Airfreight Forecasting

Presentation to Ministry of Transport

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By

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Purpose of the Research

• Airfreight is component of freight transport task
• Although volumes are relatively small the values are high
• MoT therefore wishes to understand the sector.
  • Forecasts to complement those produced recently for air passenger forecasts to provide complete picture
Nature of airfreight

• Airfreight carried in a mixture of bellyhold capacity and dedicated freighters
• As belly hold capacity competing with passenger demands
  • Passengers have priority and requirements may not be known much in advance
• Also climatic conditions may affect the capacity for freight
• General uncertainty about capacity offered at any particular time
• Differentiated pricing structure
• Freighters supply more constant capacity but only part of market
• But airfreight often used for demands arising in short term
• Need to balance uncertain demands with uncertain capacity.
• Impact of different plane types over longer term
Dedicated Freight Services

- Capacity on passenger services supplemented by dedicated freighter services
  - SIA as part of loop through Australia in both directions
  - Qantas as loop mainly Sydney/Auckland/Christchurch /Sydney but with weekly route via Cairns to Hong Kong
  - Tasman Air Cargo Auckland/Sydney (mainly for DHL but with space available for other cargoes)
- Because mainly operate in loops capacity available on any particular route segment again uncertain
Value and tonnes

• Airfreight currently about 17 per cent of international trade by value
  • 14 per cent of exports and 21 per cent of imports
• But only very small volumes
  • About 200,000 tonnes or 0.35 per cent of total volume of trade roughly balanced by direction
• Value per tonne high
  • Exports $64,000 v $1,200 seafreight
  • Imports $106,000 v $1,800 seafreight
• In tonnage terms volumes to or from NZ fairly flat from early 2000’s
• Declining proportion of total volumes although broadly fixed proportion of value
Comparison with international trends

- Growth in NZ similar to overall international position up to early 1990’s
- International traffic continued to increase
- NZ broadly static
Charges

- Airfreight competes with passengers for space
- But revenues per kg from passengers probably about 2.5 – 3.5 times higher than for airfreight
- Also competes with sea freight
- Although rates for both are very volatile, costs of airfreight may be 15-25 times higher than the costs for sea freight
- Differences define and constrain the market for airfreight
By airport

- Airfreight very much concentrated through Auckland
  - 94 per cent of imports
  - 79 per cent of exports
- Christchurch only other airport with significant volume
- Increasing concentration over time
  - reduction in freight flows through other airports particularly Wellington
Commodity distribution - Exports

• Exports of airfreight dominated by basic commodities
  • Fish, meat and fruit and vegetables
  • Some are very specific in terms of markets and seasons
    • Pimentos to Japan
    • Sour cherries to SE Asia

• Manufactured and other goods less than half the total
Commodity Distribution - Imports

• Imports display a wider spread of commodities
• High proportion of manufactured items
• Average value much higher than for exports
AKL exports - commodities, seasonality

- 84,722t (81% all NZ airfreight)
- Fish 16%, vegetables 12% fruit 9% dairy 7%, meat 7%
- 41% to Australia, 14% to China, 10% to Japan
- Focussed in the summer months; meat, fruit, fish sharply peaked
- Value: $5,140m (77% all NZ airfreight)
- Value per tonne: $60,661
Auckland: Export seasonality by destination

![Graph showing Auckland's export seasonality by destination. The graph plots tonnages per month from January to December for total exports and exports to specific destinations (Aus, China, Japan, US, SE Asia, WE). The data shows a seasonal pattern with spikes in some months.]
CHC exports - commodities, seasonality

• 18,954t (18% of all NZ airfreight)
• Fish 32%, meat 20%, fruit 10%. dairy 6%, machinery 6%
• 37% to Australia, 11% to W Europe, 10% to China. N America, UK
• Summer peak; meat to UK, W Eur; Australia main market - flat
• Value: $1,541m (23% NZ airfreight)
• Value per tonne: $81,293
  • Jet engines 34% of value
Christchurch: Export seasonality by destination

Air freight exports per month (tonnes)

- Total
- Aus
- WE
- China
- US
- UK
- SEA
Imports: Commodities, seasonality: both airports.

- AKL dominates – 88,292 t (92% NZ airfreight). CHC 7,113t (7%)
  - Much lower volume than exports for CHC – not a constraint.
- Machinery/electrical main comm: AKL 30%, CHC 31%
  - Computers
- Clothing 7% AKL, 8% CHC
- Australia and China main origins (23% each) AKL
- Same CHC – 23% & 22%; Western Europe 21%
- Broadly even March-December, lower Jan -Feb
- Value: AKL $9186m CIF; CHC $595m
- Value per tonne: AKL $104,039; CHC $83,680
Understanding capacity

• Need to understand whether lack of capacity is constraining demand

• Most freight is carried in bellyholds of passenger aircraft

• Passenger flight numbers only slight growth last ten years
  • Bigger aircraft though
  • But not always have higher freight capacity

• Passenger numbers increased and load factor too.

• Freight availability depends on passenger demands (and operational issues)

• Analysis on monthly basis which may not reveal short-term issues
Explanation of capacity methodology

• Two approaches: payload capacity and nominal capacity

• Payload: max payload less weight of pax and baggage (110kg), and then scaled by 75% to allow for low density products and difficulty of matching supply and demand for each flight.
  • Changes with pax load factor.

• Passenger numbers, seat capacity & aircraft type data from Sabre.
• Nominal: as per typical airline cargo allowance figures
• Some airlines use max payload as cargo capacity, others use the nominal allowance.

• Analysis of each AKL and CHC origin/dest by month and aircraft type.
• Nominal about two thirds of payload approach.
• Compared with actual export tonnages by month
<table>
<thead>
<tr>
<th>Aircraft type</th>
<th>Max Payload (t)</th>
<th>Typical nominal freight capacity (t)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Boeing:</strong></td>
<td></td>
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</tr>
<tr>
<td>B737 -700</td>
<td>17.0</td>
<td>1.5</td>
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<tr>
<td>B737-800</td>
<td>21.3</td>
<td>2</td>
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<td>B747-400</td>
<td>63.9</td>
<td>14.1</td>
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<td>B767-300</td>
<td>41.6</td>
<td>13</td>
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<tr>
<td>B777 -200</td>
<td>54.92</td>
<td>14</td>
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<tr>
<td>B777-300</td>
<td>64.0</td>
<td>23</td>
</tr>
<tr>
<td>B787 -800</td>
<td>43.3</td>
<td>14.3</td>
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<tr>
<td><strong>Airbus:</strong></td>
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<td></td>
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<tr>
<td>A320</td>
<td>16.6</td>
<td>2</td>
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<tr>
<td>A330-300</td>
<td>45.9</td>
<td>17</td>
</tr>
<tr>
<td>A340-300</td>
<td>30.8</td>
<td>9.2</td>
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<td>A380-800</td>
<td>66.4</td>
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</table>

<table>
<thead>
<tr>
<th>Month</th>
<th>From Auckland</th>
<th></th>
<th></th>
<th>To Auckland</th>
<th></th>
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<th></th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Actual pax load (t)</td>
<td>Payload capacity (t)</td>
<td>Capacity available for freight (t)</td>
<td>Exports to all destinations (t)</td>
<td>Nominal capacity</td>
<td>Actual pax load (t)</td>
<td>Payload capacity (t)</td>
<td>Capacity available for freight (t)</td>
<td>Imports from all origins (t)</td>
</tr>
<tr>
<td>Jan</td>
<td>41,295</td>
<td>74,439</td>
<td>24,858</td>
<td>8,106</td>
<td>17,641</td>
<td>42,268</td>
<td>74,314</td>
<td>30,565</td>
<td>6,089</td>
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<tr>
<td>Feb</td>
<td>34,936</td>
<td>62,602</td>
<td>20,750</td>
<td>7,785</td>
<td>14,782</td>
<td>35,737</td>
<td>62,441</td>
<td>25,910</td>
<td>5,773</td>
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<tr>
<td>Mar</td>
<td>36,765</td>
<td>66,309</td>
<td>22,158</td>
<td>8,352</td>
<td>15,493</td>
<td>33,997</td>
<td>66,309</td>
<td>29,964</td>
<td>7,110</td>
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<td>Apr</td>
<td>36,655</td>
<td>64,925</td>
<td>21,203</td>
<td>6,668</td>
<td>14,816</td>
<td>33,070</td>
<td>64,925</td>
<td>29,935</td>
<td>6,734</td>
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<td>May</td>
<td>33,388</td>
<td>62,922</td>
<td>22,151</td>
<td>6,235</td>
<td>14,753</td>
<td>31,818</td>
<td>62,922</td>
<td>28,803</td>
<td>7,396</td>
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<td>Jun</td>
<td>32,451</td>
<td>63,250</td>
<td>23,099</td>
<td>5,890</td>
<td>14,734</td>
<td>31,834</td>
<td>63,250</td>
<td>28,914</td>
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<td>Jul</td>
<td>36,244</td>
<td>69,734</td>
<td>25,118</td>
<td>6,235</td>
<td>16,530</td>
<td>36,871</td>
<td>69,734</td>
<td>30,246</td>
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<tr>
<td>Aug</td>
<td>34,801</td>
<td>67,134</td>
<td>24,250</td>
<td>5,680</td>
<td>15,869</td>
<td>34,550</td>
<td>67,134</td>
<td>29,711</td>
<td>7,679</td>
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<tr>
<td>Sep</td>
<td>34,885</td>
<td>64,885</td>
<td>22,500</td>
<td>5,737</td>
<td>15,415</td>
<td>35,328</td>
<td>64,885</td>
<td>27,706</td>
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<td>Oct</td>
<td>36,272</td>
<td>67,919</td>
<td>23,735</td>
<td>6,935</td>
<td>16,350</td>
<td>39,547</td>
<td>67,919</td>
<td>28,041</td>
<td>8,385</td>
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<tr>
<td>Nov</td>
<td>35,995</td>
<td>63,654</td>
<td>20,744</td>
<td>8,618</td>
<td>15,529</td>
<td>37,296</td>
<td>63,654</td>
<td>26,463</td>
<td>8,137</td>
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<tr>
<td>Dec</td>
<td>41,339</td>
<td>75,274</td>
<td>25,452</td>
<td>8,480</td>
<td>18,252</td>
<td>43,283</td>
<td>75,274</td>
<td>31,290</td>
<td>7,651</td>
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<tr>
<td>Total</td>
<td>435,025</td>
<td>803,048</td>
<td>276,017</td>
<td>84,722</td>
<td>190,162</td>
<td>435,598</td>
<td>802,763</td>
<td>347,549</td>
<td>88,292</td>
</tr>
</tbody>
</table>

Source: Sabre and consultant analysis
What table 5.6 tells us

• 803,048 t of max payload available ex AKL; pax used 435,025t
• After scaling, 276,017t available for freight
• Nominal capacity 190,162t
• Actual freight only 84,722t exports.
• Similar picture for imports.
• In no month does demand exceed supply
• In addition, 930t/week freighter capacity, 33,600/yr
<table>
<thead>
<tr>
<th>Month</th>
<th>From Christchurch</th>
<th>To Christchurch</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Actual pax load (t)</td>
<td>Payload capacity (t)</td>
</tr>
<tr>
<td>Jan</td>
<td>6,580</td>
<td>10,651</td>
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<tr>
<td>Feb</td>
<td>4,904</td>
<td>8,424</td>
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<tr>
<td>Mar</td>
<td>5,579</td>
<td>9,446</td>
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<tr>
<td>Apr</td>
<td>5,613</td>
<td>9,184</td>
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<tr>
<td>May</td>
<td>4,821</td>
<td>8,421</td>
</tr>
<tr>
<td>Jun</td>
<td>4,530</td>
<td>8,076</td>
</tr>
<tr>
<td>Jul</td>
<td>5,370</td>
<td>9,035</td>
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<tr>
<td>Aug</td>
<td>5,081</td>
<td>8,815</td>
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<tr>
<td>Sep</td>
<td>4,913</td>
<td>8,617</td>
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<tr>
<td>Oct</td>
<td>5,575</td>
<td>9,164</td>
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<tr>
<td>Nov</td>
<td>5,752</td>
<td>9,171</td>
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<tr>
<td>Dec</td>
<td>7,459</td>
<td>11,929</td>
</tr>
<tr>
<td>Total</td>
<td>66,175</td>
<td>110,932</td>
</tr>
</tbody>
</table>

Source: Sabre and consultant analysis
What does table 5.9 tell us

• On annual basis, supply still exceeds demand
• In January supply is less than demand on nominal but not payload basis;
  • Summer peak for meat
• If ignore tourist destinations, available capacity reduces by 5%; November becomes tight
• But a freighter service provides about 170t a week capacity to Sydney
  • 8400t per year, additional to the bellyhold figures above
• But potential shortages on particular flights
Forecasting - General

• The nature of airfreight and the recent patterns of flows make forecasting very difficult
  • Volatility of market
  • Competition from seafreight
    • Price
    • Changes in technology
  • Other changes in technology
• Volatility and lack of growth of particular commodity flows
• Forecasts tentative
Forecasting - Imports

- Flows dominated by manufactured goods
- Volumes have been flat over recent years
- Very little growth in imports
- Assumed this will continue in the future
Forecasting – Imports (2)

Actual and forecast growth of air freight imports 2007-2030
Forecasting Exports

- Similar procedure as for imports
- Look at recent patterns of flows
- Potential for growth in specific commodities
  - Forecasting again difficult
Forecasting Exports 2

- Overall export forecasts therefore give growth of about 0.4 per cent per year.
- Export flows in 2030 about 7 per cent higher than in 2014.
Conclusion

- Airfreight important share of NZ trade by value
- However flows in volume terms very small
- Little overall growth in recent years but volatility from year to year in total and by commodity
- Under pressure from competition with passengers and with seafreight
- Growth in future therefore likely to be limited
- On basis of analysis assume
  - no growth in volume of imports
  - Only limited growth in volume of exports
- Difficulty of forecasting means these must be only tentative
Questions