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CWH/WSI merger – cost benefit analysis for second authorisation

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1. Introduction

We have been asked by Bell Gully to quantify the benefits and detriments of a potential merger between the wool scouring businesses of Cavalier Wool Holdings Limited (CWH) and New Zealand Wool Services International Limited (WSI). The Commerce Commission authorised the merging of these businesses on 9 June 2011 (*Decision 725*). The Commission's decision was appealed to the High Court, with the appeal dismissed by the High Court in a judgment dated 23 November 2011.

Despite authorisation, that merger has not occurred. The WSI business has since been acquired by Lempriere, and now Lempriere and the shareholders of CWH are proposing a merger of the two wool scouring businesses again. This transaction would result in CWH being owned 45% by Lempriere, 27.5% by Cavalier Bremworth, 13.75% by ACC and 13.75% by Direct Capital.

CWH and WSI are therefore applying for another authorization of the proposed merger, and it is for this second authorisation that we analyse the benefits and detriments in this report.

The economics of the proposed merger appear to be very similar to those previously authorized. The main differences appear to be that:

- Wool volumes have further declined[1] (and are expected to remain flat)[2], strengthening the public benefit case for rationalisation. In particular, a further site (at Clive) would be freed-up this time; and
- There are now material costs being incurred at WSI's Kaputone site to deal with effluent, which would be avoided by the merger.

In the following sections we present a social cost benefit analysis of the proposed transaction from a national perspective. All benefits and detriments are reported in real terms (i.e., are not adjusted for inflation over time).

We find that the range of the 5 year NPV of the net benefits is $7.99- $28.05m. Following the Commission's approach in *Decision 725* to selecting "likely" values, the 5 year NPV of the net benefits is **[]**. If the bottom end of the range for the productive and dynamic detriments is used, then the point estimate is **[]**.

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[1] See Beef and Lamb New Zealand, *Stock Number Survey as at 30 June 2014*. Sheep numbers for the 2014 year are forecast to fall 3.2% after falling 1.5% the previous year. The fall is larger in the South Island (-3.9%) than in the North Island (-2.4%).

[2] Source: 13 August 2014 email from Rob Davison, Beef + Lamb Economic services, to Stuart Gair and Nigel Hales. Beef + Lamb expect "sheep numbers to remain in a band of 29.6 to 30.0 million over the next 4 years to 2019-20".

2. Benefits

2.1. Introduction

The merger would result in New Zealand scouring quantities being produced with fewer inputs. In particular:

- Scouring would occur at two sites rather than five (with three sites being sold);
- There would be a substantial reduction in labour costs;
- There would be a reduction in variable and fixed costs; and
- There would be some avoided capital expenditure (due to no longer operating sites at Kaputone and Whakatu).

We quantify these benefits in this section of our report, net of certain restructuring costs.

We note the expected timing of these benefits varies, and it is likely that not all of the benefits would be realized on day one of the merged firm's operations. However, the same could be said of the expected detriments. We therefore follow the Commission's pragmatic approach in *Decision 725*, which was to assume that benefits and detriments occur from year one onwards, unless it is clearly the case that a benefit or detriment would not occur for a significant period (see paragraph 384 of *Decision 725*).

2.2. Non-capital cost savings

The proposed merger would result in productive efficiency benefits from savings in non-capital costs. CWH has created a one-year model (based on volumes for the first year of full operation, being 2016) of fixed and variable operating and administrative expenditure under the factual and counterfactual (while the numbers are a bit different, this is a very similar model to that used last time).[3] From this model we have excluded cost savings associated with fringe benefit taxes and council rates. In *Decision 725* the Commission excluded these cost savings, on the basis that they represented a transfer rather than a saving in the amount of resources used by society.

For present purposes we assume that the results of this model apply in each of the five years that we analyse. The CWH figures are set out in Table 1.

[3] We understand from CWH that in light of Commission questioning and treatment last time, the forecast electricity and coal/gas savings are more conservative this time.

Table 1
National non-capital costs

Year	Counterfactual non-capital costs ($)	Factual non-capital costs ($)	Difference between factual and counterfactual ($)
1	**[ ]**	**[ ]**	**[ ]**
2	**[ ]**	**[ ]**	**[ ]**
3	**[ ]**	**[ ]**	**[ ]**
4	**[ ]**	**[ ]**	**[ ]**
5	**[ ]**	**[ ]**	**[ ]**
Total	**[ ]**	**[ ]**	**[ ]**
Present value[4]	**[ ]**	**[ ]**	**[ ]**

Source: NERA analysis of CWH synergies model

Note that these cost figures are net of wool grease revenues. CWH believes the wool grease yields on WSI counterfactual quantities would increase under the factual, resulting in factual wool grease quantity being greater than counterfactual wool grease quantity. Therefore the increased revenue associated with extra lanolin sales is effectively treated as a cost saving.[5] The resulting surplus increase is therefore captured in the Table 1 figures.

We note the following:

- The counterfactual and factual non-capital costs are **[ ]**; and
- The expected non-capital costs savings are **[ ]** in respect of the present proposal than they were last time (when the saving was **[ ]** per annum).

These factors are largely driven by **[ ]**.

2.3. Capital cost savings

2.3.1. Sale of surplus assets

The CWH model described above excludes the costs of the key capital assets, being land, buildings and plant.

We understand that the merger would result in the following changes to these capital assets:

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4 Assuming a **[ ]** real discount rate.

5 An alternative approach would be to count the additional revenue from higher lanolin yields as a separate benefit. The end result would be identical to the approach we have taken.

- At Whakatu, the 3.0m scouring line would be moved to the CWH site at Awatoto. The land and buildings would initially remain with Lempriere, and would be sold with covenants to ensure their use excludes wool scouring activities;
- At Clive, CWH would sell the land and buildings and scouring line. Note that the Clive capital assets were not proposed to be sold during the last process, but due to continually declining wool volumes, would be sold this time;
- At Kaputone, the land, buildings and effluent plant would be sold. The 3.0m scour line would be shifted to Timaru. Note that, for the first merger authorization, there were no plans to sell the wool scouring plant or effluent equipment at Kaputone, and so the sales value of this plant was not recorded as a benefit; and
- At Timaru, the 2.4m scour line would be sold.

The merger would therefore result in the sale of the land and buildings at Whakatu, Kaputone and Clive. We understand the land and buildings are not specialized, and so the merger would lead to the land and buildings at these sites being released as inputs into wool scouring. Applying the approach of the Commission in the *Ruapehu* authorization,[6] and confirmed by the Commission and High Court in respect of the first wool scouring merger authorisation, this benefit can be measured by the expected sales price. The current market values of these sites are set out in Table 2.

Regarding plant, because wool scouring plant is specialized, i.e., because there is no alternative use for it, its market value may be below its book value. However, even the specialized components of the wool plant would have a scrap value or value to wool scourers outside of New Zealand. The freeing-up of the plant is a benefit, measured by the estimated sales price. We have reported this in Table 2 for the effluent equipment and scouring line at Kaputone, the scouring line at Clive, and a scouring line at Timaru.

[6] In the *Ruapehu* authorization (*Decision 410*, 14 November 2000) the Commission estimated the benefits from the rationalization of off-mountain maintenance bases. The one-off benefits were calculated as the expected sales price from the sale of a maintenance base under the proposed acquisition, based on the Government valuation of the base.

Table 2
Expected market value of surplus assets

Site	Asset	**CWH estimate of market value ($)**
Whakatu	Land and buildings	**[ ]**
Kaputone	Land and buildings	**[ ]**
Kaputone	Effluent equipment	**[ ]**
Timaru	2.4m scouring line	**[ ]**
Clive	Land and buildings	**[ ]**
Clive	2.0m scouring line	**[ ]**
Total		**[ ]**

Source: CWH

2.3.2. Capital expenditure on buildings

We understand that additional capital expenditure (capex) would be required on the buildings at Timaru and Awatoto under the factual, and this should be netted off from the productive efficiency benefits. We have followed the approach used by the Commission in *Decision 725*, and assumed that all of this expenditure would be incurred immediately, and should be treated as an immediate dis-benefit. CWH has provided us with an estimate of the additional capex at Timaru and Awatoto, as shown in Table 3.

Table 3
Capital expenditure on buildings (dis-benefit)

Site	**Capital expenditure ($)**
Timaru	**[ ]**
Awatoto	**[ ]**
Total	**[ ]**

Source: CWH

2.3.3. Capital expenditure on plant

Under both the factual and counterfactual there would be new capital expenditure on plant. Because these are forward-looking costs, they should be captured in the factual and counterfactual costs. Because of the initial capex spent on plant as part of the restructure (**$[ ]**), over the five-year period that we analyse, factual capex on plant is more than counterfactual capex on plant, and the result is a net cost (i.e. capex over the 5 years analysed is higher because of the merger) – see Table 4. It is however important to note that there would be ongoing capex savings after year 5 which are not included in this calculation.

Table 4
Expected future capex on plant[7]

Year	Counterfactual ($)	Factual ($)	Difference between factual and counterfactual ($)
1	**[ ]**	**[ ]**	**[ ]**
2	**[ ]**	**[ ]**	**[ ]**
3	**[ ]**	**[ ]**	**[ ]**
4	**[ ]**	**[ ]**	**[ ]**
5	**[ ]**	**[ ]**	**[ ]**
Total (undiscounted)	**[ ]**	**[ ]**	**[ ]**
Present value	**[ ]**	**[ ]**	**[ ]**

Notes: **[ ]**

2.3.4. Redundancy and rationalisation costs

Included in the non-capital cost savings of section 2.2 are reduced salaries and wages due to less employees being required for wool scouring in the factual compared to the counterfactual.

We understand that CWH's **[ ]**[8].

Arguably redundancy payments could be considered a transfer from CWH to employees and should therefore not be included in a cost benefit analysis. However, it is possible that employees may not find work straight away or will require re-training or relocation to move into another job. The cost of this might be considered a social cost. Indeed, both the

[7] Note that the year 1 **[ ]**m factual expenditure would be split between Timaru ($**[ ]**m) and Awatoto ($**[ ]**m). We assume that the other factual expenditures in Table 4 would be split equally between the North and South Islands.

[8] **[ ]**

Commission in *Decision 725* and the High Court[9] included redundancy costs as a social cost. Consistent with this, we use the expected redundancy payments as a proxy for the social cost of terminating the employment of workers in the factual.

In addition, we understand that CWH has budgeted contingency rationalisation costs of $**[ ]** in the first year of the factual. We include this as a dis-benefit.

[ ]. We include this as a dis-benefit.

[9] See paragraph 270 of Godfrey Hirst NZ Limited v The Commerce Commission HC WN CIV 2011-485-1257 [23 November 2011].

3. Detriments

3.1. Introduction

We start this section by setting out a critical loss analysis. This assists in assessing the extent to which a price increase by the merged entity would be constrained by the entry/expansion of competing firms (whether domestic or overseas).

We then calculate allocative, productive and dynamic efficiency detriments, adopting the frameworks we used in the last process, but adjusted to incorporate the approaches of the Commission in *Decision 725* and the High Court's judgment.

3.2. Critical Loss Analysis

In this section we undertake a critical loss analysis to assist in assessing the extent to which a price increase by the merged entity would be constrained by the entry/expansion of competing firms (whether domestic or overseas).

If the merged entity were to raise prices its profits would change in two offsetting ways:

- Profits would decrease due to the loss of volume, e.g., to rival firms; and
- Profits would increase due to the additional margin earned on volumes that remain with the merged entity.

If the latter effect dominates, then a post-merger price increase would be profitable to the merged entity. Critical loss analysis is a technique used to estimate the fraction of the merged entity's sales that would need to be lost in order to make an attempted price increase unprofitable (the "critical loss").

The equation generally used to calculate the critical loss is as follows:

$$\text{Critical loss} = \left[\frac{ssnip}{ssnip + gm} \right] 100$$

where the *ssnip* is a particular post-merger price increase (often taken to be 5%), and *gm* is the post-merger gross margin:

$$gm = \frac{p - c}{p}$$

where *p* is price and *c* is marginal cost (which can be proxied by the post-merger average variable cost).

For the purposes of critical loss analysis and the remainder of our analysis, the allocation of costs between variable and fixed may be different to that adopted for internal management purposes. The question being tested is whether the merged entity could raise its price by 5-10% and sustain that price increase profitably for about a year. Any attempt by the merged entity to raise its price by this much would reduce quantity demanded and supplied in the

market. So the ultimate question is, if quantity was to drop from Q_{cf} (being the counterfactual quantity) to Q_f (being the factual quantity) over the period of a year, what costs could the merged entity avoid?

It follows from this framework that the timeframe for considering which costs are fixed and which are variable should be one year. During the last process, the then-CFO of Cavalier Bremworth (being a shareholder in CWH) allocated costs between fixed and variable on this basis.[10] We have applied that allocation to the most recent costs supplied by CWH.[11]

In the last process **[ ]** The **[ ]**.

While Lempriere will be a 45% shareholder and will have two seats on the board of CWH, **[ ].**

For our analysis we have used the pre-merger price of CWH, and CWH's estimate of the variable costs for the merged entity (taking account of the Lempriere volumes).[12] This results in gross margins of **[ ]**% in the North Island and **[ ]**% in the South Island. Note that we have deducted from the variable costs the expected revenue the merged entity would obtain from selling the wool grease by-product. In effect, the production of a valuable by-product reduces the marginal costs the merged entity would face in providing scouring services. The effect of this expected revenue is to increase the scouring gross margin.

The critical loss based on these gross margins and various assumed price increases is shown in Table 5. To explain these results, consider the following example. If the merged entity raised price by 5% in the North Island, and actually lost more than **[ ]**% of North Island sales, then the price increase would be unprofitable. On the other hand, if the merged entity raised price by 5% and lost less than **[ ]**% of its sales, then the price increase would be profitable.

We have also estimated the critical volumes, and these are also set out in Table 5. To do this we have taken the factual joint production of CWH and WSI (as estimated by CWH) of **[ ]** bales in the North Island and **[ ]** in the South Island and converted this to greasy kilograms using a conversion factor of 165 kgs per bale. Using the estimated post-merger margins we applied the percentage critical loss to determine the critical volume. To use the North Island as an example, a **[ ]** critical loss equates to a critical volume of **[ ]** million kgs. Using the 5% price increase as an example again, if the merged entity raised price by 5% in the North Island and lost sales equivalent to **[ ]** million kgs per annum then the price increase would be unprofitable, while if it lost sales equivalent to (say) **[ ]** million kgs per annum the price increase would be profitable.

Table 5 also shows the critical elasticity. This is the price elasticity of (residual) demand at which the merged firm's actual loss would be equal to its critical loss. For example, with a

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[10] In a spreadsheet titled "CriticalLoss.xls". We have used a version of the spreadsheet renamed to "CriticalLoss (NERA edit) 2nd auth 170914.xls".

[11] In the last process, the CriticalLoss.xls spreadsheet (provided by CWH) used to allocate costs between fixed and variable linked directly to CWH's merger model. This time around, we have taken that and linked it to the new merger model (which has the same format as the merger model used last time).

[12] Being average price per kg of $**[ ]** in the North Island and $**[ ]** in the South Island and an estimated (post-merger) average variable cost of $**[ ]** in the North Island and $**[ ]** in the South Island.

5% price increase in the North Island, the actual loss will equal the critical loss if the elasticity of demand is **[ ].** If the elasticity of demand is greater than this in magnitude (e.g., **[ ]**), the actual loss will exceed the critical loss and a 5% price increase will be unprofitable.

Table 5
Critical Loss Calculations

	North Island			South Island		
SSNIP	**Critical loss**	**Critical volume (kg)**	**Critical elasticity**	**Critical loss**	**Critical volume (kg)**	**Critical elasticity**
1%	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**
2.5%	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**
4%	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**
5%	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**
7.5%	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**
10%	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**	**[ ]**

Source: NERA analysis

To put the critical volumes into perspective, Table 6 and Table 7 below list the 2014 volumes of CWH's North Island and South Island customers. Note **[ ]**. The square bracketed amount is that which goes through merchants and therefore is picked up in the other entries in the table.

Table 6
CWH North Island Major Customer Volumes (2014)

Customer	Volume (kg m)
[ ]	**[ ]**
Total	**[ ]**

Source: CWH.
Note: **[ ]**

Table 7
CWH South Island Major Customer Volumes (2014)

Customer	Volume (kg m)
[ ]	**[ ]**
Total	**[ ]**

Source: CWH
Note: **[ ]**

Compared to the **[ ]**m kg critical loss associated with a 5% price increase in the North Island, **[ ]** customers scour more than this level **[ ]**. Therefore, **[ ]** customers would be sufficient to defeat a 5% price rise. Similarly, **[ ]**m kg could be reached by **[ ]** customers. In the South

Island volumes **[ ]**. The **[ ]**customers all have volumes that exceed (or are close to exceeding) the critical loss of **[ ]**m kg.

The residual demand elasticity of a particular firm is a function of, among other things, the elasticity of supply of the firm's competitors. The elasticity of supply describes how much the quantity supplied changes in response to price changes. Therefore if the elasticity of supply is quite large, any attempt to raise prices by the merged entity would result in a large increase in supply by competitors and therefore a corresponding decrease in the residual demand faced by the firm.

At this point we do not have the data to empirically estimate the residual demand curve facing the merged entity. In this instance, the elasticity of residual demand would depend on the scope for domestic entry (which the Commission has previously regarded as likely in the event of a price increase), the economics of scouring wool in China and Malaysia, and the levels of excess capacity in those countries. If a small price increase would prompt domestic entry and/or make scouring in China or Malaysia profitable, then residual demand is likely to be quite elastic and thus even a small price increase would be unprofitable.

A key conclusion to take from this analysis is that, **[ ]**, the merged entity is likely to be sensitive to volume losses.

3.3. Allocative inefficiency

3.3.1. Explanation

In the Air NZ/Qantas Authorisation ("Air NZ/Qantas"), the Commission described allocative inefficiency in the following manner:[13,14]

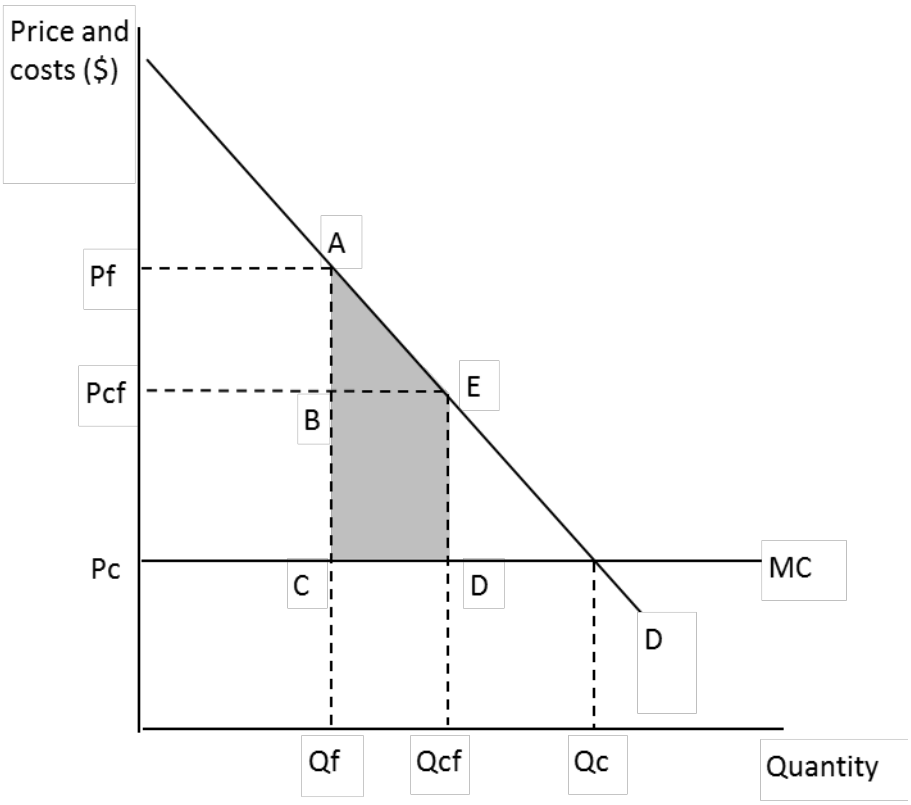
> *The impact of reduced competition—or, in other words, of increased market power—is generally to cause the market price to be increased further above, and market output to be reduced further below, the level which prevailed prior to the introduction of a proposed merger or set of arrangements*

In economics this situation is described as an increase in the "deadweight loss". Deadweight loss is surplus that is available to society (firms and consumers) but is not achieved because prices are above the competitive (equivalently, the allocatively efficient) level. This concept is illustrated graphically in Figure 4 of *Air NZ/Qantas* reproduced below.

[13] Para 902, *Air NZ/Qantas*.

[14] See also paragraph 221 of *Decision 725*.

Figure 1
The Basic Model of Allocative Efficiency



In this graph the shaded area (ABCDE) represents the deadweight loss. The *f* subscript denotes prices and quantities in the factual (with the merger), the *cf* subscript denotes those in the counterfactual (without the merger) and the *c* subscripts denote the competitive price and quantity. Here the merger leads to prices increasing from P_{cf} to P_f, and quantity decreasing from Q_{cf} to Q_f. The increase in price leads to a loss of consumer surplus (which is measured by the area above price and below the demand curve) and a loss of producer surplus (the area below price and above the marginal cost curve). In this simple case, the deadweight loss (allocative inefficiency) resulting from the merger can be calculated as:

$$DWL = (0.5 \times \Delta P \times \Delta Q) + (GM_{cf} \times \Delta Q) \qquad (1)$$

The term in the first brackets represent the loss of consumer surplus, and is given by the triangle HGA. The term in the second brackets represent the loss in producer surplus, and is given by the square GFDA. Note that the merger also leads to some consumer surplus being transferred to producers (the rectangle marked "Transfer" in the graph), but such transfers are not part of the deadweight loss. The variables in equation (1) are defined as follows:

$$\Delta P = P_f - P_{cf} \qquad \textit{(price change)}$$

$$\Delta Q = Q_f - Q_{cf} = \frac{\varepsilon \times Q_{cf} \times \Delta P}{P_{cf}} \qquad \textit{(quantity change)}$$

$$\varepsilon = \frac{\Delta Q}{\Delta P}\frac{P_{cf}}{Q_{cf}}$$ *(price elasticity of demand)*

$$GM_{cf} = P_{cf} - MC$$ *(pre-merger gross margin)*

3.3.2. Data

CWH has provided us with the following data,[15] which is used as an input into our detriment calculations:

- Average pre-merger market price to all customers: **[ ]** cents/kg in the North Island and **[ ]** cents/kg in the South Island. This is the counterfactual price modelled by CWH across all volumes, including WSI's. CWH's view is that this is a reasonable proxy given only a small proportion of WSI's business is commission scouring. This price is calculated using revenue from the CWH accounting categories "scour (net)", "bleach & additives", "other" and "press". Note that wool grease revenue is not included as part of the "price" of scouring, but is instead netted off when calculating marginal cost given it is a by-product that is sold separately;
- Pre-merger total market quantity: for the North Island the FY 2016 quantity is forecast to be **[ ]**bales, while for the South Island it is **[ ]**bales. In addition, we are advised that each bale weighs 165kg, and so we have used this to convert the number of bales to kilogram quantities; and
- Pre-merger variable cost to all customers: the (pre-merger) average variable cost (net of wool grease revenue) is **[ ]**cents/kg for the North Island and **[ ]** cents/kg for the South Island.[16] This is counterfactual variable cost across all volumes calculated by CWH using its own data and WSI's statutory accounts.

Based on this data, the total variable cost for New Zealand is $**[ ]** ($**[ ]** if lanolin revenue is netted off)[17] while the total revenue (excluding lanolin) is $[**]**.

3.3.3. Results

We have estimated the allocative inefficiency detriment arising from the proposed merger across a range of assumed price increases and elasticities. The combined national result is shown in Table 8. Our critical loss analysis indicates that any price rise would not be profitable for residual demand elasticities of greater than **[ ]** in the North Island and**[ ]** in the South Island. Therefore, as per our approach last time and the Commission's approach in *Decision 725*, we have used a range of elasticities from -0.05 to -1.

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[15] Data is sourced from the spreadsheet aSholpan Sum Syn v4 17-09-14.xls. As mentioned earlier, variable costs are estimated using the approach applied by CWH in the previous process.

[16] The comparable post-merger figures, as used in our critical loss analysis are **[ ]** cents in the North Island and **[ ]** cents in the South Island

[17] The comparable figures from last time (i.e., leaving in **[ ]** and **[ ]** volumes) are $[**]** if lanolin is not netted off and $[**]** if it is.

Our reading of the reasoning set out by the High Court and the Commission in *Decision 725* is that a price rise above 10% was likely to induce entry. Our revised entry model (see Appendix A) shows that if an entrant could secure sufficient volumes,[18] then entry would be profitable using second hand plant or a new Chinese scour if there was a 10 or 15% price rise (respectively).

The results of our allocative inefficiency calculations are set out in Table 8.

Table 8
National Allocative Inefficiency Detriments ($ per year)

	Demand elasticity		
Price increase	-0.05	-0.5	-1
5%	-52,538	-525,378	-1,050,756
10%	-109,932	-1,099,322	-2,198,644
15%	-172,183	-1,721,831	-3,443,662

Source: NERA analysis.

It is important to note the following:

- Any incentive to raise post-merger prices would be mitigated by the expected variable cost reductions, discussed in section 2.2 of our report; and
- These allocative inefficiency calculations incorporate the surplus loss due to the decreased production of the wool grease by-product. This is because we have treated wool grease revenue as an offset to the marginal cost of scouring wool. This has the effect of increasing surplus in the wool scouring market, and correspondingly increasing the surplus loss when there is a price increase for wool scouring services.

When we pull together the benefit and detriment analysis in Section 4 of our report, we assume that the allocative efficiency detriments set out in Table 8 occur in each of the five years that we analyse.

3.4. Productive inefficiency

3.4.1. Explanation

Productive efficiency refers to efficiency in internal firm production. A monopoly producer is normally considered to lack the competitive pressures to be efficient. Hence a 2-to-1 merger would be considered to yield productive efficiency losses (although the merged entity in the present case would still be subject to the threat of New Zealand entry and pressure from lower cost Chinese and Malaysian scourers).

[18] As we discuss further in Appendix A, entry would require the volumes of a coalition of customers.

In *Decision 725*, the Commission described productive inefficiency as follows:[19]

> *One outcome generally associated with a loss of competition is that a firm gaining market power has less incentive to minimise costs and to avoid waste. Organisational slack may creep into its operations, and costs may increase, because a satisfactory level of profit is assured even when the firm is less than fully efficient.*

We have estimated the productive inefficiency detriments by applying a percentage factor to the dollar value of pre-merger variable costs. For this exercise we include **[ ]** volumes. We have applied the same factors the Commission used in *Decision 725*, being 1% - 5% of pre-merger variable costs. This range was not disputed by the High Court, although it queried the Commissions' choice of the midpoint. The results of this are shown in Table 9.

Table 9
National Productive Inefficiency Detriments ($ per year)

Productive inefficiency factor	National Detriment
1%	**[ ]**
3%	**[ ]**
5%	**[ ]**

Source: NERA analysis.

Note that the top of the range is higher than the comparable figures from *Decision 725* despite lower volumes (the 5% detriment was **[ ]**). This is **[ ]**.[20]

When we pull together the detriment and benefit analysis in section 4 of our report, we assume that the productive efficiency detriments set out in Table 9 occur in each of the five years that we analyse.

3.5. Dynamic inefficiency

The Commission describes dynamic efficiency in *Air NZ/Qantas* as follows:[21]

> *Dynamic inefficiency arises when a business or industry is less innovative than it might be. Innovations bring benefits to consumers either through the introduction of improved new products that buyers value more highly ("product innovations"), or through the use of new, lower cost ways of producing existing products ("process innovations")*

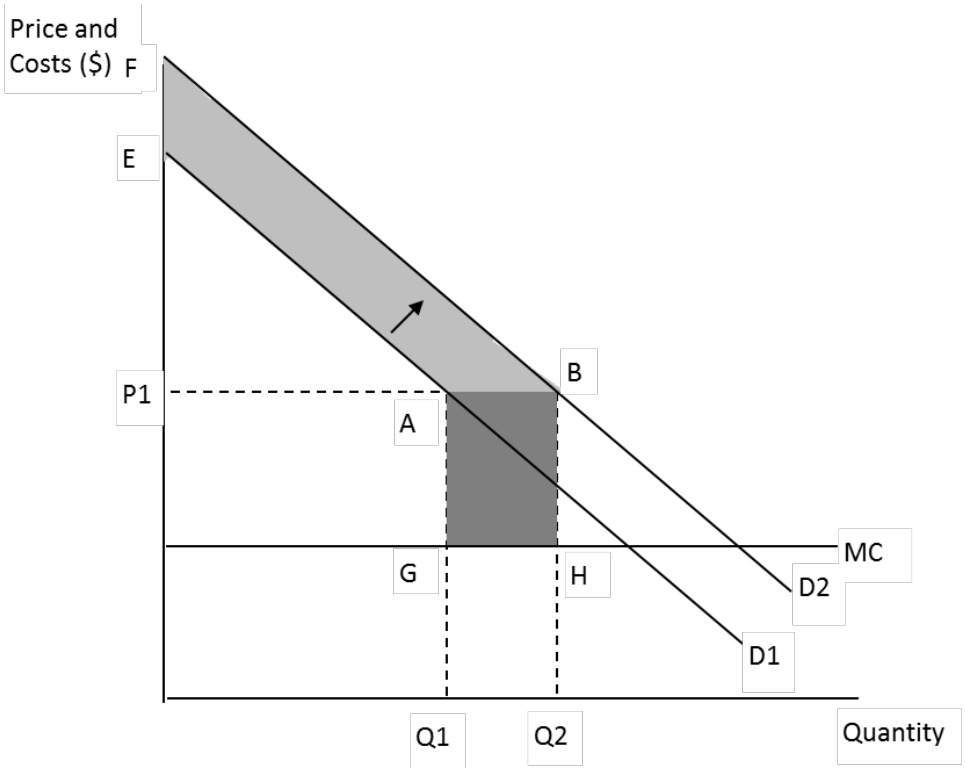
[19] Paragraph 259 of *Decision 725*.

[20] **[ ]**.

[21] Para 42, *Air NZ/Qantas*.

This is typically modelled by the Commission as a reduction in demand (product innovations) or an increase in cost (process innovations) relative to the counterfactual (without the merger). The demand contraction (or equivalently, expansion) point is illustrated graphically in Figure 3 of *Ruapehu* reproduced below.

Figure 2
Model of Dynamic inefficiency losses and gains from *Ruapehu*



Thus calculating the dynamic efficiency loss from reduced product innovations would involve calculating the shaded area EFBHGA. To do so would require the same information as for allocative inefficiency (price, quantity, marginal cost and elasticity estimates or assumptions), as well as an assumption about how much demand would be contracted. In *Ruapehu* the Commission examined the range of the detriment for various levels of lost demand growth (0.5%, 1% and 1.5%).

The above approach only takes into account product innovations. In *Air NZ/Qantas* the Commission adopted a simpler method to try and account for both process and product innovations. There the Commission calculated the loss in "general dynamic efficiency" by multiplying total revenue by a factor of 0.5%-1%.[22] For a "back of the envelope calculation" this approach will be the easiest to implement as the only information required is total industry revenue.

[22] Para 1181 of *Qantas/Air NZ*.

In *Decision 725* the Commission's applied the *Air NZ/Qantas* approach of calculating the loss of "general dynamic efficiency". We therefore apply this approach here by multiplying total revenue (including WSI revenue) by a factor of 0.5%-1.0% as shown in Table 10.

Table 10
National General Dynamic Inefficiency Detriments ($ per year)

Dynamic inefficiency factor	National Detriment
0.5%	**[ ]**
1%	**[ ]**

Note this is lower than the comparable figures in *Decision 725* (our calculation for 1% was **[ ].**

4. Conclusions

In Table 11 we bring together the benefits and detriments, to obtain the net benefits of the proposed merger. Our analysis is carried out over a five-year timeframe following the merger, and we discount to obtain present values, using a 10% real discount rate.

The key differences in our overall results since the first authorisation are:

- Larger cost savings due to:
  - Freeing up of Clive;
  - **[ ]**;
- Higher productive inefficiencies **[ ]**; and
- Lower dynamic inefficiencies **[ ]**.

Table 11
National summary of present value of benefits and detriments

Demand elasticity	-0.05	-0.5	-1
Detriments ($m PV)			
Allocative	(0.22) – (0.72)	(2.19) – (7.18)	(4.38) – (14.36)
Productive	**[ ]**	**[ ]**	**[ ]**
Dynamic	**[ ]**	**[ ]**	**[ ]**
Total Detriments 5 year PV ($m)	**(2.30) – (8.71)**	**(4.28) – (15.18)**	**(6.47) – (22.36)**
Benefits ($m PV)			
Non-capital cost savings	**[ ]**	**[ ]**	**[ ]**
Land and buildings cost savings	**[ ]**	**[ ]**	**[ ]**
Plant cost savings	(1.09)	(1.09)	(1.09)
Capex on buildings	**[ ]**	**[ ]**	**[ ]**
Cartage to NI	**[ ]**	**[ ]**	**[ ]**
Redundancy/Contingency	**[ ]**	**[ ]**	**[ ]**
Total Benefits 5 year PV ($m)	**30.35**	**30.35**	**30.35**
Net Benefit 5 year NPV	**21.64 – 28.05**	**15.17 – 26.07**	**7.99 – 23.88**

Note: Calculations carried out using unrounded numbers and presented rounded so will not add.

Therefore the range of net benefits 5 year NPV is **[ ]**.

In *Decision 725* the Commission selected point estimates based upon the "likely" values. For present purposes this applies to the detriment calculations as we do not have any ranges for the benefits. Table 12 below presents the net benefits using the "likely" values the Commission used in *Decision 725*.

Table 12
"Likely" net benefits based upon *Decision 725 ($m, 5 year NPV)*

Detriments	
Allocative Detriment (-1 elasticity and 10% price rise)	**[ ]**
Productive detriment (3% of total variable cost)	**[ ]**
Dynamic detriment (0.5% of industry revenue)	**[ ]**
Benefits	**[ ]**
Net benefit (detriment)	**[ ]**

Note: Calculations carried out using unrounded numbers and presented rounded so will not add.

For the sake of completeness, we note our view that the "likely" value of the productive and dynamic efficiency ranges would be at the lower end of those ranges, because the most material of the pressures to be productively and dynamically efficient would remain post-merger, being:

- The threat of increased exports of greasy wool to China and Malaysia;
- The continued threat of entry; and
- The declining supply of wool grown in New Zealand (meaning that the merged entity's demand curve will be shifting inwards).

In addition, the merged entity would continue to have a concentrated group of shareholders with strong incentives to maximize profits, and therefore reduce costs.

The High Court found that there was no justification for using 0% for dynamic inefficiency. Therefore the Commission's value of 0.5% is already the bottom of the range. Therefore using the bottom of the range for productive and dynamic detriments only involves changing the productive detriment in Table 12. The results of this modification are shown in Table 13 below.

Table 13
"Likely" net benefits based upon *Decision 725*, modified to use bottom of the range for productive inefficiency *($m, 5 year NPV)*

Detriments	
Allocative Detriment (-1 elasticity and 10% price rise)	**[ ]**
Productive detriment (1% of total variable cost)	**[ ]**
Dynamic detriment (0.5% of industry revenue)	**[ ]**
Benefits	**[ ]**
Net benefit (detriment)	**[ ]**

Note: Calculations carried out using unrounded numbers and presented rounded so will not add.

Appendix A. Entry model

A.1. Introduction

As we did during the last process, we can assess the economics of entry using a multi-period cash flow model to calculate the net present value (NPV) of the cash flows.

As part of the last process, we prepared a template for such a model, and provided this to CWH. Drawing on its own internal financial models, CWH estimated the relevant revenues, operating expenditure and capital expenditure of entry. We used this information to develop our NPV model that was submitted to the Commission during the last process.[23] We understand that the Commission accepted this model, but adjusted the upfront capital expenditure input, to reach its view on the price increase required to trigger entry.[24]

CWH has now updated the new entrant template[25], and accordingly we have used this information to update our entry model. In this appendix we set out the assumptions underlying this model, and the results.

A.2. Assumptions

The following are our key assumptions:

- We test entry at assumed price increases of 0%, 5%, 10% and 15% from the pre-merger (counterfactual) price. Using the pre-merger price of **[ ]** per kg,[26] this equates to post merger prices of **[ ]**, **[ ]** and **[ ]** respectively. To obtain the entrant's revenue per kg we then add lanolin revenue using CWH's estimate of the lanolin price **[ ]** per kg of lanolin. This equates to revenue per greasy kg of wool of **[ ]** in year 1 and **[ ]** in year 2.[27]
- Given the decline in total wool volumes, and in particular the reduced volumes of wool used in domestic carpet manufacture,[28] the entry we model is likely to be underwritten (either by ownership or contract) by a combination of large merchants. It is CWH's view that entry at this scale would most efficiently utilise a 2.4m scour rather than a 3.0m scour, and accordingly our model adopts a 2.4m scour. This is consistent with the Commission's finding in *Decision 725* that a likely minimum commercial scale of entry would be a single 2.4m scour line.[29]
- The following volumes are assumed in the CWH entry template for a 2.4m scour:

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23 See NERA, *CWH/WSI – Response to Certain Issues Raised at Conference,* 18 May 2011.

24 See paragraphs 176-180 of *Decision 725*.

25 See tab "New Entrant" in the merger model "GHog Sum Syn-WSIest-NewEnt CC FY13.xls".

26 This is CWH's estimate of the industry average price, **[ ]**

27 **[ ]**.

28 As the Commission noted in *Decision 725*, Godfrey Hirst's North Island demand of **[ ]** was equivalent to **[ ]** of the capacity of a 2.4m scour. Godfrey Hirst now scours a total (i.e. North and South Island) volume of **[ ]** through CWH.

29 *Decision 725*, paragraph 182.

- In the first year of operation there would be no production for the first four months while the plant is installed and commissioned, followed by 8 months of production at 70% of capacity (i.e. 9,996,000 greasy kgs in year 1). This allows for the "run-in" of the new plant. Because of this we have assumed the firm would only accrue 8 months' worth of tax depreciation in the first year.
- By year 2, the scour would be operating at a run rate of 2,800/hr at 90% volume capacity (i.e. 20,745,000 greasy kgs).

Note that this 20.7m kg is **[ ]**% of total North Island volumes (71.9m kg in 2013).[30]

- We have assumed flat volumes over the time period given entry would likely be underwritten.
- We have assumed land and buildings would cost $**[ ]** million. This is similar to the expected sale prices for each of the Whakatu and Clive sites. In addition, we are advised by CWH that the entrant would need approximately **[ ]** of working capital.
- In the last process we tested plant costs in a range of $3m (for a secondhand plant) to $12.5m. At the time CWH was aware of relatively inexpensive second hand plant available on the market that an entrant could purchase. We are informed that this is no longer the case as growth in scouring in China, India and Malaysia has absorbed much of the second hand plant.

  We therefore no longer test a $3m plant cost scenario. CWH has compiled three scenarios of plant costs for an entrant, a breakdown of which is provided in the CWH spreadsheet "New Entrant Model.xls":

  - "New Top Quality Gu Scourline" for $**[ ]**.
  - "Second hand 2.4m Andar Scourline" for $**[ ]**; and
  - "New Chinese Conventional Scourline" for $**[ ]**.

  We understand these figures include all the relevant costs of commissioning the scour, excluding land, buildings and working capital, for which a further **[ ]** is added. We model entry for each of these scenarios.
- The model has a time period of 20 years.[31] This seems a reasonable assumption given CWH's current 2.4m scour lines at Awatoto are over 20 years old and CWH believes they are still in excellent condition. There would likely be some residual value of the business after year 20, however because the impact of the residual value on the NPV result would be minimal due to discounting, we have not attempted to estimate it.[32]

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[30] Alternatively, based upon the FY16 figures used in the merger model, 20.7m kg would amount **[ ]** of **[ ]** kg in the North Island.

[31] We understand that while the accounting depreciation rate used by CWH implies a book value of zero after 15 years, the assumed annual R&M expenditure of approximately **[ ]** would extend the life of the plant well beyond this period. Therefore no additional capex is required over this 20 year time frame.

[32] Our results would be similar if we used a shorter timeframe (e.g., five years), and calculated a residual value for the business. The key point is that once the investment in plant has occurred, a highly utilised scouring business results (at the assumed prices) in material levels of positive cash flows.

- Although CWH does not believe it would be necessary given the likely make-up of any entrant, to be conservative a specific cost for a new CEO has been included in addition to a general manager and other managers.
- For the sake of this analysis we have adopted the pre-tax cost of capital figure argued for by Dr Layton during the last process, although we do not necessarily accept that this is the appropriate figure given the likelihood that entry would be underwritten by contract or the owner's own wool volumes. Our model is post-tax so we have grossed the figure down to 15%.

A.3. Model

The model itself will be sent to the Commission as a separate, confidential spreadsheet, although we now set out the high level results. We have modeled a number of potential scenarios: no price increase, and a 5%, 10% and 15% price increase.

The results of this modeling are set out in Figure 3 below.

Figure 3
NPV of entry for different plant costs scenarios (15% post tax WACC)

[ ]

As Figure 3 illustrates, the model results are that entry would be a profitable strategy for price increases of 10% or greater for the **[ ]** option and 15% for the **[ ]** option, assuming that the entrant can obtain the requisite volumes. These results are sensitive to volumes, however, if entry is underwritten or volumes are provided by the owners, this risk is likely to be mitigated. Similarly, the model is also sensitive to the cost of capital used. If entry is underwritten, this may mean that the 15% post tax cost of capital we currently use is too high. Figure 4 below sensitivity tests our results for a lower post tax cost of capital of 10%.

Figure 4
NPV of entry for different plant costs scenarios (10% post tax WACC)

[ ]

As the critical loss analysis earlier in this report demonstrates, a loss of the volumes modelled in this entry analysis (**[ ]** kg) would be unprofitable for the merged entity.

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