

24 May 2011

Proposed SCPN/Aorangi
Merger
Russell McVeagh

NERA
Economic Consulting

Public Version

Project Team

James Mellsop

Will Taylor

NERA Economic Consulting
Level 18
151 Queen Street
PO Box 105 591
Auckland 1143
Tel: +64 9 373 7230
Fax: +64 9 373 7239
www.nera.com

Contents

1.	Introduction and Summary	1
2.	Historical and Forecast Financial Performance	2
2.1.	Contextual factors	2
2.2.	Economic profit analysis	4
2.3.	Deferred investments	7
3.	Cost Savings	8
4.	Comparison Regions	9
5.	The Investment Problem	11
5.1.	Intuitive discussion	11
5.2.	Game theoretic analysis	12
5.3.	Conclusion	14
6.	Constraints on the Merged Entity's Pricing	14

1. Introduction and Summary

Southern Cross Palmerston North (“SCPN”) and Aorangi Hospital propose to merge their Palmerston North private hospital businesses in a joint venture structure. They are applying to the Commerce Commission for an authorization for this transaction, under the Commission’s streamlined procedure.

We have been asked by Russell McVeagh, counsel to SCPN and Aorangi, to analyse the economic benefits and detriment of this proposed transaction. Our analysis is contained in this report.

We conclude that the benefits of the merger (particularly greater investment and cost savings) are likely to outweigh any detriments due to lessened competition, for the reasons summarized below.

Historically, the MidCentral DHB area may have been large enough to support two private hospitals. However, there are a variety of demand- and supply-side factors operating that are undermining the viability of having two private hospitals in that area.

On the demand-side, the market for private hospital services in the MidCentral DHB area has been shrinking since 2006, and this is likely to become more dramatic as:

- ACC funding is cut back;
- DHBs increase their output in response to Government public health initiatives; and
- Private health insurance funding decreases.

On the supply-side, new medical technologies are raising the costs of supplying private hospital services.

These pressures are reflected in the financial performance of SCPN and Aorangi – SCPN in particular has been making persistent economic losses, and Aorangi has made economic losses in four out of the last eight years.

As a consequence, investment **SCCI&ACI** is being deferred. We are advised that neither hospital is investing to the extent necessary to comply with “best practice”.

Furthermore, private hospitals in comparable and even smaller regions around New Zealand are investing in facilities such as HDU/ICUs, high tech imaging and high tech theatres, expanding the available procedures for patients, and the safety of procedures, in those areas. These investments are being made despite there being just one private hospital in each of these areas. In contrast, these investments are not being made by either private hospital in Palmerston North, and are unlikely to be made under the counterfactual.

Accordingly, under the counterfactual, compared with consumers in other areas of New Zealand, MidCentral DHB region consumers would either miss out on procedures or have to travel to a different geographic area for them.

In contrast, the evidence suggests that the merged entity would be more likely to invest in facilities such as HDU/ICUs, high tech imaging and high tech theatres. Because of scale issues, consumer welfare-enhancing investment (dynamic efficiency) would be more likely in the factual than in the counterfactual.

Any price increases (and accordingly allocative inefficiency) under the factual would be mitigated by (among other things) variable cost (consumables) reductions, Southern Cross' ("SC") non-profit motives, increased capacity at the MidCentral DHB and competition from other surgical rooms and clinics.

While the factual would involve less competitive pressure, private hospital services in the MidCentral DHB area would be provided using less resources in the factual than in the counterfactual (productive efficiency).

2. Historical and Forecast Financial Performance

2.1. Contextual factors

At a high level it is useful to begin by examining the trend in patient numbers over time at both hospitals, as shown in Figure 2.1.

Figure 2.1
Time series of patient numbers

SCCI&ACI[]

Since 2006 there has been a decline in patient volumes, felt particularly by SCPN.

SCCI&ACI[]

Table 2.1
Theatre utilisation

Year	SCPN	Aorangi
2008	SCCI[]	ACI[]
2009	SCCI[]	ACI[]
2010	SCCI[]	ACI[]
2011YTD	SCCI[]	ACI[]

There are a variety of supply- and demand-side factors operating that are undermining the viability of having two private hospitals in Palmerston North.

Firstly, new technologies are imposing cost pressures. The US Congressional Budget Office has noted the following:¹

Although many factors contributed to that [health spending] growth, most analysts have concluded that the bulk of the long-term rise resulted from the health care system's use of new medical services that were made possible by technological advances, or what some analysts term the "increased capabilities of medicine." Major advances in medical science have allowed health care providers to diagnose and treat illness in ways that were previously impossible. Many new services are very costly; others are relatively inexpensive but raise aggregate costs quickly as ever-growing numbers of patients use them. Technological innovation can theoretically reduce costs and, for many types of goods and services, often does. Historically, however, the nature of technological advances in medicine and the changes in clinical practice that followed them have tended to raise spending.

Secondly, ACC funding for surgery is expected to decline as the ACC seeks to cut costs.² In Palmerston North this could have a material impact on the two private hospitals, because orthopedic surgery accounts for **SCCI&ACI**[] of the combined volumes in Palmerston North.³

Thirdly, Government public health initiatives have resulted in DHBs across the country producing greater surgical output.⁴ This has two flow-on impacts for private hospitals:

- Less outsourcing from DHBs; and
- Shorter waiting lists for public surgery, reducing the demand for private surgery.

The effect of this in Palmerston North has been material. In recent years DHB revenue has contributed up to approximately **SCCI&ACI**[] in revenue to the two private hospitals **SCCI&ACI**[]. Neither hospital currently receives DHB funding, nor do they expect this situation to change.

Fourthly, private health insurance funding is decreasing. We understand that there are a similar number of New Zealanders insured, but that people are downgrading their cover, resulting in increased co-payments for private surgery.⁵ Increased co-payments make private surgery less attractive.

Finally, we understand that surgical procedures are increasingly being undertaken in the surgeons' own rooms,⁶ and surgeons are "walking out" on hospitals and setting up their own specialty clinics.⁷ In Palmerston North short stay procedures are now being performed at the

¹ Congressional Budget Office (2008) "Technological Change and the Growth of Health Spending".

² See 10 (c) of the application.

³ Figure taken from the joint merger model.

⁴ See 10 (b) of the application. More generally, see the government's "Health Targets" at <http://www.moh.govt.nz/moh.nsf/indexmh/healthtargets-targets> and *National To Tackle Hospital Waiting Lists*, <http://www.voxy.co.nz/politics/national-tackle-hospital-waiting-lists/5/3786>.

⁵ See 10 (d) of the application.

⁶ We are informed that the Broadway Surgical Rooms have three procedure rooms, and that The Palms has one procedure room which is designed to be easily upgraded to a full operating theater. SCPN understand that The Palms plans to carry out this upgrade in the near future.

⁷ E.g. the recently established eye clinic in Rotorua.

Broadway Surgical Rooms, The Palms and the Caci Clinic. Furthermore, we understand that general anesthesia is carried out by one of the resident surgeons at the Broadway Surgical Rooms, though Broadway Surgery's primary focus is dental extractions and orthodontics.

2.2. Economic profit analysis

In light of the preceding discussion on the pressures facing the hospitals and the claim that further investment is not economic due to the size of the market, it is useful to analyse the economic profitability of the Palmerston North hospitals. As noted in a memo to Russell McVeagh during the 2008 clearance process (which we understand was filed with the Commission),⁸ economic profit is defined as:

$$\Pi^E = \text{revenue} - \text{avoidable (economic) costs}$$

In that memo we noted that avoidable costs should include economic depreciation (of non-sunk assets) and the opportunity cost of not deploying the capital elsewhere. This measure differs from cash flow because both of these opportunity costs are non-cash costs. While in the absence of regular capital expenditure to maintain facilities a hospital may be able to limp along with positive cash flows (albeit potentially irrationally, in our view), consumers will suffer from a lack of investment.

This is illustrated in the present case by the level of deferred investment at both SCPN and Aorangi. While the two hospitals may be recording positive cash flows (although on and off in the case of SCPN), it is important to recognise that at the same time they have been deferring investment **SCCI&ACI** (see section 2.3 of our report).

To give a simple indication of the per year economic profit/loss of the two hospitals, we have simply taken the earnings before interest and tax (EBIT)⁹ of each hospital, added back any non-avoidable costs and then subtracted the firm's pre-tax weighted average cost of capital (WACC) multiplied by total assets.^{10,11}

2.2.1. SCPN

We have been provided with profit and loss statements for SCPN from 2003–2011 and balance sheets from 2004–2011.¹² We can therefore calculate economic profit from 2004–2011. The key non-avoidable cost that must be added back for SCPN is the “network services charge” that SCPN pays to SCHL to cover national overheads. However, we understand that this includes the cost of the hospital's general manager as well as certain IT

⁸ *Economic Profitability of SXP*, 17 June 2008.

⁹ We subtract accounting depreciation as a proxy for economic depreciation.

¹⁰ We have not analysed the level of sunkness of the hospitals' assets.

¹¹ Note that for both hospitals total assets exclude land and buildings. This is because both hospitals rent rather than own the land and buildings. In the case of SCPN this is a nominal rental to its parent company, whereas in the case of Aorangi we understand that the rental is set at market.

¹² Note that the 2011 figures are forecasts.

licensing costs which would be avoided if the hospital was shut down. Accordingly these costs are netted off.¹³

The “Asset lease cost” expense line is the nominal fee that SCPN pays to SCHL for the land and buildings used.¹⁴ We understand that this figure is significantly below what a market rental rate would be.¹⁵ We have thus removed this expense and included the “adjusted Blackmore” market rental previously put before the Commission.¹⁶ This estimate corresponds to 2007, so we have assumed a rental growth of 5% per year to obtain a rough estimate for the years before and after 2007. For 2010 and onwards we have used the figure of \$500k from the joint merger model.¹⁷

For SCPN’s WACC, we use the SCHT hospital network wide pre-tax WACC of **SCCI[]**. The SCHT board arrived at this number by taking the estimate validated by PwC of **SCCI[]** and reducing it by **SCCI[]** to reflect SCHT’s non-profit objective function.

The result of our economic profitability analysis is shown in Table 2.2 below.

Table 2.2
Economic profitability of SCPN

	2004	2005	2006	2007	2008	2009	2010	2011 (F)
EBITDA	□	□	□	□	□	□	□	□
- depreciation	□	□	□	□	□	□	□	□
EBIT	□	□	□	□	□	□	□	□
+ network services charge	□	□	□	□	□	□	□	□
+ asset lease cost	□	□	□	□	□	□	□	□
- market rental	□	□	□	□	□	□	□	□
- GM cost	□	□	□	□	□	□	□	□
- other avoidable costs	□	□	□	□	□	□	□	□
- WACC (SCCI[]) * total assets	□	□	□	□	□	□	□	□
Economic surplus	□	□	□	□	□	□	□	□

Table 2.2 demonstrates that SCPN has been making persistent economic losses.

¹³ Note that we only have information concerning the magnitude of these costs for 2005-2009. We have simply extrapolated these costs for the years outside this period, e.g., we have used the 2005 costs for the 2004 period, and the 2009 costs for the 2010 period.

¹⁴ In the management accounts this is the “Asset lease” line.

¹⁵ For example, the budgeted “Asset lease” expense for FY11 is **SCCI[]** whereas the SCPN/Aorangi merger model uses an estimate of **SCCI&ACI[]** for the rental cost for the SCPN premises.

¹⁶ For details of this calculation see our 17 June 2008 Memo submitted as part of the clearance application entitled “Economic Profitability of SXPN”.

¹⁷ **SCCI[]**

2.2.2. Aorangi

Turning now to Aorangi, we have drawn on the 2008 PwC valuation of Aorangi as well as financial statements for the period since that date.¹⁸ Since Aorangi is a stand alone entity, we do not need to make adjustments like we have for SCPN with the network services and rental charges. The one adjustment we do make is add back the “JV expenses” line in the 2008 and 2009 financials as we understand that these relate to the proposed JV/merger, and are therefore extraordinary costs.

We have been informed by Aorangi that its pre-tax hurdle rate is between **ACI**[], depending on the risk of the investment. We first take the lower bound of this range, which biases towards showing an economic profit as opposed to loss. The economic profitability of Aorangi is shown in Table 2.3.

Table 2.3
Economic profitability of Aorangi

	2004	2005	2006	2007	2008	2009	2010	2011 (F)
EBITDA	□	□	□	□	□	□	□	□
-depreciation	□	□	□	□	□	□	□	□
EBIT	□	□	□	□	□	□	□	□
+ JV costs	□	□	□	□	□	□	□	□
- WACC (ACI []) * total assets	□	□	□	□	□	□	□	□
Economic surplus	□	□	□	□	□	□	□	□

Table 2.3 shows that unlike SCPN, Aorangi has typically had a positive EBIT. On its face this suggests Aorangi has been performing better than SCPN. In economic terms however, due to the higher cost of capital faced by Aorangi it has similarly been making sustained economic losses.

We do not have any empirical evidence concerning Aorangi’s cost of capital. PwC regularly calculates the cost of capital for selected NZX firms. The closest comparator on the NZX is Wakefield Health Limited.¹⁹ As a rough proxy we have simply taken PwC’s current estimate of Wakefield’s post-tax WACC and grossed it up by the corporate tax rate. This gives a figure of 9%.²⁰ To see the difference this makes, Figure 2.2 below plots EBIT/Total assets against the different figures we have for Aorangi’s WACC. The difference between EBIT/Total Assets and WACC is economic profit in percentage terms.

¹⁸ We note that FY 2007 figures used are forecasts as the financial year was not complete at the time of the PwC report.

¹⁹ <http://www.nzx.com/markets/nzxs/WFD>.

²⁰ PwC’s most recent cost of capital report is for December 2010 and calculates Wakefield’s post tax WACC as 6.3%. Using a corporate tax rate of 30% this gives a pre tax WACC of 9%.

Figure 2.2 Aorangi WACC sensitivity testing

ACI[]

Figure 2.2 shows that even at the lower WACC, Aorangi has in half the years of our time series earned below its cost of capital.

The frequency of economic losses exhibited in Table 2.2 and Table 2.3 is consistent with both hospitals lacking scale. This is also corroborated by our understanding that ACI[]

2.3. Deferred investments

We understand that as a result of the poor financial performance of both hospitals, investment is being deferred in necessary hospital infrastructure and equipment. We are advised that neither hospital is investing to the extent necessary to comply with “best practice”.

At a high level this is evidenced for Aorangi by comparing actual versus budgeted capex. This gives an indication of what the hospital felt it needed to spend and what it actually spent. For 2008-2010 Aorangi’s actual versus budgeted spend is shown in Table 2.4.

**Table 2.4
Actual vs budgeted CAPEX at Aorangi**

Year	Capex Budget for replacements	Capex Budget for New Equipment	Total Capex Budget	Total Actual Spend
2008	[]	[]	[]	[]
2009	[]	[]	[]	[]
2010	[]	[]	[]	[]

Source: Aorangi

Although this table covers only a short time period, it shows that over the last three years Aorangi has ACI[]

In terms of specific examples, we have been informed by Aorangi that they ACI[].
ACI&SCCI[].

At least for 2009 to 2011 TYD, SCCI[], as shown in Table 2.5.

Table 2.5
Actual vs budgeted CAPEX at SCPN

Year	Actual Capex	Budgeted Capex
2008	[]	[]
2009	[]	[]
2010	[]	[]
2011YTD	[]	[]

Source: SCPN

This table shows that investment at SCPN has been below what has been budgeted for since the clearance. We understand that this is mainly due to investments being deferred. Specific examples of this at SCPN are **SCCI**[].

In *Decision 650*, the Commission placed some weight in its competition analysis on its view that both hospitals were investing. Whether or not that was an accurate assessment in 2008, it does not appear to be the case today.

3. Cost Savings

In section 2 we discussed the poor financial performance of both Palmerston North hospitals. The motivation for the merger is that a single hospital will be able to achieve significant economies of scale, reversing the sustained economic losses both hospitals have been experiencing and enabling future investment.

Southern Cross and Aorangi have jointly prepared a model of the merger which demonstrates relatively significant cost savings and a return to (accounting) profitability without any price increases. **SCCI&ACI**[]

The costs over time (and thus expected savings) are shown in Table 3.1 below.

Table 3.1
Merger cost modeling

(\$000)	2010	2011	2012	2013	2014	2015
Direct staff costs	[]	[]	[]	[]	[]	[]
Direct supply Costs	[]	[]	[]	[]	[]	[]
Indirect Costs	[]	[]	[]	[]	[]	[]
Total Costs	[]	[]	[]	[]	[]	[]

For our purposes, 2010 can effectively be thought of as the counterfactual as no rationalisation would have occurred at that stage. Thus the model demonstrates that by 2015 there will be annual cost savings of **SCCI&ACI**[] broken down into:

SCCI&ACI[]

As noted in section 6, some of these are variable cost savings, which would mitigate any price increase from the merger. **SCCI&ACI**[]

Furthermore, a reduction in the cost base and a corresponding improvement in profitability for the merged entity would provide improved funding for future investments.

SCCI&ACI[].

The merger model does not include a forecast balance sheet and therefore we cannot calculate the forecast economic profitability of the merged hospital. **SCCI&ACI**[].

4. Comparison Regions

In *Decision 650*, the Commission defined the geographic market to be the MidCentral DHB area. In Table 4.1, we have listed all of the New Zealand DHBs, their populations and number of doctors (excluding GPs). We have also listed the number of private hospitals in each DHB region, including theatres, and whether there has been private hospital investment in HDU/ICUs, high tech imaging and high tech theatres in each of those regions.

Table 4.1
DHBs and private hospitals

DHB	Population ²¹	Number of Doctors ²²	Number of private hospitals ²³	Number of theatres ²⁴	HDU/ICU ²⁵	High Tech Imaging on site ²⁶	Hi Tech Digital Theatres ²⁷
Waitemata	528,400	506	2		Yes	Yes	Yes
Canterbury	501,980	953	3		Yes	Yes	Yes
Counties Manukau	481,700	466	1		No	Yes	Yes
Auckland	444,100	1,821	4		Yes	Yes	Yes
Waikato	365,080 ²⁸	641	3		Yes	Yes	Yes
<i>Southern</i> ²⁹	<i>300,400</i>						
Otago	179,750	458	1		Yes	Yes	Yes
Southland	120,650 ³⁰	123	1		No	No	No
Capital and Coast	295,900 ³¹	761	3		Yes	Yes	Yes
Bay of Plenty	207,720	294	1	6	Yes	Yes	Yes
MidCentral	158,100	262	2	6	No	No	No
Northland	155,750	205	1	2	No	No	No
Hawke's Bay	153,260	219	1	2 or 3	No	No	Yes
Hutt Valley	142,700	171	1	3	No	Yes	Yes
Nelson Marlborough	136,800	182	2	3 + (Nelson) + 1 (Blenheim)	No	No	Yes
Taranaki	108,230	153	1	3	No	No	Yes

²¹ Source: The New Zealand Medical Workforce in 2009 report from the Medical Council of New Zealand – <http://www.mcnz.org.nz/portals/0/publications/Workforce%20Survey%20Report%202009.pdf>

²² Source: *ibid.*

²³ Source: <http://www.nzpsha.org.nz/members.php>. Note that this source provides members of the private hospital association in each region, this may underestimate the number of actual hospitals in larger regions like Auckland.

²⁴ Source: Terry Moore, CEO SCHAT.

²⁵ Source: Terry Moore, CEO SCHAT.

²⁶ Source: Terry Moore, CEO SCHAT.

²⁷ Source: Terry Moore, CEO SCHAT.

²⁸ Includes all TLA Ruapehu to simplify analysis. Officially, Ruapehu District is split between Whanganui and Waikato DHBs.

²⁹ The Southern DHB was created by a merger between the Southland and Otago DHBs in May 2010. While it is one single DHB, it covers a very large geographic area and still has separately elected board members for the Southland and Otago “constituencies”. Therefore we have not modified the Medical Council’s approach of reporting Otago and Southland as separate regions.

³⁰ Includes all Queenstown-Lakes to simplify analysis. Officially Queenstown-Lakes is split between Southland and Otago DHBs.

³¹ Includes all TLA Kapiti to simplify analysis. Officially, Kapiti Coast District is split between Capital & Coast and MidCentral DHBs.

					Public Version		
Lakes	101,800	142	1	3	Yes	No	Yes
Whanganui	58,300	75	1	1	No	No	No
South Canterbury	55,560	64	1	1 or 2	No	No	No
Tairāwhiti	46,200	64	1	2	No	No	No
Wairarapa	39,960	35	1	1	No	No	No
West Coast	32,590	28	0	0	No	No	No
Total	4,314,530	7,623					

Setting aside for the moment Nelson-Marlborough, the first thing to notice from this table is that the MidCentral DHB area has a relatively small population to support two private hospitals. Similar size DHBs areas are Otago, Southland, Hawkes Bay, Hutt Valley, and Northland. In each of these areas, there is only one private hospital (although the Hutt Valley is of course close to the Capital and Coast DHB area, which is well served by private hospitals). The Bay of Plenty DHB area is larger than the MCH DHB area, but still has only one private hospital.

Indeed, other than the MidCentral DHB and Marlborough-Nelson DHB areas, multiple private hospitals do not appear in areas with less than almost 300,000 people (as context, there are 158,100 people in the MidCentral DHB region).

The second thing to notice is that many of the areas with similar or smaller populations than the MidCentral DHB region have private hospital HDU/ICUs, high tech imaging and/or high tech theatres, whereas the MidCentral DHB region does not.

Returning to Nelson-Marlborough, we understand that the Blenheim private hospital is co-located and shares facilities with the local public hospital. We also understand that a similar situation exists in the Wairarapa, where the “private” hospital is located in the public hospital. Indeed, we are advised by SCHAT that the investment for both the Blenheim and Wairarapa “private” hospitals actually came from the public hospitals (to make the respective areas more attractive to doctors).

We therefore think that the Nelson-Marlborough (and Wairarapa) private hospitals can be distinguished for the purposes of the preceding analysis. Also, Nelson and Blenheim are over 100km apart. This illustrates the general problem that DHB areas do not necessarily correspond with the geographic market the hospitals operate in.³²

5. The Investment Problem

5.1. Intuitive discussion

As discussed in section 4, other regions in New Zealand of comparable size to the MCH DHB region are experiencing investment in high tech hospital services despite there being only a single private hospital. Larger regions that have multiple private hospitals (e.g.

³² For example, the Hutt Valley private hospital almost certainly competes with the private hospitals in the Capital & Coast DHB region.

Wellington, Auckland and Hamilton) also offer facilities that are not available in Palmerston North.

These investments are expanding the available procedures for patients, and the safety of procedures, in those areas. They are also likely to attract surgeons to these regions.

Why are these investments not occurring in Palmerston North? The view of SCPN and Aorangi is that they cannot justify investing if they will only capture 50% of the market for the resulting services. That is, the size of the market means that for an investment to be profitable one hospital would need to capture the whole market for that service.

To be more specific, the hospitals argue that if one of them invests in a facility such as an HDU/ICU, high tech theatre or high tech imaging, the other will feel compelled to follow suit – because these facilities open up a variety of new procedures (and increase the safety of some existing procedures), the other hospital would have to make the same investment, to avoid being marginalized. That is, the loss from investing and obtaining half the market is less than the loss from being the “inferior” hospital. Because both hospitals know that if they invest the other will follow, neither hospital invests.

5.2. Game theoretic analysis

Because the two hospitals are continually interacting with each other and always have the option to invest in new technologies, the situation described above can be represented using what is known in game theory as an “infinitely repeated game”. The parameters for a simplistic representation of the game are as follows:

- If one or both hospitals make the investment, the resulting new services would generate total revenues of \$15 per year;
- If both hospitals invest they would split the market evenly regardless of who invests first, i.e., each would receive annual new revenues of $\$15/2 = \7.5 ;
- If only one hospital makes the investment, \$5 of existing revenue per year switches to the investing hospital from the non-investing hospital;
- The investment has a fixed, year 1 cost of \$100;
- Investment takes one year, i.e., revenues are not generated until the year after investment; and
- The discount rate is 10% per year.

In this simple example, a single investment of \$100 would result in present value revenue of \$150,³³ implying that the investment would add value and therefore be socially beneficial. However, as we now analyse, this investment is unlikely to happen when there are two hospitals.

³³ The value of a perpetuity is calculated by dividing by the discount rate. In this example $\$15/0.1 = \150 .

To understand why, first consider the situation if one hospital has already invested. In this situation it would be optimal for the other one to invest immediately, since this would involve capex of 100 and would generate annual *incremental* revenue flow of 12.5 (the sum of the hospital's share of revenue from the new service, 7.5 (present value of \$75), and the effect of stopping patients switching to its competitor, 5.0 (present value of \$50)). The NPV from investment in this situation is $125 - 100 = 25$. The reason that the NPV is positive, even though the project's *direct* benefits do not justify the cost, is that investment eliminates the rival hospital's competitive advantage for other services provided by the two hospitals.³⁴

The direct payoff to both hospitals is -25 since they receive revenue with a present value of \$75 yet each pay capex of \$100. In a one shot game the result of these payoffs is what economists call a "prisoner's dilemma" - both firms would be better off not investing, yet both have the incentive to "deviate" and invest to steal business from the other firm.

However, the interaction between the hospitals is not a one shot game. Each hospital will always have the option of investing (whether it be in one technology or multiple technologies), and so in every period the same "game" will occur. There are two sensible equilibria in the infinitely repeated version of this investment game.

In the first one, both hospitals invest immediately (the prisoner's dilemma mentioned above):

- Each hospital incurs capex of 100 immediately and receives revenue of 7.5 per year, starting the following year. The payoff for each firm is -25.
- Neither firm has an incentive to deviate from the strategy of investing immediately. To see this, consider the incentives on SCPN if Aorangi invests immediately. If SCPN invests immediately, it receives the equilibrium payoff of -25. If SCPN does not invest immediately, then from the discussion above we know that it will invest next year, so that it incurs cash flow of 0 this year, a cash flow of -105 next year (as some patients switch to Aorangi), and cash flow of 7.5 per year after that (since no switching occurs). The payoff is -27.27, so that investing immediately (for a payoff of -25) is optimal.

In the second sensible equilibria, neither firm ever invests. To see that this is an equilibrium, consider the situation facing Aorangi:

- If it follows the equilibrium strategy and does not invest, then it receives a perpetual cash flow of 0, for a PV of 0.
- If it deviates from the equilibrium and invests, it knows that SCPN will invest the following year (from the discussion above). Aorangi's cash flow will be -100 this year, $15 + 5 = 20$ next year (since it has the market for the new service to itself and also poaches some of SCPN's customers), and 7.5 each subsequent year (since it shares the market and there is no poaching of patients for other services). The PV is -13.64.

Therefore, Aorangi will not invest.

³⁴ Another way to understand this is to consider that if the hospital does not invest, its payoff is -50, while if it does invest, its payoff is -25. Therefore it should invest.

In one equilibrium, both firms invest immediately for a PV payoff of (-25,-25). In the other equilibrium, neither firm invests for a PV payoff of (0,0). The second equilibrium seems more likely to occur than the first one, given that it benefits both participants. That is, it would be sensible for both firms to not invest initially, believing that this would be the most likely strategy adopted by their competitor.

We note that game theory is often sensitive to the assumed structure of the payoffs. Our purpose here has been to use an economic framework to explain the reported investment behaviour of SCPN and Aorangi. We do not claim that SCPN and Aorangi would necessarily carry out this type of formal analysis themselves, just as we do not expect that firms more generally would explicitly estimate and then equate marginal revenue and marginal cost when they set prices. We do think, however, that the framework we have set out helps to explain what is likely to be the less formal analysis and decision-making that SCPN and Aorangi go through.

5.3. Conclusion

The preceding analysis suggests that the counterfactual is not likely to be dynamically efficient, as investment has and will continue to stagnate.

In contrast, the evidence discussed in sections 2 and 4 of this report suggests that the merged entity is more likely to invest in facilities such as an HDU/ICU, high tech imaging and/or high tech theatres, which will in turn expand the available procedures, and the safety of procedures, in the area. It is noteworthy that these types of investments are being made in the smaller DHB regions by “monopoly” private hospitals,³⁵ implying that pressures for investment exist even without a local rival private hospital.³⁶

Accordingly the merger is likely to be dynamically efficient.

6. Constraints on the Merged Entity's Pricing

The merger would remove one of the constraints on private hospital pricing in the MidCentral DHB region. However, any price increases from the merger are likely to be mitigated by:

- The reduced variable costs in the factual **SCCI&ACI** We would expect at a minimum that half of the variable cost savings would be passed through to consumers;³⁷
- The non-profit nature of **SCHT**. **SCCI**;
- The effect of having surgeons as shareholders. For a surgeon, the private hospital service is a complement to the surgeon's own service, i.e., a rise in the price of the private hospital service would lower the demand for the surgeon's service, all else being equal.

³⁵ We understand that the Tauranga HDU/ICU investment only occurred after the merger of the two private hospitals there.

³⁶ The need to attract surgeons to the region will provide continued pressure on the merged entity to invest in the factual. This is particularly important for Palmerston North, given the average age of surgeons is high. **SCCI**. **ACI**

³⁷ See Hausman, Jerry and Gregory Leonard (1999), “Efficiencies from the consumer viewpoint”, *George Mason Law Review*, Vol 7:3, pp707-727.

Accordingly, surgeons as shareholders would have less incentive to raise private hospital prices than pure investor shareholders;

- Competition for the day stay market is provided by the Broadway Surgical Rooms, the Palms and Caci Clinic;³⁸
- Increasing surgical procedures being undertaken by the MidCentral DHB;³⁹
- The threat of entry by surgeons setting up their own specialist clinics, as has happened in Rotorua and elsewhere.⁴⁰ We understand that the two procedures most susceptible to this in Palmerston North are endoscopy **SCCI&ACI** and ophthalmology **SCCI&ACI**.^{41,42} The reason these procedures are susceptible is that they require lower technical and support standards (e.g. air conditioning) and equipment costs are lower than that necessary for a full hospital.
- The countervailing power of insurance firms, as exercised through Southern Cross Health Insurance's "affiliate provider programme" and the "reasonable charge" scheme implemented by other insurance firms.⁴³

As a consequence, allocative inefficiency detriments are likely to be mitigated.

³⁸ This is discussed further at 17 (b) and (c) of the application.

³⁹ See 10 (b) of the application.

⁴⁰ See 17 (c) of the application for other examples of specialist clinics that have been set up.

⁴¹ These figures are taken from the joint merger model.

⁴² As discussed at 17 (d) of the application, there are other procedures which could easily be undertaken at a specialist clinic.

⁴³ These schemes are described in more detail at 10 (d)-(f) of the application.

NERA

Economic Consulting

NERA Economic Consulting
Level 18
151 Queen Street
PO Box 105 591
Auckland 1143
Tel: +64 9 373 7230
Fax: +64 9 373 7239
www.nera.com