nzier

authoritative analysis

National and regional impact of the National Convention Centre

A general equilibrium evaluation

Report to Sky City Auckland and Ministry of Economic Development

June 2011

About NZIER

NZIER is a specialist consulting firm that uses applied economic research and analysis to provide a wide range of strategic advice to clients in the public and private sectors, throughout New Zealand and Australia, and further afield.

NZIER is also known for its long-established Quarterly Survey of Business Opinion and Quarterly Predictions.

Our aim is to be the premier centre of applied economic research in New Zealand. We pride ourselves on our reputation for independence and delivering quality analysis in the right form, and at the right time, for our clients. We ensure quality through teamwork on individual projects, critical review at internal seminars, and by peer review at various stages through a project by a senior staff member otherwise not involved in the project.

NZIER was established in 1958.

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Executive summary

Objective

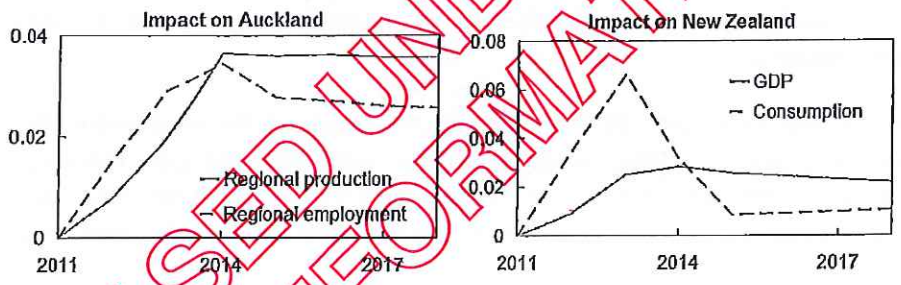
We use a computable general equilibrium model of the New Zealand and Auckland economies to estimate the economic impacts of Sky City Auckland's National Convention Centre (NCC) between 2012 and 2018.

Direct effects

The initial impact upon the economy is generated by the construction of the centre. Construction will generate $240 million of investment and capital creation in the Auckland region between 2012 and 2014. Upon construction, the NCC will draw export revenues of nearly $90 million per year into New Zealand, as well as inducing domestic spending from other regions. Part of that expenditure will be on the NCC's services but the majority will be induced tourism: conference attendees will spend time and money in New Zealand far beyond their conference attendance fees.

Figure 1 Impact on key macroeconomic variables

Cumulative percentage change from baseline



Source: NZIER

Regional effects

The effect upon the Auckland region of the investment phase is marked: employment increases by 0.03% as construction peaks in 2013 with the construction of the NCC. That means an extra 380 jobs in the Auckland region. Gross Regional Product increases by $13 million in 2013 at the peak of construction activity.

Once operational, the NCC will bring in an additional $90 million of visitor expenditure to the Auckland region each year. Of this amount, $72 million will come from overseas delegates, and $18 million from non-Auckland domestic delegates. By 2018 the gross regional product of Auckland has risen by $23 million (0.03%) as a consequence of the NCC's construction and employment has risen again to create a total of 340 extra jobs.

Benefitting greatly is the retail sector as induced tourism boosts demand for their products by 0.12%.

Table 1 Regional and national impacts
Cumulative change from baseline

	New Zealand		Auckland	
	Construction (2013)	Operation (2018)	Construction (2013)	Operation (2018)
Additional delegate spending	-	$90m	-	$90m
GDP	$53m	$47m [1]	$13m	$23m
Private Consumption	$87m	$14m		
Employment	120 FTEs	18 FTEs	380 FTEs	340 FTEs
Real wage	0.02%	0.05%		

Note: (1) The average increase in GDP across the first 5 years of operation is $49 million.

Source: NZIER

National effects

At the national level, the impacts are smaller because there are some offsetting effects for non-tourism export industries due to a higher exchange rate and less capital accumulation.

In total, national GDP rises by $53 million at the height of the construction and employment grows by 0.03%, which creates an additional 120 jobs nationally. However, the investment in the NCC prevents investment that would otherwise have occurred in other sectors; consequently, they grow more slowly than might have been expected.

In addition to generating business for local service providers the increased tourism causes the New Zealand currency to appreciate, which makes our non-tourism exports less competitive overseas. The dairy industry, for instance, contracts by 0.02% by 2018. Nonetheless, greater tourism sees our overall export volumes rise by 0.06% overall by 2018.

Over time the impact on employment subsides as real wages rise to meet the additional demand for labour but, by 2018, wages are 0.05% higher than they would otherwise have been without the construction of the NCC. Output has risen similarly and GDP in 2018 is 0.02% greater than current forecasts. That is equivalent to an extra $47 million of GDP in 2018. The difference between the additional export revenue of $90 million and the GDP figure is due to the lost investment in other sectors retarding their growth and the loss of exports as a consequence of the currency's appreciation.

The extra income created by the additional tourism allows households to consume $14 million more goods and services by 2018. These benefits are primarily due to the extra income generated by the induced tourism from the NCC. There is also a short

term spike in consumption around 2013 as borrowing to fund the construction phase of the NCC puts more money in the pockets of those in the construction industry.

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1. Purpose of report

Sky City Auckland Limited and the Ministry of Economic Development have engaged NZIER to estimate the national and regional economic impacts of building and operating a National Convention Centre (NCC) in Auckland. Construction of the NCC is expected to commence in 2012, take three years to complete and is projected to cost $241 million.[1]

When fully operational, it is expected to host an *additional*:

- 31 multi-day conferences (one of which has been 'cannibalised' from Christchurch)
- 31 banquets
- 26 cocktail events
- 5 public exhibitions
- 6 trade exhibitions.

each year.

These events will draw in visitors from overseas and elsewhere in New Zealand, which will boost regional and national tourism spending.

We use our dynamic computable general equilibrium (CGE) model of the New Zealand economy and its regions to estimate the economic impact of NCC out to 2018.

2. Modelling approach

2.1 Conceptual framework

The NCC will create economic opportunities for the regional and national economy. During its construction phase, it will support the local construction sector and draw in materials from other sectors of the New Zealand economy.

When the NCC is operational, it will attract new visitors to New Zealand from overseas, who are likely to stay on beyond the duration of the event they are attending and thus contribute to tourism spending. International delegates often tend to bring their partners to accompany them, further lifting tourism expenditure. In addition, the new events will draw in visitors from other parts of New Zealand, boosting the Auckland regional economy.

The initial or 'direct' injections of construction and tourism expenditures have flow-on effects that filter through the national and regional economies. For example, as

[1] Source: Sky City. This figure excludes land purchase costs, funding costs, fees, contingency and escalation.

international visitors demand more accommodation, this also pushes up the demand for the food and drink required to sustain them, laundry services, transport, etc. The additional demand for workers in these downstream industries pushes up their wages, which allows them to spend more on goods and services. This has further flow-on or multiplier effects.

At the same time, the boost to construction and tourism has some offsetting effects on other sectors that also need to be taken into account. For example, the increase in tourism exports from additional international attendees pushes up the exchange rate. This makes non-tourism exports less competitive and thus leads to these sectors experiencing slower export growth. In the construction phase, the additional capital being pumped into the convention centre is no longer available to be used by other sectors, which reduces their potential growth.

All of these positive and negative direct and flow-on impacts need to be evaluated when considering the overall economic impact of the NCC. To estimate the size of these impacts in a robust way, we use a CGE model of the New Zealand economy, which also has a regional component so that we can identify the Auckland-specific outcomes.

2.2 Why CGE modelling?

Our dynamic CGE model is a more robust framework than alternative approaches for estimating the contribution of NCC to the New Zealand and Auckland economies. The most commonly used alternative is input-output (IO) or 'multiplier' analysis.

IO or multiplier analysis has two significant limitations:

- **It does not adequately consider the reallocation of resources** following a 'shock' to the economy, such as a surge in demand for tourism exports. In particular, multiplier analysis assumes that resources (land, labour, capital, energy, intermediate inputs) are available in unlimited quantities for the expansion of a sector. It does not consider how those resources might otherwise have been used in the economy – their opportunity cost.

  In reality, resources *are* scarce and any additional resources used in the construction or tourism sector must be diverted from other industries. The output of these other industries must therefore fall. The overall macroeconomic impact of the increase in demand in one sector should take into account these losses elsewhere in the economy.

- **It does not account for relative price changes**. For example, it assumes that wage rates do not change as the demand for labour rises or falls, and that the prices of intermediate goods such as transport and business services do not change in response to shifts in demand.

  In reality, if there is additional demand for workers in the construction or tourism sectors, this will place upward pressure on wages across the economy. Even though this wage pressure might be relatively small, it will still have a negative impact on input costs for other firms in the economy, and could lead to a drop in

output. A similar story is true for intermediate inputs. As the construction and/or tourism sectors demand more of these inputs, their price rises for all other firms in the economy, causing output to fall.

Multiplier analysis therefore tends to vastly overstate the economic impacts of changes in demand in a specific sector. These unrealistically large impacts are thus not particularly informative for policy makers.

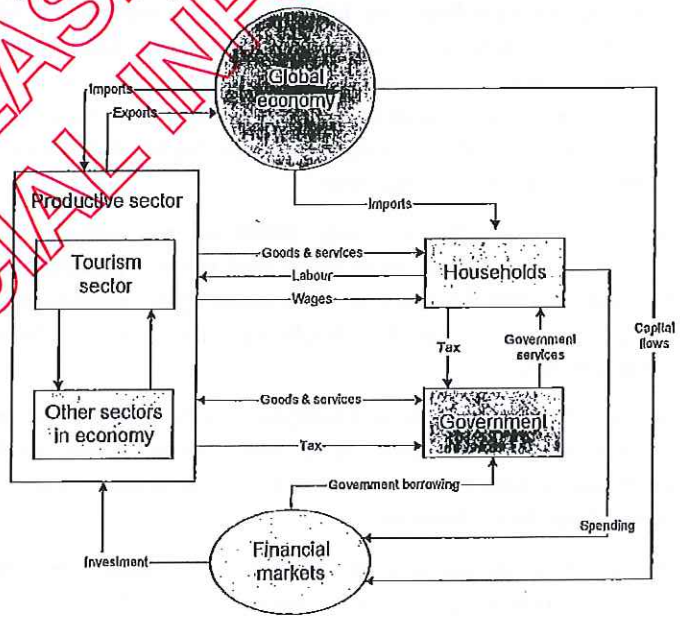
CGE models explicitly address both resource allocation and relative price shifts, allowing for a more credible, richer analysis of economic contribution. These models tend to produce more conservative estimates of economic impact, but are more consistent with economic theory and practice.

2.3 The MONASH-NZ CGE model

The MONASH-NZ dynamic CGE model contains information on 131 industries and 210 commodities in its basic form. CGE modelling is a highly-respected and well-developed technique that has a rich history for assessing policy, regional and industry questions.

Our model was developed in close collaboration with Monash University, a global leader in building and applying CGE models. It captures the various inter-linkages between these sectors, as well as their links to households (via the labour market), the government sector, capital markets and the global economy (via imports and exports). A visual representation is shown in Figure 2 highlighting the complex and multidirectional relationships between the various parts of an economy.

Figure 2 Components of a CGE model



Source: NZIER

More technical detail on the model is presented in Appendix A.

2.4 How do we model the impacts of NCC?

To calculate the economic impact of NCC, we go through the following steps.

1. **Determine baseline scenario** – this is what the New Zealand economy would look like between now and 2018 if the NCC was *not* constructed. To develop our baseline scenario, we use economic forecasts from NZIER's *Quarterly Predictions* publication. In the baseline, the economy is in equilibrium, with all resources fully employed for a given price.[2]

2. **Determine 'shocks' from NCC** – using data from Sky City and Horwath, we calculate the direct effects of the construction and operation phases of the NCC. These 'shocks' are used to knock the economy from its baseline path.

3. **Model NCC scenario** – after the model is shocked, it then readjusts in all 131 sectors and factor markets. We can then compare GDP, employment, wages, exports, household spending, etc, in this scenario with those from the baseline. The difference in the two is the economic impact of NCC.

2.5 The tourism sector

There is no specific 'tourism' sector in the economy but there are many industries that tourists tend to frequent. In order to represent an increase in tourism in our model we increase the export demand for those industries. The 'tourism' industries were selected by examining Statistics New Zealand's Tourism Satellite Accounts and generating a concordance between that data and our CGE database.

The industries considered a significant part of tourism expenditure in this simulation are the accommodation and meal services industries, passenger transportation, retail sales, sport and recreation industries and a few others related to common tourist destinations. In addition we use the accommodation sector to represent the conference centre industry. The cost and sales profile of national accommodation services is similar to that of the NCC so it seems to be an appropriate match.

3. Modelling scenario

There are two parts to the shocks that we impose on the model. First, we model the construction of the NCC and, secondly, we model the effect of its ongoing operation.

3.1 Construction shock

The initial impact of the NCC is the effect of its construction on the local economy. Construction is modelled through an increase in investment in the accommodation industry, which is our proxy for conference centres. The implicit assumption made in

[2] As a result of this assumption, we cannot take into account seasonality or spare capacity in the tourism and construction sectors.

modelling it this way is that there is presently no excess demand for convention centres in New Zealand at current prices. If there are presently significant capacity constraints in the industry and steadily increasing prices then this may not be a reasonable assumption. In that case our modelling will underestimate the total impact of construction.

Using information from Sky City Auckland, we apportioned the $241 million construction cost (excluding fees, contingency and escalation) across 2012 ($65 million), 2013 ($122 million) and 2014 ($54 million). That investment increases the supply of convention facilities in NZ and reduces the overall, average price of New Zealand convention services. That does not imply that the NCC's prices fall but merely that its construction increases the competitive pressure on other conference facilities throughout the con8ntry. The subsequent increase in the number of people using such facilities triggers an increase in tourism as conference attendees from overseas spend money during their stay in New Zealand. Thus, there is an increase in expenditure on conference facilities induced by the construction of the NCC.

3.2 Tourism shock

We had to consider two shocks to model the expenditure impact of the additional visitors drawn to Auckland and New Zealand once the NCC is fully operating from 2015.[3] We consider only the additional events that NCC hosts.

1. For the national level analysis, the only 'new' expenditure generated by NCC is from overseas delegates (and their partners for longer events) to events that would not otherwise have happened in New Zealand.

   Any expenditure by New Zealand delegates to NCC events is assumed to be non-additional from a New Zealand Inc perspective: it would otherwise have happened at convention centres in other parts of the country, been saved or spent on other goods and services. Similarly, we ignore expenditure related to events that would have occurred elsewhere in New Zealand if the NCC had not been built, save for shifting their spending to the Auckland region.

2. For the Auckland level analysis, we assume that all of these additional events at NCC are 'new' to Auckland.[4] So in addition to these international delegates, we are also concerned with the expenditure from domestic delegates outside of Auckland. We do not count spending by Auckland delegates as additional.

See Appendix B for a summary of events and expenditure assumptions. These were provided by Horwath HTL Limited.

A summary of the tourism shocks for the national level analysis is shown in Table 2. The total amount of new international spending amounts to $90 million per year.

[3] We assume that NCC operates at 50% capacity in 2014, and pro-rata the new expenditure accordingly.

[4] That is, the events are not transferred from other parts of Auckland.

Table 2 National level tourism shocks

Additional tourism expenditure per year

	Value of new international spending	Value spent in Auckland	Value spent Rest of NZ
Mulliday	$ 84,246,852	$ 60,345,238	$ 23,901,614
Banquets	$ 2,877,750	$ 2,877,750	$ -
Day meetings	All transferred from elsewhere in New Zealand		
Cocktails	All domestic attendees		
Concerts	All domestic attendees		
Public exhibitions - attendees	All domestic attendees		
Public exhibitions - exhibitors	$ 304,969	$ 194,063	$ 110,906
Trade exhibitions - attendees	$ 2,424,944	$ 1,209,563	$ 1,215,381
Trade exhibitions - exhibitors	$ 83,188	$ 54,313	$ 28,875
TOTAL NEW SPEND	$ 89,937,701	$ 64,680,925	$ 25,256,776

Source: NZIER, Horwath HTL Limited

A summary of the Auckland regional tourism shocks is presented in Table 3. The injection of new tourism spending to the Auckland economy is also $90 million per year.

Table 3 Regional level tourism shocks

Additional tourism expenditure per year

	Value of new international spending for Akld region	Value of new domestic spending for Akld region	Value of new total spending for Akld region
Mulliday	$ 67,847,581	$ 7,938,081	$ 75,785,663
Banquets	$ 2,892,375	$ 2,410,313	$ 5,302,688
Day meetings	$ -	$ -	$ -
Cocktails	$ -	$ 246,048	$ 246,048
Concerts	$ -	$ -	$ -
Public exhibitions - attendees	$ -	$ 2,559,210	$ 2,559,210
Public exhibitions - exhibitors	$ 194,063	$ 1,917,000	$ 2,111,063
Trade exhibitions - attendees	$ 1,209,563	$ 1,189,795	$ 2,399,357
Trade exhibitions - exhibitors	$ 54,313	$ 1,254,988	$ 1,309,300
TOTAL NEW SPEND	$72,197,894	$17,515,433	$ 89,713,327

Source: NZIER, Horwath HTL Limited

We estimate that 25% of the additional expenditure is due directly to expenditure on the conference, while the remaining 75% is general expenditure while the conference attendee is in the country.[5] That 75% includes all spending during and surrounding the conference period that is not directly collected by the venue.

4. Interpreting the results

4.1.1 Change from baseline

The CGE technique used by NZIER calculates impacts as changes from a baseline level. That baseline level is projected to 2018 using NZIER's *Quarterly Predictions* macroeconomic forecasts. Results are then reported as percentage changes from the baseline forecast. Where dollar values are reported they are calculated using the forecast future value of the variable; changes in forecasts will affect those dollar values. We report effects at 2018, which is the final year of our simulation. The choice of the final year is arbitrary but, the further out the projections, the less accurate they become.

When considering the magnitude of the impacts it should be remembered that the construction of the NCC, while a major investment, is small relative to the size of the national economy. With the national economy forecast to approach $250 billion by 2018, and the Auckland economy being about a quarter of that, the entire $240 million cost of construction is less than 0.1% of a year's GDP. Given that, the estimated impacts of the NCC on national and regional output are far from insignificant.

4.1.2 Direct and indirect effects

In analysing the modelling results we track the impacts as they flow through the economy, beginning with the direct impacts on the conference sector itself. We then analyse the flow-on or indirect impacts. It can aid understanding to split indirect impacts into the following categories:

- **Supplying industries** – industries that supply the tourism sector with intermediate inputs are likely to benefit. Such industries include meal services providers, and business service industries.
- **Household expenditure industries** – industries that households spend money on are likely to benefit from increased income that comes through employment and wages, and increased returns to capital from a growing tourism industry. Such industries include housing and real estate (which takes a large share of households' budgets), and those for consumption goods like the retail trade.
- **Investment related industries** – industries that are used for investment when the conference services industry expands. Typically these revolve around business construction sectors and office related capital.

[5] Calculated from data provided by Horwath.

- **Competing export industries** – industries that suffer from the tourism industry's growth as they compete for resources, which are now more expensive, and also face a stronger New Zealand dollar. Typically these industries are the labour intensive export industries such as horticulture and manufacturing.

4.1.3 Macroeconomic effects

The national results flow logically from the direct and indirect impacts. We focus on key macroeconomic variables such as employment and Gross Domestic Product (GDP), as well as consumption, which is a measure of economic welfare (how 'well off' we are).

The scenarios will have differing impacts on GDP and consumption, and not always in the same direction. GDP is essentially a measure of how many goods and services New Zealand produces – it shows the size of the economy. Consumption shows how much household spending increases following a change in the economy. It is more appropriate than GDP as a measure of welfare.[6]

The effect on the Auckland region is a microcosm of the national results and, similarly, we report changes in gross regional product (GRP) and employment.

5. Impact of the NCC

5.1 Direct effects

5.1.1 Construction

The initial impact upon the economy is generated by the construction of the centre. Construction will generate $241 million of investment and capital creation in the Auckland region between 2012 and 2014. Much of that will flow out to the rest of the economy as resources are drawn in from across the nation by the NCC's construction needs.

5.1.2 Tourism

Upon construction, the NCC will draw export revenues of over $90 million per year into New Zealand. Part of that expenditure will be on the NCC's services but the majority will be induced tourism: conference attendees will spend time and money in New Zealand far beyond their conference attendance fees. Much of that extra expenditure will remain in Auckland as attendees spend their time in hotels and cafes within the city.

[6] W. Coleman, "Gauging Economic Performance Under Changing Terms of Trade: Real Gross Domestic Income Or Real Gross Domestic Product?," *Economic Papers: A journal of applied economics and policy* 27, no. 4 (2008): 329–342.

5.2 Indirect effects

The construction of the NCC has flow-on effects on numerous other industries. Initially, it generates revenue for construction industries and those that supply building materials. That can be seen by the 0.20% rise in construction in 2013, which then tails off as the NCC becomes operational.

As the NCC commences operations it demands more intermediate inputs and the supplying industries increase their output. Alcohol and financial services, for example, grow by 0.20% and 0.01% respectively by 2018 (see Table 4).

The increased incomes of people working in those sectors drive higher private consumption spending. In our simulation the retail sector grows by 0.12% nationally as households' discretionary income rises. Note that increased output in the retail sector is also motivated by the increase in tourism spending. As an industry with significant exposure to tourism spending it benefits the most of any of the industries listed in Table 4.

Table 4 Indirect impacts in 2013 and 2018
Cumulative percentage change in value added from baseline, selected industries

Industry	Type	Impact	
		Construction	Operation
Tobacco and alcohol	Supplying	0.05%	0.20%
Financial services	Supplying	0.02%	0.01%
Retail	Household expenditure	0.03%	0.12%
Construction	Investment	0.20%	0.00%
Horticulture	Competing export	- 0.16%	- 0.09%
Textiles	Competing export	- 0.08%	- 0.09%

Source: NZIER

However, not all industries benefit from the wealth generated by increased tourism exports. The increased export value causes an appreciation in the exchange rate that hurts others exporters. Horticulture and textiles, which are competing export industries, suffer particularly. As Table 4 shows, they are worse off than in the baseline after the NCC is built.

5.3 Macroeconomic effects

5.3.1 Impact on Auckland region

The results show that the greatest impact on the Auckland region is generated by the operation of the NCC. As operation ramps up in 2014-15 employment and production in the region increases greatly.

As Figure 3 shows, both measures increase by around 0.03% and remain at that level for the remainder of the simulation. That is because Auckland has not only drawn in tourists from overseas but also attracted conferences from other domestic centres. Consequently, many of the national costs that are discussed in the next section are dampened in Auckland by the influx of tourism form other domestic regions, particularly Christchurch.

The effect upon the Auckland region of the investment phase is less significant, although stil noticeable: employment increases by 0.03% as construction peaks in 2013-14. That means an extra 380 jobs in the Auckland region even before the NCC's commencement of operations.

Figure 3 Impact on Auckland region
Cumulative percentage change from baseline

Source: NZIER

By 2018 the gross regional product of Auckland has risen by $23 million (0.03%) as a consequence of the NCC's construction and operation, as shown in Table 5.

Table 5 Regional impacts in 2013 and 2018
Cumulative change from baseline

	Construction (2013)		Operation (2018)	
	Percentage change	Real value change	Percentage change	Real value change
GDP	0.02%	$13m	0.03%	$23m
Employment	0.03%	380 FTEs	0.02%	340 FTEs

Source: NZIER

5.3.2 National impact

The effect upon the nation is slightly more complex than the effect upon the local, Auckland economy. Initially the construction of the NCC generates work for the construction sectors and draws in resources from across the nation. National GDP

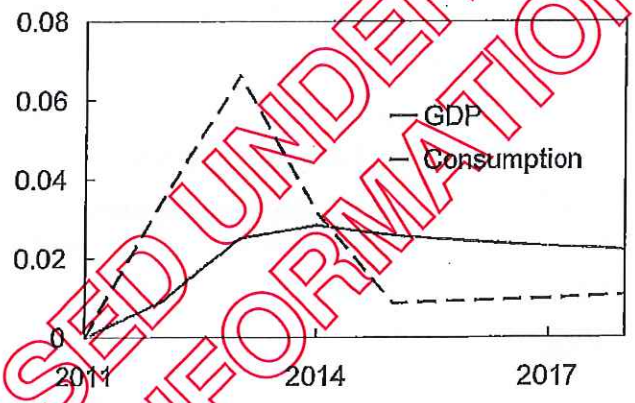
rises by $53 million at the height of the construction and employment grows by 0.03%. That creates an additional 120 jobs nationally at the peak of construction.

However, the investment in the NCC prevents investment that would otherwise have occurred in other sectors; consequently, they grow more slowly than might have been expected. This effect occurs irrespective of whether the NCC's construction is funded via borrowing or equity: in either case the investment crowds out other projects by drawing funds from capital markets.

On the other hand, industries such as the retail industry benefit from the demand created by conference participants and that adds to the growth of the sector. By 2018, the retail industry has grown by 0.12% nationally in response to the greater tourism and increased number of conventions in New Zealand.

Figure 4 Impact on GDP and household consumption

Cumulative percentage change from baseline



Source: NZIER

In addition to generating business for local service providers the increased tourism causes the New Zealand currency to appreciate, which makes our non-tourism exports less competitive overseas. The dairy industry, for instance, contracts by 0.02% by 2018. Nonetheless, the increase in tourism sees our overall export volumes rise by 0.06% overall by 2018 (see Table 6).

Table 6 National impacts in 2013 and 2018
Cumulative change from baseline

	Construction (2013)		Operation (2018)	
	Percentage change	Real value change	Percentage change	Real value change
GDP	0.02%	$53m	0.02%	$47m
Private Consumption	0.07%	$87m	0.01%	$14m
Exports (volume)	-0.14%		0.06%	
Imports (volume)	0.15%		0.03%	
Employment	0.03%	120 FTEs	0.00%	18 FTEs
Real wage	0.02%		0.05%	

Source: NZIER

Over time the impact on employment subsides as real wages rise to meet the additional demand for labour and, by 2018, wages are 0.05% higher than they would otherwise have been without the construction of the NCC.

When interpreting the employment figures note that, in our modelling, we assume 'sticky wages'. That means we assume employment tends back towards the long run growth path following a shock while wages adjust to compensate. Consequently, the long run impact on employment is negligible whereas, in the short run, wages are slow to adjust. That there is no long run impact upon aggregate employment does not mean that the construction and operation of the NCC have no effect upon the labour market. Indeed, there will be jobs created at the NCC and wages across the nation rise permanently as a consequence of the NCC's construction. However, the jobs created by the NCC are, in the long run, lost by other firms as labour becomes more expensive.

Output has risen similarly and GDP in 2018 is 0.02% ($47 million) higher than current forecasts.[7] Averaged across its first 5 years of operation, national GDP is estimated to be an average of $49 million higher. The medium term rise in GDP is attributable almost entirely to the increase in tourism attributable to the NCC.

The extra income created by the export rise allows households to spend more and, by 2018, household consumption has risen by $14 million over current forecasts. These benefits are primarily due to the extra income generated by the induced tourism from the NCC. There is also a short term spike in consumption as borrowing to fund the construction phase of the NCC puts more money in the pockets of those in the construction industry.

[7] The difference between the additional tourism export revenue of $90 million and the GDP figure can be explained partly via the offsetting effects due to the increased demand pushing up resource costs and dampening growth in other industries. The remainder of the difference can be attributed to the lost investment in other sectors, which permanently depresses their growth path below baseline.

Finally, it is important to mention the assumptions we have made about construction and capital creation. We have assumed that investment can be funded from overseas borrowing. In total, New Zealanders have borrowed an extra $300 million from overseas by 2018 in our simulation, which imposes an increased interest burden of $24 million per annum. While interest repayments are decreased by the currency appreciation, there is an increased stock of debt to service and repay. That must be balanced against the increased GDP and consumption, which is partially funded by the additional borrowing.

6. Conclusions

Our modelling demonstrates that the NCC will have an important impact on the Auckland regional and New Zealand economies. The additional activity generated by the construction of the centre will boost regional employment and deliver spillover benefits to supplying sectors in other parts of the New Zealand economy.

The NCC's events will then attract new visitors to Auckland, both from within New Zealand and – more importantly from a New Zealand Inc perspective – from overseas. These visitors' expenditure, both at NCC events in Auckland, and before and after in other parts of the country, will boost national GDP by an average of $49 million per year for the next five years.

Appendix A CGE modelling framework

A.1 MONASH-NZ

Our results were produced on a model of the New Zealand economy based on a tried and tested generic model (MONASH) that has been found effective for policy analysis in Australia and around the world. The model has been calibrated to the local setting and loaded with New Zealand data. The assumptions needed are based on consultation with industry specialists and reflect best practice.

The model has been developed with considerable assistance from CGE modelling experts at the Centre of Policy Studies at Monash University in Melbourne Australia.

A.2 Database structure

The model is based on a large database containing the value flows of the economy. The database defines the initial structure of the economy, which by definition is assumed to be in equilibrium in all markets. The structure of the database is similar to traditional input-output tables; for example commodities may be used as intermediate input for further production, utilised in investment, exported or consumed by households and the government. Industry costs include the cost of intermediates, margins, taxes and primary factor costs for labour, land and capital. As per the accounting identities in input-output tables, the total value sum of producers' input costs (including margins, taxes, returns to factors and other costs) equates to the total value of output production (the 'MAKE' matrix in the database).

The MONASH-NZ model consists of:

- 131 industries
- 210 commodities
- 1 household

The database has been sourced initially from Statistics New Zealand 1995/96 Inter-Industry tables, updated using the subsequently released 2003 Supply and Use tables, and finally 'up-scaled' to 2007 levels using latest Statistics New Zealand macroeconomic data.

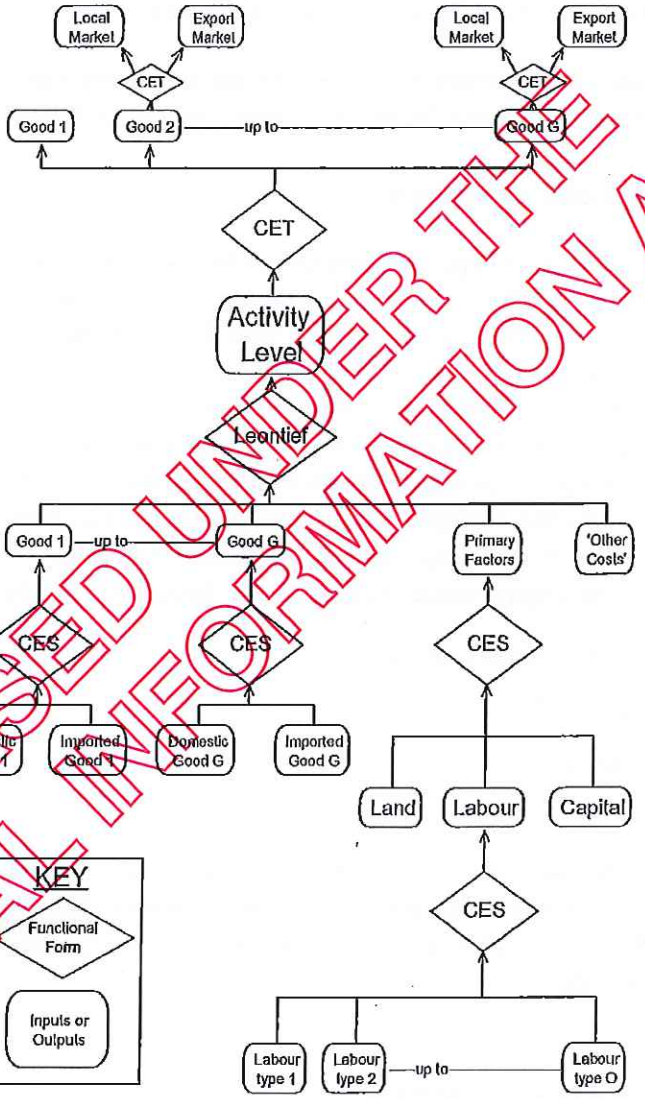
A.3 Production structure

The production structure of the model is presented in Figure 5.[8] Each industry can produce a number of different commodities. Production inputs are intermediate commodities, both domestic and imported, and primary factors labour, land and

[8] Mark Horridge, Monash University. Centre of Policy Studies, and IMPACT Project (Australia), *ORANI-G: A General Equilibrium Model of the Australian Economy* (Centre of Policy Studies, 2000).

capital. Working from bottom to top, we see constant elasticity of substitution (CES) production nests for occupations, primary factors and the choice between imported and domestic commodities. In this case, an increase in price moves sourcing towards another input, for example, if the price of imports increases, more domestic commodities are demanded in the intermediate sourcing CES nest.

Figure 5 Production structure



Source: Horridge, 2000

At the activity level, intermediate goods, primary factors and other costs are combined using a Leontief production function. This means the proportion of production inputs does not change. On the output side, there are two further

constant elasticity of transformation (CET)[9] nests. The production mix of each industry is dependent on the relative prices of each commodity. Similarly, the export nest determines local and export market shares depending on relative prices.

[9] A CET function is identical to a CES function except that the transformation parameter has the opposite sign (i.e. increasing price increases output in a CET; in a CES, increasing price reduces demand).

Appendix B

(withheld in its entirety pursuant to section (9)(2)(b)(ii) of the Official Information Act 1982)

The following documents, referred to in this report, are withheld in their entirety pursuant to section (9)(2)(b)(ii) of the Official Information Act 1982:

1. Horwath HTL: *Proposed National Convention Centre – Market Update*, 15 April 2011
2. Horwath HTL: *Proposed National Convention Centre – Delegate/Attendee Expenditure Analysis*, 26 May 2011
3. Horwath HTL: Letter to SKYCITY Entertainment Group Ltd re *Proposed National Convention centre – further conference analysis*, 3 June 2011
4. Horwath HTL: Letter to SKYCITY Entertainment Group Ltd re *National Convention centre – incremental demand summary*, 8 June 2011