner (2003: 3) also concluded that the Econtech's conclusion that 'there are very significant productivity gains to be had through altering work arrangements' was not supported and 'the estimated economic benefits of such changes are, therefore, overstated.'

Toner's argument initially hinged on the fact that Econtech (2003) did not consider 'alternative explanations for the costs differences evident in the Rawlinson's data across the two industries.' Econtech (2003) made the following highly simplistic conclusions: (a) There are cost differentials between Commercial and Residential construction; (b) The cost differentials are due to lower labour productivity in Non-Residential construction; and (c) The lower labour productivity must be attributable to restrictive work practices. While accepting the Econtech estimates of the cost differentials, Toner (2003) rightfully exposed the simplistic nature of this causal train which ignores all other plausible factors that might also help explain the movements in the data.

Econtech (2007: i) noted that Toner (2003) had 'argued that the cost gap between the commercial and domestic residential building sectors was due to structural factors, not restrictive work practices. The structural factors suggested were greater on-site

complexities, higher capital intensity and higher profit margins in the commercial building sector compared with domestic residential building. Nonetheless, if the hypothesis presented by Toner that the cost gap was due to structural factors were true, then the cost gap would be expected to persist.'

While some of Toner's alternative explanations are not structural but cyclical in nature (for example, profit margins), the general criticism of the position taken by Econtech is that if the cost gap had closed significantly in the last several years then it would have to be shown that these "alternative factors" had changed in ways that would be consistent with their hypothesised involvement. Econtech (2007) do not attempt to rationalise their "findings" in terms of movements in these alternative factors, which means that they do not adequately test their major hypothesis nor negate Toner's alternative hypotheses. It seems that Econtech (2007) are prepared to simply assert the causality between an alleged narrowing of the cost gap and the introduction of Work Choices and the creation of the ABCC and ignore any complications that might undermine this simplicity.

Econtech's simplistic approach also underpins their 2007 Report in which they conclude that if the cost differentials had been substantially reduced in the last few years following the creation of the Building Industry Taskforce and its successor, the more formal ABCC and the introduction of Work Choices then: (a) labour productivity must have risen in Non-Residential construction; (b) that the rise in labour productivity must have been as a consequence of the elimination of restrictive work practices; and (c) that these developments were directly the result of the creation of the ABCC and the introduction of Work Choices. They conclude that the creation of the ABCC and the introduction of Work Choices were beneficial pieces of legislation.

The final part of Econtech (2007) conducts an economic modelling exercise based on some highly stylised and in some cases erroneous assumptions and provides estimates of the quantum of the forthcoming benefits. The modelling exercise, while seemingly authoritative, not the least because it is unfathomable to the general reader, is largely a case of generating whatever results you want. The current author is an expert on econometric models and is unconvinced by these numerical simulations but a critique of this section of their report is beyond the scope of this current study.

In terms of the scope of this study, the CFMEU commissioned a briefing document with the following Term of Reference:

- To examine the validity of the cost comparisons and conclusions made by Econtech (2007).

It is these Terms that are addressed in this Report.

Significantly, the major conclusions of Econtech (2007) are totally dependent on the initial analysis of the cost movements in the relativities between commercial and residential construction. Even though their later analysis can be heavily criticised on a number of grounds, not the least being those already identified by Toner (2003), it is their starting point that is worthy of examination..

Toner (2003) accepted Econtech's (2003) analysis of the Rawlinsons' data and chose to focus on the conclusions that Econtech drew from the analysis. However, when one is familiar with the general trends in the data provided by the Australian Bureau of Statistics (ABS) in relation to construction activity implicit deflators (measures of inflation in the building industry by sub-sector) and also the movements in the

construction cost series, it is not apparent that the scale of movement between commercial and residential construction that Econtech (2007) claim has occurred is accurate.

3. Econtech's cost differential methodology

3.1 The requirements of transparency in empirical analysis

The first principle of quality control in applied economic research, which is standard practice in academic circles, is that the empirical results in a published study have to be capable of replication by a third party. Transparency of method and data sources is the key in this regard. This principle provides some security in the knowledge generation process such that one can determine whether the published empirical results are robust and also allows reviewers to form an assessment of the validity of the tools, techniques and methods employed to generate the empirical results.

Econtech (2007) violates this basic principle governing quality economic research. In estimating cost differentials between commercial and residential construction, Econtech (2007) follows the same obscured methodology as its earlier report (Econtech, 2003). There is no transparency in their published work and replication of their results is impossible. There are a number of ways in which Econtech obscures their approach to avoid replication. We consider each in turn in this Section.

3.2 What is the exact demarcation between commercial and domestic construction?

Econtech (2007: 21) seek to 'compare the costs for the same building tasks between domestic residential building and commercial building'. They define commercial building to 'include larger-multi-unit dwellings, offices, retail, industrial, and other buildings besides domestic building' (Econtech, 2007: 21). Given that Econtech claim authority by using Rawlinsons' data, it would have been better to relate the demarcation between domestic residential building and commercial building exactly to the Rawlinsons' categories to ensure the comparison is transparent and comprehensible. Further, in footnote 18, Econtech (2007: 22) notes that the 'domestic part of residential building includes all dwellings except larger multi-unit dwellings'. A close examination of Rawlinsons (2007) of the section on Residential cost estimates does not differentiate between smaller and larger multi-unit dwellings. It differentiates between single-unit and multi-unit. So what is a large multi-unit? Econtech (2007) provide no clue in their analysis which means their results are not transparent. We return to these issues in Section 4.

Further, it is not clear how one can decisively demarcate commercial and domestic construction costs based on the data that Econtech used to define the representative building tasks (see Section 3.2 for more detail). The Rawlinsons Handbook contains a section they call "Detailed Prices" which provides the cost data pertaining to the detailed building tasks used by Econtech to compute the average costs. Within that section, Rawlinsons define a sub-section, "Domestic Construction". However, one cannot assume that all other sub-sections within the Detailed Prices section relate to commercial construction. In explanatory notes relating to the Detailed Prices data not classified as "Domestic Construction", Rawlinsons (2007: 172) say that 'the Detailed Prices are indicative average prices for reasonable quantities of work and would apply to projects in excess $1,000,000 and having average site conditions.' Under domestic construction, Rawlinsons (2007: 652) say that the 'prices given hereafter are

indicative average prices and apply to either domestic projects or similarly constructed commercial/industrial projects in the $100,000 to $750,000 range, and having average site conditions.'

It might be considered reasonable to demarcate commercial construction and domestic residential construction in this way. But the fact remains that there is no clean distinction in terms of the detailed tasks in Table 1 between commercial and domestic construction because Rawlinsons include small-scale commercial construction within its domestic construction estimates. We would need to know the shift in the composition in scale in commercial construction before we could be definitive. Further, how many projects fall in the $750,000 to $1,000,000 range for which no reliable averages are provided? This sort of complexity is ignored by Econtech and impacts negatively on the validity of their analysis.

3.2 The composite unit

Econtech (2007) employ Rawlinsons construction cost data to assemble the cost differentials between domestic residential building and commercial building. To motivate this analysis, Econtech (2007: 21) claim that 'a useful way of determining the extent to which the ABCC and the industrial relations reforms have impacted on productivity in the construction industry is by comparing the costs for the same building tasks in commercial building with those for domestic residential buildings.'

It is here that we encounter what I term to be the "composite unit" which is alleged to adequately summarise the relative average construction costs between domestic residential building and commercial building. Without saying it explicitly, Econtech construct some sort of composite unit as a summary measure of building costs by averaging across 8 building tasks. These building tasks are listed by Econtech (2007: 22) as:

- concrete to suspended slab;
- formwork to suspended slab;
- 110 single skin face brick wall;
- corrugated zinc roof;
- 10mm plasterboard wall;
- painting (sealer and two coats);
- hollow core door;
- carpentry wall.

These building tasks form the basis of their 'cost comparison of commercial building with domestic residential building' (Econtech, 2007: 22). There is no discussion provided to justify the choice of these building tasks. Anyone familiar with the construction industry will know that some of these tasks are less important in commercial construction (for example, a corrugated zinc roof and single skin brick walls) and so there is a question as to whether these tasks provide a reliable comparison, notwithstanding other problems that are involved in using this method of analysis. At the very least, Econtech should have justified this choice of approach.

However, the problems go further than this. Econtech (2007) provide no further detail as to the exact dimensions relating to each of these building tasks. The problem first confronted by someone seeking to understand Econtech's results is that the actual

Rawlinsons' data is very detailed. We are confronted with significant choice as to what exact tasks (under the broad headings) are being compiled into the composite unit.

For example, under concrete slab work in the non domestic construction (that is, large-scale commercial) section, Rawlinsons (2007: 228) list two options for suspended slabs, reinforced Grade 25 concrete (25 Mpa): (a) N.E. 150mm thick; and (b) 150/300mm thick. For domestic and small-scale commercial construction, estimates are provided for only Grade 20 concrete (20 Mpa) with no indication of thickness. To reliably compare domestic and commercial slab construction costs, we would have to compare like with like. That is not possible using this data.

For Formwork, the domestic (small-scale commercial) option is Standard formwork (Class 3, limited imperfections with two options: (a) Soffit of suspended slab up to 250mm thick. (Rawlinsons, 2007: 653) For commercial construction (larger-scale) there are two options provided for Class 3 Formwork, Soffit of suspended slab: (a) 100/200mm thick; (b) 200/300mm thick (Rawlinsons, 2007: 234). The costs vary between these options. Which option did Econtech (2007) employ and why?

In terms of corrugated zinc roofs, Rawlinsons (2007: 381) provides four options for large-scale commercial construction: 0.42mm, 0.48mm, 0.60mm and 0.80mm. For domestic construction, Rawlinsons (2007: 656) supply only one option, 0.42mm. Did Econtech compare the same thickness tasks?

Another example of this heterogeneity occurs when dealing with a carpentry wall. For large-scale commercial construction, one has a choice of cost estimates in Rawlinsons (2007: 315) depending on height and thickness of the studs and centres (12 variations in all ranging from, for example, in Adelaide, from $29.10 per sqm to $45.40 per sqm). For domestic and small-scale domestic construction, there are 6 choices none of which match the characteristics of the large-scale commercial options (see Rawlinsons, 2007: 654). The studs used in the commercial construction are larger (50mm) than those used for residential construction (38mm). Again it is impossible to compare like with like and any cost comparison would be biased in favour of residential construction, other things being equal.

So Econtech (2007) avoids replication and scrutiny by failing to provide the detailed information that underpins their composite (average) unit. It is unclear exactly what data has been used by Econtech to define the specific building tasks that form the basis of their cost comparison.

A further concern is the "black box" nature of the calculations underpinning the composite unit. Even if we were prepared to accept the fuzziness of the building tasks and the blurred boundary between commercial and domestic construction (such that movements in domestic costs may be solely or partly driven by small-scale commercial cost trends), Econtech provide no information about how they compiled the summary cost measures to reflect the cost movements in the eight building tasks which they publish as Table 5.1 (Econtech, 2007: 22). As an aside, Table 5.1 in Econtech (2007) purports to summarise costs differences in the same state but the data provided by Rawlinsons Australian Construction Handbook is for capital cities only.

But in terms of the composite unit, it is unclear how one could reasonably combine these disparate building tasks into one summary measure of cost. One approach is to define a standard cost unit based on a metre of building (cubic for task 1 and square

for tasks 2-6) and add one hollow core door to the composite (given Rawlinsons publishes door cost estimates per unit).

The other possibility is to weight these building tasks by their importance in the overall construction. However, the problem is that the "Detailed Prices" data does not provide any indication of the percentage of the total building costs that the individual building task would comprise. When the complexity of the different building types that define the total construction industry is appreciated it comes as no surprise that weighting these particular tasks would be a meaningless exercise. But the point is that there is no way of determining a reliable weighting scheme from the "Detailed Prices" data provided by Rawlinsons, which could be used to average across these 8 building tasks to define a composite unit.

My conclusion is that only an arbitrary weighting scheme could have been employed to combine these building tasks into some composite unit and at the very least the workings that were used to come up with this composite unit should be made public so that due diligence can occur.

3.3 A composite unit based on a $ per square metre unit

As a rough guide to the cost movements in the building tasks used by Econtech we created a composite unit defined in terms of *one square metre of building work* comprising each of these tasks (see Table 1) excluding the hollow core door, noting that Task 1 is specified in cubic metres while tasks 2-6 and 8 are specified in square metres) which ignores the hollow core door. Unlike the Econtech (2003, 2007) reports the detailed description of the tasks compared as provided by Rawlinson's Australian Construction Handbook is provided in Table 1.

Table 1 Rawlinsons building tasks defined as $ per square metre

Building task	Details
1. Concrete to suspended slab (per cubic metre)	Commercial 25 Mpa 150mm, Domestic (small-scale commercial) 20 Mpa
2. Formwork to suspended slab (per square metre)	Soffit, 100/200mm
3. 110mm single skin face brick wall (per square metre)	Standard bricks
4. Corrugated zinc roof (per square metre)	0.42mm
5. 10mm plasterboard wall (per square metre)	Timber wall framing
6. Painting (per square metre)	Sealer and two coats to woodwork, acrylic, general surface.
7. Hollow core door (per door)	Standard faced with prime coated hardboard
8. Carpentry wall (per square metre)	Framing 3000mm high with plates, studs and two rows of noggings, 75 x 50mm studs @ 450mmm centres, 75 x 38mm in Domestic (small-scale commercial).

Source: Rawlinsons (2007) and earlier editions.

As noted in Section 3.2, there is considerable heterogeneity in the descriptions and associated costs estimated for broad tasks (such as a concrete slab) provided by

Rawlinsons. The choice used in this exercise was thus somewhat arbitrary and designed to give as close a fit between the large-scale commercial and the domestic and small-scale commercial cost estimates. The cost estimates are also heavily qualified by the discussion in Sections 3.1 and 3.2 and it should be understood that like is not being compared with like. The estimates are thus indicative only and should be treated with caution.

The results are reported in Table 2 and present a different picture to those presented in Econtech (2007, Table 5.1). Construction costs generally are more volatile than the movements in the general price level (measured by the change in the All Groups Consumer Price Index). Large-scale commercial costs inflate at different rates than Domestic (and small-scale commercial) costs.

Where the percentage cost differential between "commercial" and "domestic" construction costs has narrowed significantly, domestic cost inflation has been significantly higher than commercial cost inflation. For example, in Sydney in 2007 (as at January) the data suggests that the differential is now 0.2 %. But domestic costs are inflating at 16.9 per cent on the previous year while commercial costs are inflating at 9.3 per cent on the previous year. Both cost impulses are well above the national inflation rate and have spiked up on the previous year. It is hard to impute a labour productivity explanation for these changes.

Overall, the data is incapable of producing a cost differential decline as stark as that published by Econtech (2007: Table 5.1). There is no evidence in the data that a structural shock (in the form of an institutional change such as the introduction of the ABCC) has fundamentally shifted the mean of this data, which would be the conclusion one would draw from Econtech's analysis.

Table 2 Cost differentials and inflation rates for commercial and domestic construction costs, Capital cities, various years, per cent

		1995	2000	2001	2002	2003	2004	2005	2006	2007
Adelaide	Differential %	9.0	5.0	5.7	6.7	8.3	6.9	7.2	12.0	13.3
	Change in Commercial costs %	5.7	4.5	-0.3	7.0	7.2	5.7	13.7	5.6	1.2
	Change in Domestic Costs %	6.2	7.6	-1.0	6.0	5.6	7.0	13.5	1.1	0.0
Brisbane	Differential %	6.4	9.7	7.9	10.3	11.7	17.1	14.1	18.5	13.9
	Change in Commercial costs %	5.1	1.5	0.8	3.7	11.4	23.2	14.9	6.7	-5.1
	Change in Domestic Costs %	4.4	-0.1	2.5	1.4	10.0	17.5	18.0	2.8	-1.3
Melbourne	Differential %	6.2	11.0	10.8	11.0	11.4	18.9	19.1	13.6	9.9
	Change in Commercial costs %	1.5	8.2	2.1	2.3	13.0	14.2	6.8	5.1	0.6
	Change in Domestic Costs %	3.1	7.0	2.2	2.2	12.6	6.9	6.6	10.1	4.0
Perth	Differential %	13.1	13.6	13.3	13.0	12.7	10.1	5.6	2.6	5.4
	Change in Commercial costs %	4.6	4.3	-2.7	0.0	5.5	5.6	13.0	2.1	6.5
	Change in Domestic Costs %	6.7	4.9	-2.4	0.2	5.8	8.1	17.9	5.1	3.6
Sydney	Differential %	0.5	4.3	5.6	5.9	5.8	5.6	7.1	7.3	0.2
	Change in Commercial costs %	3.8	1.3	-0.9	1.2	6.0	5.3	5.4	0.5	9.3
	Change in Domestic Costs %	5.8	3.7	-2.2	1.0	6.0	5.5	3.9	0.3	16.9
Australia	Differential %	4.9	7.9	8.2	8.7	9.1	11.7	11.3	10.8	6.5
	Change in Commercial costs %	3.6	3.6	-0.1	2.2	8.7	10.7	8.8	3.5	3.2
	Change in Domestic Costs %	5.0	4.3	-0.3	1.6	8.3	8.1	9.1	3.9	7.3
Inflation rate	% change	4.6	4.5	4.4	3.0	2.8	2.3	2.7	3.5	2.1*

Source: Rawlinsons Australian Construction Handbook, various editions and authors' own calculations. The capital cities average (denoted Australia) is weighted using the State Final Demand data (ABS National Accounts: National Income, Cat. No. 5206.0). The results are not substantially different if other aggregate measures of activity are used to weight the average. ABS Consumer Price Index, Australia, Cat. No. 6401.1 used to compute the CPI inflation rate (* is the June 2006-June 2007 inflation rate).

4. Alternative methodology

Rawlinsons do however provide some data that allows us to compute an objective and transparent estimate of the costs of domestic residential construction relative to commercial construction. Rawlinsons provides a significant amount of information in their "Estimating – Elemental Costs of Buildings" section about the elements that go into making a building and the dollar per square metre cost for each and their percentage contribution to the total building cost per square metre (see Rawlinsons, 2007, 623-107).

These elemental costs are grouped in 8 sub-headings (elements) which are defined in Table 3. Within each of these sub-headings there are up to 10 components that are individually costed depending on the specific building type. Each component that is included is weighted (contribution to total per square metre cost of that particular building) and the same component might take a different weight for two separate building types. For example, for a single-unit framed house of medium standard, the external walls and windows account for 17.6 per cent of the total per square metre cost while they account for 21.4 per cent of the total per square metre cost for a medium standard full brick single-unit house (Rawlinsons, 2007: 100).

Table 3 Elements involved in a construction project

Element	Description
Preliminaries	See Rawlinsons (2007: 64)
Substructure	See Rawlinsons (2007: 64)
Superstructure	See Rawlinsons (2007: 64)
Finishes	See Rawlinsons (2007: 65)
Fittings	See Rawlinsons (2007: 65)
Services	See Rawlinsons (2007: 65)
External Services	See Rawlinsons (2007: 65)
Contingency	See Rawlinsons (2007: 65)

Source: Rawlinsons (2007: 64-65).

The data is then organised for broad building groups which are detailed in Table 4. The plethora of building types within each broad building group (see column three in Table 3) and the variation of elemental contributions (weights) to total square metre costs makes it virtually impossible to objectively determine a set of weights for each element.

We should also note that the building tasks used by Econtech (2007) (see Table 1) do not map back in any comprehensible or unique way into the elements used by Rawlinsons for which weights are provided. This reinforces my conclusion that only an arbitrary weighting scheme could have been employed to combine these building tasks into some composite unit. It goes without saying that an alternative and equally arbitrary weighting scheme could generate very different results.

Table 4 Sectors used for estimating the Elemental Costs of Building

	Broad building group	No of sub-types (2007)
1.	Administration, Civic	16
2.	Agricultural	n/a
3.	Banks	3
4.	Educational	19
5.	Entertainment	n/a
6.	Hospitals, health	8
7.	Hotels, motels, clubs	10
8.	Industrial	32
9.	Offices	25
10.	Parking	5
11.	Recreational	13
12.	Religious	4
13a	Residential – single-unit	9
13b	Residential – multi-unit	16
14.	Retail	10

Source: Rawlinsons, 2007. Sub-types are for Sydney. Some variation is total building sub-types occurs for other cities. N/A means there was not detailed data provided by Rawlinsons for these groups.

Using the data provided in the *Estimating Elemental Costs of Buildings* section an average $ per square metre estimate can be computed for each of the building groups and sub-types summarised in Table 2 (barring Agricultural and Entertainment for which no data is provided). Rawlinsons (2007: 63) say that the 'Total cost given is the approximate mean of the cost range for the respective buildings' based on building costs per square metre. Rawlinsons provide a mean figure for Sydney and a cost range (low-high) for the other cities of interest here: Adelaide, Brisbane, Melbourne and Perth. We took the mid-points of the range presented by Rawlinsons for Adelaide, Brisbane, Melbourne and Perth as the average cost. This choice is unlikely to introduce any bias into the final estimates and sensitivity analysis was undertaken at the extreme values and no qualitative differences were detected in the results.

The task then is to allocate the broad groups to commercial or domestic and then to generate an average cost per square metre for each of the broad construction group. Commercial was defined as groups bar single-unit residential, which was allocated to domestic. All other residential construction (multi-unit etc) was allocated to commercial.

So for each capital city, the $ per square metre estimates for each sub-type was averaged to get an average cost for each broad building group which was then averaged into commercial and domestic construction costs per square metre.

To derive a weighted-average of the capital cities (Adelaide, Brisbane, Melbourne, Perth and Sydney), which is denoted as Australia two measures of regional activity were used as weights: (a) State Final Demand sourced from tables published in the

ABS National Accounts: National Income, Cat. No. 5206.0; and (b) ABS Construction Activity Chain Volume data sourced from ABS Construction Work Done, Australia, Cat. No. 8755.0 which provide State activity breakdowns for various sectors of the construction industry.

The choice of weighting scheme did not significantly alter the results.

The advantage of this method over the earlier method (whereby a selected set of tasks is chosen) is that the complete building cost is estimated. There is no arbitrary selection of tasks. The limitation of this method is obvious in that data limitations prevent us from weighting the sub-types or broad building groups for contribution to total activity. However, unless the compositional shifts within total construction were large over the period analysed a relative assessment is still viable. Using ABS Construction Activity: Chain Volume Measures (see Section 5 for more information), it is clear that the weights for residential building and non-residential construction (which includes non-residential building and engineering construction) have not shifted significantly. Non-residential construction has increased relative to residential building sine 1995 in its share of total construction costs. However, this finding is not particularly illuminating because the residential component of the Construction Chain Volume Measures contains both single unit and multi-unit dwellings thereby blurring the distinction between commercial and domestic construction. Further, the broad trends depicted are consistent with other evidence available, for example, ABS Construction Implicit Price Deflators.

Table 5 provides the $ per square metre average costs for Residential (broken into domestic and commercial) and the aggregate Commercial construction for 1995, 2000 and 2007.

Table 6 utilises the data in Table 5 to express the $ per square metre average construction costs as percentage cost differentials, which allows us to reflect on the plausibility of the Econtech (2007) estimates.

The results in Table 6 would appear to contrary to the conclusions published by Econtech (2007, Table 5.1). For Australia overall, irrespective of which weighting method is used there has been no noticeable shift in the difference between commercial construction and domestic residential construction costs over the 12 years since 1990. A year-by-year analysis would deliver a qualitatively similar result.

If the ABCC had have had the stunning effect depicted by Econtech (2007) then the 2007 estimates of the difference between commercial construction and domestic residential construction costs should have dropped significantly on the 1995 estimates.

Further, Columns 5-7 show the difference between single-unit residential construction costs (which Econtech suggest is domestic construction) and multi-unit residential construction costs (which Econtech include within commercial construction) for 1995, 2000, and 2007. The results indicate that so-called commercial residential construction has been getting relatively dearer than domestic residential construction over the time span noted. Again, this is the opposite result that you would expect if the major hypothesis being proposed by Econtech was at all plausible.

Table 5 Average construction costs ($ per square metre) for Commercial, Domestic Residential and Commercial Residential, 1995, 2000 and 2007.

	Adelaide	Brisbane	Melbourne	Perth	Sydney	Australia (a)	Australia (b)
	$ per sqm	$ per sqm	$ per sqm	$ per sqm	$ per sqm	$ per sqm	$ per sqm
2007							
Commercial	1714	1829	1865	1859	1911	1737	1751
Residential - domestic	1240	1754	1724	1534	1714	1557	1569
Residential - commercial	1537	1764	1825	1821	1726	1639	1665
2000							
Commercial	1258	1178	1410	1238	1513	1289	1318
Residential - domestic	982	1042	1234	1081	1241	1093	1120
Residential - commercial	1107	1023	1261	1067	1264	1111	1135
1995							
Commercial	1099	1009	1130	1057	1102	1018	1028
Residential - domestic	871	934	987	930	1009	909	924
Residential - commercial	995	932	1018	957	975	916	925

Source: Rawlinsons (2007: 63-107) and author's calculations. Australia (a) indicates that State final demand (see text for source) was used to weight the individual capital cities and (b) indicates that the ABS Construction Activity (see text for source) was used as the weights.

Table 6 Percentage cost differences between commercial construction and domestic residential construction

	Difference between Commercial Construction and Domestic Residential Construction			Difference between Single-unit residential and Multi-unit residential		
	1995	2000	2007	1995	2000	2007
	%	%	%	%	%	%
Adelaide	26.2	28.1	38.2	14.3	12.7	23.9
Brisbane	8.0	13.1	4.3	-0.2	-1.9	0.6
Melbourne	14.5	14.3	8.2	3.1	2.2	5.8
Perth	13.7	14.5	21.2	2.9	-1.4	18.7
Sydney	9.2	21.9	11.5	-3.4	1.8	0.7
Australia (a)	12.0	18.0	11.5	0.7	1.7	5.3
Australia (b)	11.3	17.7	11.6	0.2	1.4	6.1

Source: see Table 5.

5. Construction Implicit Price Deflators

The ABS publish Chain Volume Measures (CVM) of value of construction work done. The Implicit Price Deflators are derived from these measures. The deflators are broken down into Residential building, Non-residential building, Non-residential construction, and Total construction. The ABS estimates the value of work done in each areas of construction based on the Building Activity Survey and the Engineering Construction Survey which it conducts on a quarterly basis. The survey results are released in a number of related publications:

- Construction Activity: Chain Volume Measures, Australia, Cat. No. 8782.0.65.001;
- Building Activity, Australia, Cat. No. 8752.0; and
- Engineering Construction Activity, Australia, Cat. No. 8762.0.

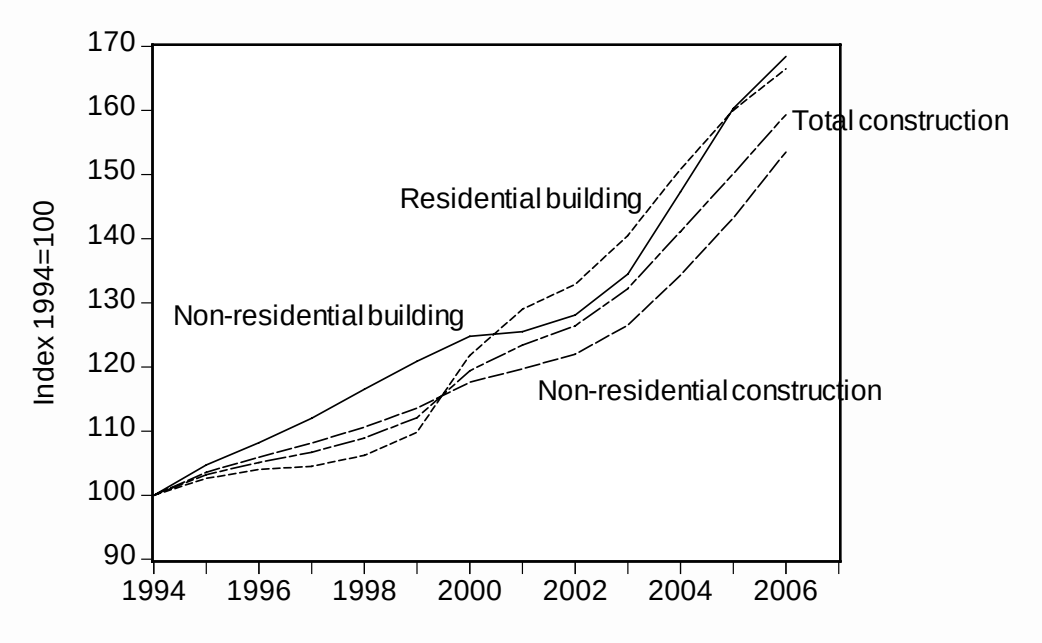
The data is sourced from the responses received from 'builders and other individuals and organisations engaged in building activity' (ABS, 8782.0.65.001). In the explanatory notes attached to the latest edition of Construction Activity (Cat No. 8782.65.001) the ABS explain that the quarterly survey involves: (a) sampling private sector building sites involving 'residential building jobs valued at $50,000 or above and non-residential building jobs valued at $250,000 or more'; (b) all 'such public sector building jobs'; and (c) 'statistical estimates based on building approvals for residential building jobs valued at $10,000 or more but less than $50,000, and non-residential building jobs valued at $50,000 or more but less than $250,000.'

The Chain Volume Measures (CVM) provide estimates of the value of the construction activity actually reported (see ABS Information Paper: Introduction of Chain Volume Measures in the Australian National Accounts, Cat. No. 5248.0). The ABS (8782.0.65.001) say that 'While current price estimates of value of work done reflect both price and volume changes, chain volume estimates measure changes in

value after the direct effects of price changes have been eliminated and therefore only reflect volume changes.'

The implicit price deflators reflect the relationship between the current price estimates of the value of the work done and the CVM estimates. Implicit price deflators provide a measure of the increase in costs and are computed by dividing the current price (nominal) by the constant price (real) construction activity data.

Figure 1 Implicit price deflators in construction, 1994=100



Source: ABS Construction Activity, Australia, Cat. No. 8752.0.

Figure 1 shows the movement in the implicit price deflators since 1994 (indexed to 100 at 1994) broken down into Residential building, Non-residential building, Non-residential construction, and Total construction. All deflators have moved in the same direction. Despite some interruption at the time of the introduction of the Goods and Services tax where timing of projects was brought forward in an accelerated fashion, the percentage change in the price deflators is similar over the period. Both Residential and Non-residential building deflators have inflated at the same rate, with Non-residential construction lagging somewhat.

Significantly, there is no sign of any "external event" effect in recent years (such as the introduction of the ABCC) affecting the behaviour of any of the deflators.

Table 7 compares the aggregate ABS annual Australian inflation rate (CPI all capital cities) to the construction cost inflation derived from the implicit price deflators for the period 1995 to 2006. While total construction costs have accelerated in the last few years relative to the overall movement in the annual inflation rate, there is no evidence to support Econtech's assertion of a dramatic drop in the gap between residential building costs and commercial building costs.

Table 7 General inflation rate and construction cost inflation, Australia, various years

	Annual Inflation Rate (CPI)	Total construction	Residential building	Non residential building	Total building	Non residential construction
	% p.a.	% p.a.	% p.a.	% p.a.	% p.a.	% p.a.
1995	4.6	3.2	2.6	4.7	3.4	3.6
2000	4.5	7.3	12.1	3.9	9.2	4.0
2001	4.4	4.0	7.1	0.7	4.7	2.1
2002	3.0	3.1	3.9	2.5	3.5	2.4
2003	2.8	5.8	7.6	6.4	7.3	4.5
2004	2.3	8.9	10.3	12.8	11.2	7.8
2005	2.7	9.0	9.2	12.9	10.6	8.9
2006	3.5	9.2	6.5	8.2	7.2	10.4

Source: see Figure 1 and Table 2.

6. Conclusion

The brief for this Report was narrow and focused on evaluating the Econtech (2007) report in terms of its analysis of cost differentials in the Australian construction industry between what they term commercial construction and domestic construction.

The first major criticism of the Econtech analysis is that it fails the basic test for research quality – it fails to be transparent in its method and the results its presents are incapable of replication. There are several dimensions of this failure which we have outlined.

Notwithstanding the issues involved in actually demarcating commercial from non-commercial construction, we have used a more transparent and objective method for estimating the cost differentials between the two sectors.

The resulting estimates are substantially different from those published by Econtech (2007) yet are consistent with trends in other cost data published by the ABS.

I conclude that the lack of transparency in the Econtech analysis and the impossibility of it being replicated by a third party is evidence of poor research quality. Using transparent (though qualified) methods, which are capable of replication, I can find no evidence to support the stark results presented by Econtech.

I have also found no evidence to support the hypothesis that a sudden "event" (postulated by Econtech to be the introduction of the Work Choices and the creation of the ABCC) has altered the time series behaviour of the underlying data published by Rawlinsons.

References

Australian Bureau of Statistics (ABS (2006) *Australian and New Zealand Standard Industrial Classification* (ANZSIC), Cat. No. 1292.0, Canberra

Econtech (2003) *Economic Analysis of Building and Construction Industry*, Report prepared for the Department of Employment and Workplace Relations, February 2003.

Econtech (2007) *Economic Analysis of Building and Construction Industry Productivity*, Report prepared for the Office of the Australian Building and Construction Commissioner, July 2007.

Rawlinsons Australian Construction Handbook, Various editions, Rawlhouse Publishing, Perth.

Toner, P. (2003) *An Evaluation of the 'Economic Analysis of the Building and Construction Sector'*, Employment Studies Centre, University of Newcastle.