



## in brief

- Detailed definitions for the *Waterline* stevedoring productivity indicators are included in this edition.
- The five-port average crane rate improved to 25.5 containers per hour in the December quarter 2000. This is the first quarter in which the five-port average crane rate has exceeded the Government's target rate of 25.0 containers per hour set in 1998.
- The five-port elapsed labour rate decreased to 27.9 containers per hour compared with the previous quarter's figure, while the ship rate increased to 39.5 containers per hour.
- The proportion of 40-foot containers increased to 34 per cent in the December quarter 2000.
- The five-port total container traffic, measured in teus, rose to an all-time high of 1.697 million teus during July–December 2000.

## at a glance

at a glance

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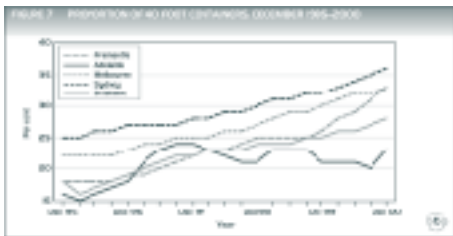
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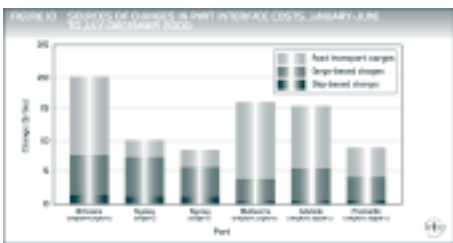
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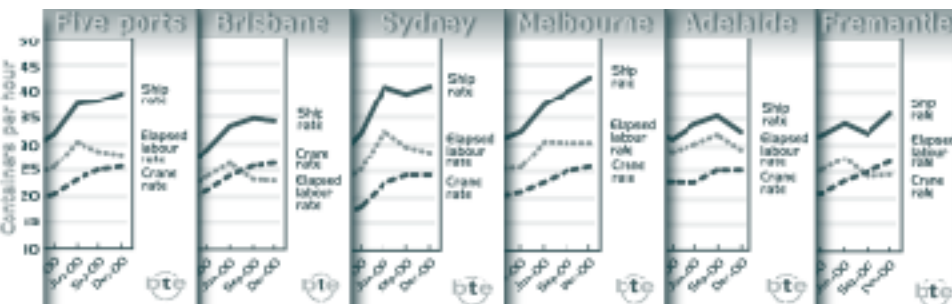
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## STEVEDORING PRODUCTIVITY DEFINITIONS

Following are the definitions used by CSX World Terminals (formerly Sea-Land), P&O Ports, and Patrick the Australian Stevedore to calculate their quarterly stevedoring productivity indicators for inclusion in Waterline.

### **Ships**

Only fully cellular ships are included in calculations. Fully cellular ships are defined as purpose-built container ships equipped with 40-foot cell guides below deck as a minimum, and exclude such vessels if used for mixed cargoes of containers and general cargo.

### **Containers Handled**

The total number of containers lifted on/off fully cellular ships.

### **TEUs Handled**

The total number of 40-foot containers lifted on/off fully cellular ships multiplied by 2, plus the total number of 20-foot containers lifted on/off fully cellular ships.

### **Elapsed Labour Time**

This is the elapsed time between labour first boarding the ship and labour last leaving the ship, less the following non-operational delays:

- No labour allocated to ship
- Closed-port holiday
- Port-wide industrial stoppage
- Break bulk and containers that require manual interventions, e.g. use of wires, chains, non-rigid spreaders or other handling gear.\*

\*When calculating the ship break-bulk time, the time allowed is:  
Total Crane Hours spent handling break-bulk divided by Crane Intensity (see below).

### **Elapsed Crane Time**

This is the total number of allocated crane hours, assuming that the vessel is ready for working, less the following operational and non-operational delays:

- No labour allocated
- Closed-port holiday
- Port-wide industrial stoppage
- Total crane time spent handling break-bulk cargo and containers that require manual intervention, e.g. use of wires, chains, non-rigid spreaders or other handling gear
- Award or Enterprise breaks as applicable
- Adverse weather
- Delays caused by the ship or its agent
- All portainer breakdowns, including spreader changes
- Other equipment breakdowns which stop portainer crane operations
- Booming up for passing ships



- Handling hatch covers
- Cage work and lashing/unlashing where crane operations are affected
- Crane long-travelling between hatches and crossing accommodation
- Labour withdrawn without operator's agreement, including Enterprise-related industrial stoppages
- Over-dimensional containers requiring additional (rigid) spreader
- Spreader changes
- Waiting for export cargo
- Defective ship's gear (e.g. jammed twist-locks, broken cell guides, ballast pumps unable to maintain list/trim, etc.)

### Crane Intensity

Crane Intensity is the Total Crane Hours (labour on to labour off) divided by Ship Labour Hours (labour on to labour off) less the following delays:

- No labour allocated to ship
- Closed-port holiday
- Port-wide industrial stoppage

### Elapsed Labour Rates

The total number of containers handled divided by the Elapsed Labour Time.

The total TEUs handled divided by the Elapsed Labour Time.

### Crane Rates

The total number of containers handled divided by the Elapsed Crane Time.

The total number of TEUs handled divided by the Elapsed Crane Time.

### Ship Rate

This is the Crane Rate multiplied by Crane Intensity (as defined above).





### STEVEDORING PRODUCTIVITY

Table 1 presents the December quarter 1998 to December quarter 2000 indicators of stevedoring productivity at the five major Australian container ports, expressed in *container moves per hour*. Figures 1 to 6 present these data over the December quarter 1995 to December quarter 2000 period. The Brisbane data are the weighted averages for the container terminals operated by P&O Ports, Patrick and CSX World Terminals. The data for Sydney, Melbourne and Fremantle are weighted averages for the container terminals operated by P&O Ports and Patrick. The Adelaide data are for the CSX World Terminals container terminal.

The national crane rate productivity, as measured by the five-port average, improved further in the December quarter 2000. This is the first quarter in which the five-port average crane rate has exceeded the target rate of 25.0 containers per hour that was set in 1998. Compared to the previous quarter's figures, the ship rate also increased while the elapsed labour rate declined.

In summary:

- the five-port average *crane rate* (productivity *per crane* while the ship is worked) was 25.5 containers per hour for the December quarter compared with 24.9 in the September quarter 2000;
- the five-port average *elapsed labour rate* (productivity *per ship* based on the time labour is aboard the ship) was 27.9 containers per hour for the December quarter compared with 28.5 in the September quarter 2000; and
- the five-port average *ship rate* (productivity *per ship* while the ship is worked) was 39.5 containers per hour for the December quarter compared with 38.0 in the September quarter 2000.

The *Brisbane* (P&O Ports, Patrick, CSX World Terminals) average crane rate was 26.3 containers per hour in the December quarter, up from 25.8 in the September quarter. The elapsed labour rate of 23.1 containers per hour and the ship rate of 34.4 containers per hour were both slightly down on the previous quarter's figures.

The *Sydney* (P&O Ports, Patrick) average crane rate of 24.3 containers per hour in the December quarter remained unchanged from the September quarter figure. The Sydney elapsed labour rate of 28.6 containers per hour was down, and the ship rate of 40.9 containers per hour was up, compared with the previous quarter's figures.

The *Melbourne* (P&O Ports, Patrick) average crane rate was 25.8 containers per hour in the December quarter, up from 25.0 in the September quarter. The elapsed labour rate of 30.5 containers per hour remained unchanged, while the ship rate of 42.7 containers per hour was up on the previous quarter's figures.

The *Adelaide* (CSX World Terminals) average crane rate of 25.3 containers per hour in the December quarter remained unchanged from the September quarter figure. The elapsed labour rate of 29.3 containers per hour and the ship rate of 32.6 containers per hour were both down on the previous quarter's figures.

The *Fremantle* (P&O Ports, Patrick) average crane rate was 26.8 containers per hour in the December quarter, up from 24.9 containers per hour in the September quarter. The elapsed labour rate of 24.4 containers per hour and the ship rate of 35.9 containers per hour were both up on the previous quarter's figures.

### Proportion of 40-foot containers

Figure 7 charts the quarterly proportion of 40-foot containers at the five major container ports from December 1995 to December 2000. The December quarter 2000 figures indicate that the proportion of 40-foot containers was 30 per cent at Brisbane, 37 per cent at Sydney, 35 per cent at Melbourne, 27 per cent at Adelaide, and 36 per cent at Fremantle.



**TABLE I CONTAINER TERMINAL PERFORMANCE INDICATORS—  
PRODUCTIVITY IN CONTAINERS PER HOUR**

Port / Indicator	Quarter								
	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00
<b>Five ports</b>									
Ships handled	942	942	958	979	933	875	808	840	814
Total containers	477 744	448 224	469 742	506 696	557 659	517 533	505 802	531 700	545 075
Crane rate	18.9	19.9	20.3	19.6	19.1	20.4	23.1	24.9	25.5
Elapsed labour rate	21.9 <sup>a</sup>	23.1 <sup>a</sup>	24.0 <sup>a</sup>	23.1	23.7	25.4	30.3	28.5	27.9
Ship rate	26.9	28.2	29.0	28.9	29.1	31.8	37.5	38.0	39.5
40-foot containers (per cent)	28	28	28	30	30	31	32	33	34
<b>Brisbane</b>									
Ships handled	180	176	193	224	232	219	178	187	179
Total containers	67 691	61 204	71 008	77 914	84 354	77 992	71 679	80 366	83 082
Crane rate	16.8	18.3	18.9	18.6	19.7	21.2	24.0	25.8	26.3
Elapsed labour rate	19.6	21.2	21.4	19.5	21.5	23.8	26.3	23.3	23.1
Ship rate	22.9	24.7	25.9	24.7	26.4	28.9	33.4	34.9	34.4
40-foot containers (per cent)	24	23	24	27	26	25	27	29	30
<b>Sydney</b>									
Ships handled	230	221	243	259	244	221	218	223	211
Total containers	155 063	142 767	154 062	170 684	195 544	171 164	166 212	173 988	176 106
Crane rate	15.7	17.7	18.2	18.0	16.6	18.6	22.8	24.3	24.3
Elapsed labour rate	18.9	22.6	22.2	23.1	22.5	25.4	32.6	29.6	28.6
Ship rate	24.6	29.5	28.7	29.4	27.6	32.2	40.9	39.5	40.9
40-foot containers (per cent)	31	31	32	33	33	34	35	37	37
<b>Melbourne</b>									
Ships handled	274	271	282	278	266	247	217	227	218
Total containers	170 056	161 894	167 942	183 058	195 723	184 710	178 156	189 306	189 580
Crane rate	21.5	21.5	21.8	20.8	20.3	21.2	23.0	25.0	25.8
Elapsed labour rate	24.3	23.6	25.8	24.5	25.4	25.7	30.7	30.5	30.5
Ship rate	30.7	28.8	31.0	30.2	30.8	32.6	37.6	40.1	42.7
40-foot containers (per cent)	29	28	28	32	31	32	33	34	35
<b>Adelaide</b>									
Ships handled	74	73	66	62	62	56	56	62	63
Total containers	26 319	24 221	24 445	23 969	26 090	21 803	25 245	26 836	27 800
Crane rate	23.2	23.2	23.1	23.0	23.2	23.1	23.0	25.3	25.3
Elapsed labour rate	29.3	28.5	30.0	29.4	30.6	28.9	30.3	32.1	29.3
Ship rate	30.4	30.7	31.1	31.5	33.1	31.2	34.0	35.5	32.6
40-foot containers (per cent)	24	29	21	18	17	27	21	15	27
<b>Fremantle</b>									
Ships handled	184	201	174	156	129	132	139	141	143
Total containers	58 615	58 138	52 285	51 071	55 948	61 864	64 510	61 204	68 507
Crane rate	20.7	21.4	21.7	20.7	21.2	20.9	23.3	24.9	26.8
Elapsed labour rate	na	na	na	20.4	21.7	25.3	27.5	24.1	24.4
Ship rate	25.5	25.6	26.6	28.0	30.7	31.8	34.1	32.1	35.9
40-foot containers (per cent)	24	25	26	27	28	30	31	35	36

na not available

a. Four-port average only as Fremantle elapsed rate data were not available.

Note 1. Data from CSX World Terminals at Brisbane are incorporated from the December quarter 1999 onwards.

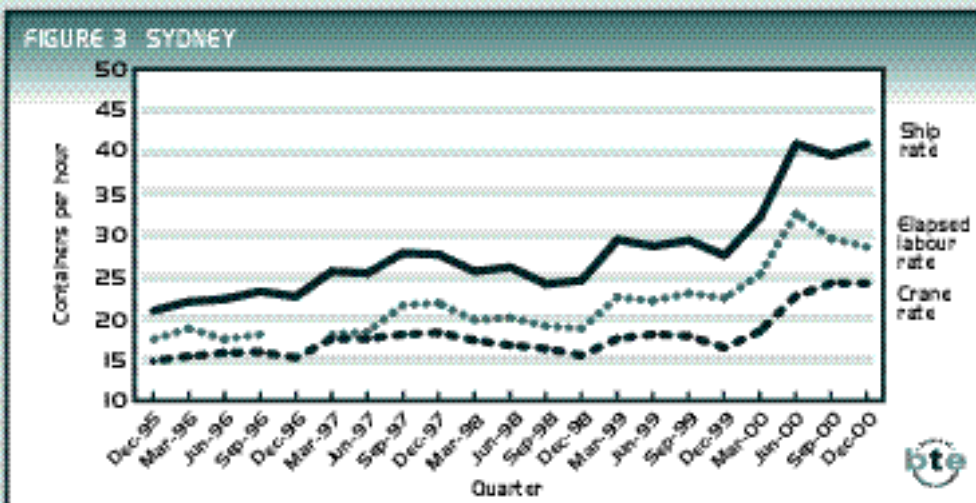
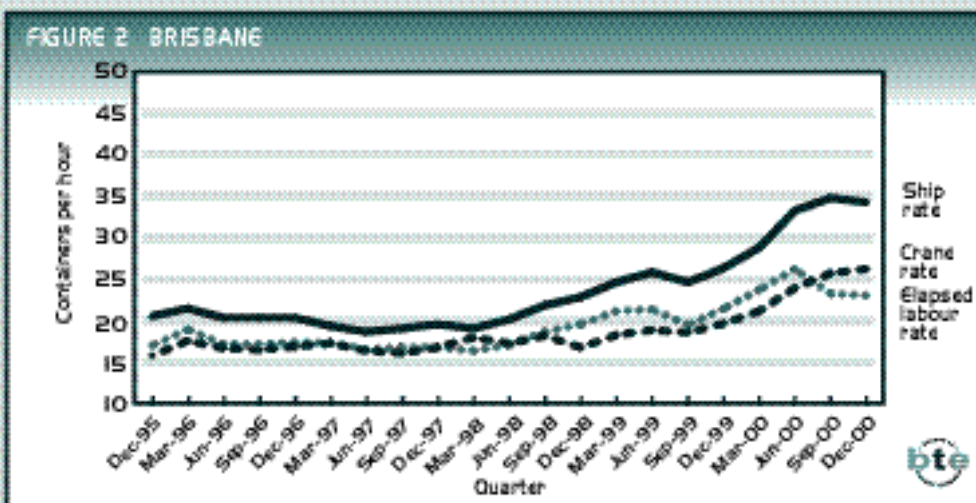
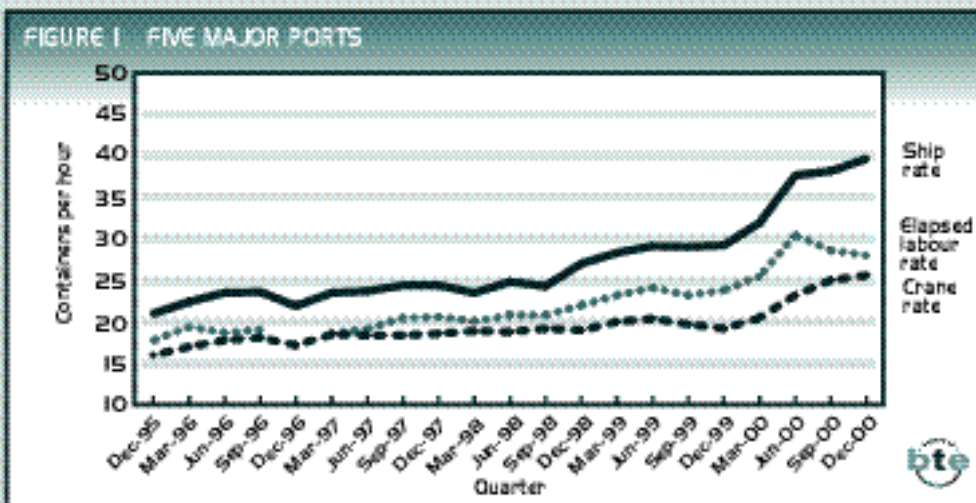
2. The data in this table are expressed in containers (i.e. lifts or moves) per hour and therefore are not directly comparable with the teus per hour data in table 9.

Sources Patrick, P&O Ports and CSX World Terminals.





## CONTAINER TERMINAL PRODUCTIVITY



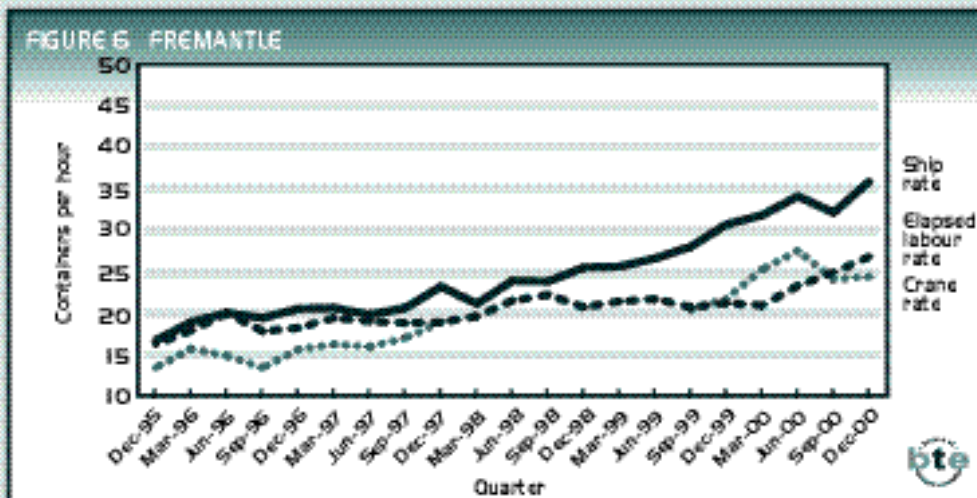
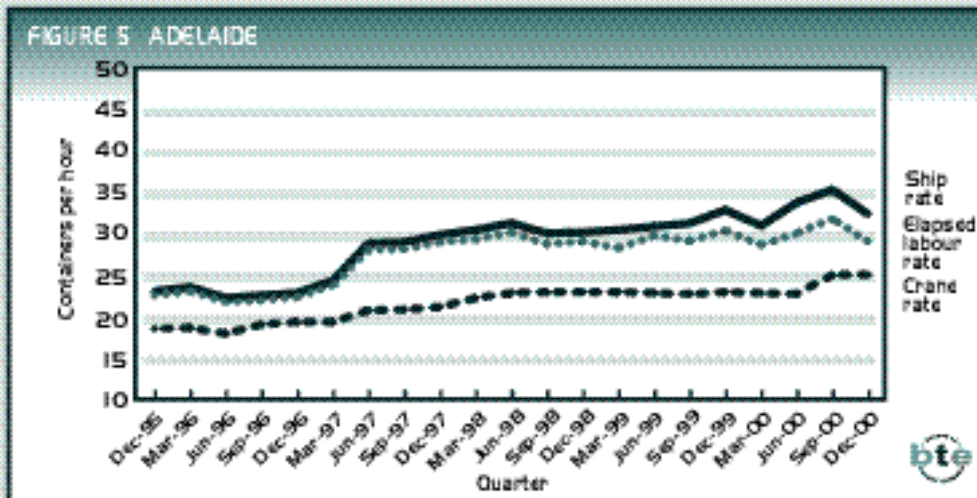
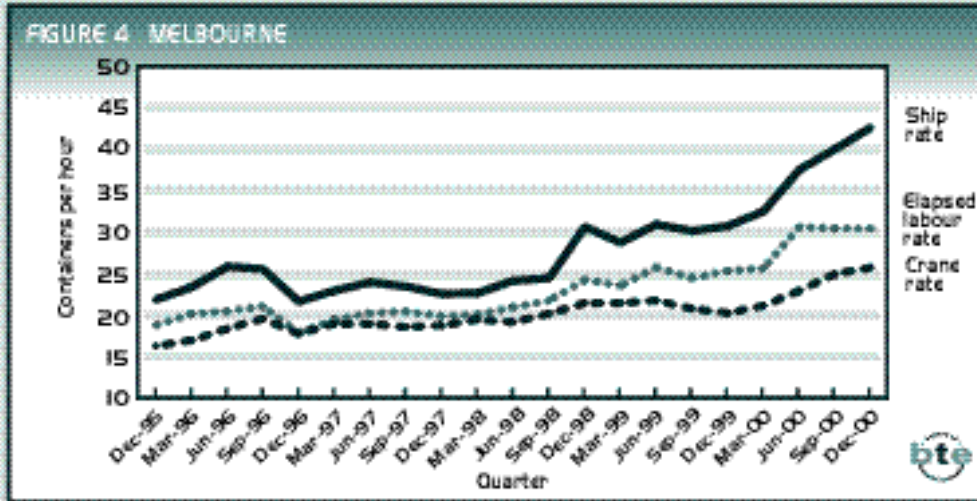
Note These figures are based on the data contained in table I. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and CSX World Terminals.





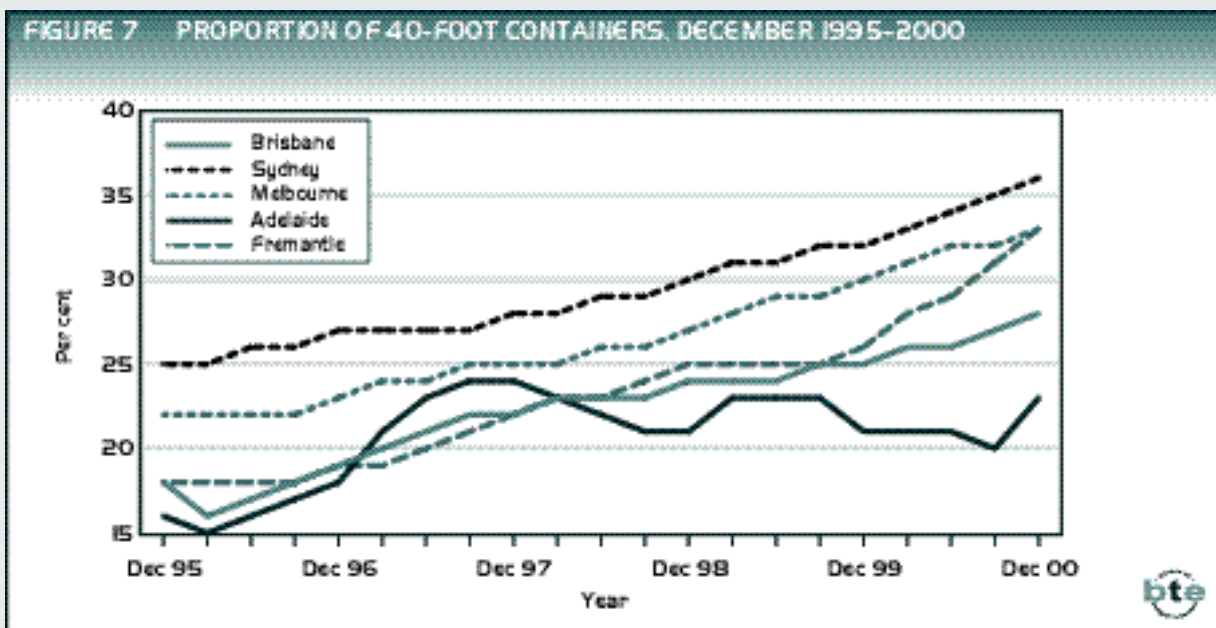
## CONTAINER TERMINAL PRODUCTIVITY



Note These figures are based on the data contained in table I. Readers should refer to the notes in that table.

Sources Patrick, P&O Ports and CSX World Terminals.





Source Cross-Modal and Maritime Transport Division, Department of Transport and Regional Services.

The average proportion of 40-foot containers for the whole of 2000 was 33 per cent, which reflects an increase of 12 per cent on the 1999 average. Comparing last year's proportion of 40-foot containers to the 1999 average, there were increases of 10 per cent in Brisbane and Sydney, 11 per cent in Melbourne, 6 per cent in Adelaide, and 25 per cent in Fremantle.

It would appear that the increased volume of container trade over recent years has resulted in greater use of 40-foot containers.

**Teus per hour**

Table 9 presents the stevedoring productivity indicators in terms of teus per hour. These data are retained in *Waterline* for the purpose of long-term historical comparison; they are not directly comparable with the data in table 1 because indicators based on teus per hour may be affected by changes in the mix of 20-foot and 40-foot containers from one period to the next.







**WATERFRONT RELIABILITY**

The *Waterline* reliability indicators provide partial measures of the variability of waterfront performance for container traffic at major Australian ports. They cover the timeliness of selected port services, sources of other ship waiting time, aspects of stevedoring performance and the accuracy of ship arrival advice.

**Berth availability, pilotage, towage**

Table 2 presents information on berth availability, pilotage and towage for a sample of ship calls in the December quarter 2000. It indicates the extent to which selected port services were available at the scheduled or confirmed time.

The sample for the December quarter 2000 covers 204 ship calls, equivalent to around 25 per cent of total ship calls at the major container terminals during the period. One shipping line that normally supplies data to *Waterline* was unable to do so for December quarter 2000. The proportion of ship calls covered at individual ports ranges from 17 per cent at Fremantle to 33 per cent at Melbourne. The sample includes calls by container ships operating to and from Europe, the Mediterranean, the Middle East, North America, Asia and New Zealand.

The *berth availability* indicator measures the proportion of ship arrivals where a berth is available within four hours of the scheduled berthing time. Figure 8 shows that berth availability for the sample of ship calls was 96 per cent in the December quarter 2000. This

was slightly higher than in the previous quarter, and is the highest figure recorded since the series commenced in the March quarter of 1997. Caution should be used in undertaking inter-port comparisons of the berth availability data, as there is significant variation between ports in sample sizes and ship call patterns.

Average waiting time for ships unable to obtain a berth within four hours of the scheduled berthing time was 23 hours in the December quarter 2000, up from 13 hours in the previous two quarters. This increase was due to berth congestion at one port in early November.

The *pilotage* and *towage* indicators reported in *Waterline* measure the proportion of ship movements where the service is available to the ship within one hour of the confirmed ship arrival/departure time. The proportion was 100 per cent for the pilotage indicator in the December quarter 2000, the same as in the September quarter 2000. The proportion was 98.5 per cent for the towage indicator in the December quarter 2000, down from 99.3 per cent in the September quarter 2000. Performance has been at similar levels since the first data (covering the March quarter 1997) were published in *Waterline*.

**Other waiting time**

The four shipping lines that supplied information for table 2 also provided data on other ship waiting time. This category incorporates waiting time that is attributable to factors other than the unavailability of a

**TABLE 2 AVAILABILITY OF BERTH, PILOTAGE AND TOWAGE SERVICES AT THE SCHEDULED/CONFIRMED TIME, DECEMBER QUARTER 2000**

Port/operation	(Number of ship calls)								Total no. of ship calls
	Delay (hrs)								
	0	1	2	3	4	5-10	11-20	>20	
<b>Brisbane</b>									
Berth availability	31	0	0	0	0	1	0	1	33
Pilotage	33	0	0	0	0	0	0	0	33
Towage	28	2	2	0	0	1	0	0	33
<b>Sydney</b>									
Berth availability	61	0	0	0	0	1	0	0	62
Pilotage	62	0	0	0	0	0	0	0	62
Towage	61	0	0	0	0	1	0	0	62
<b>Melbourne</b>									
Berth availability	64	0	1	0	1	4	0	2	72
Pilotage	72	0	0	0	0	0	0	0	72
Towage	72	0	0	0	0	0	0	0	72
<b>Adelaide</b>									
Berth availability	12	0	0	0	0	0	0	0	12
Pilotage	12	0	0	0	0	0	0	0	12
Towage	11	0	0	0	0	0	1	0	12
<b>Fremantle</b>									
Berth availability	25	0	0	0	0	0	0	0	25
Pilotage	25	0	0	0	0	0	0	0	25
Towage	25	0	0	0	0	0	0	0	25
<b>Five ports</b>									
Berth availability	193	0	1	0	1	6	0	3	204
Pilotage	204	0	0	0	0	0	0	0	204
Towage	197	2	2	0	0	2	1	0	204

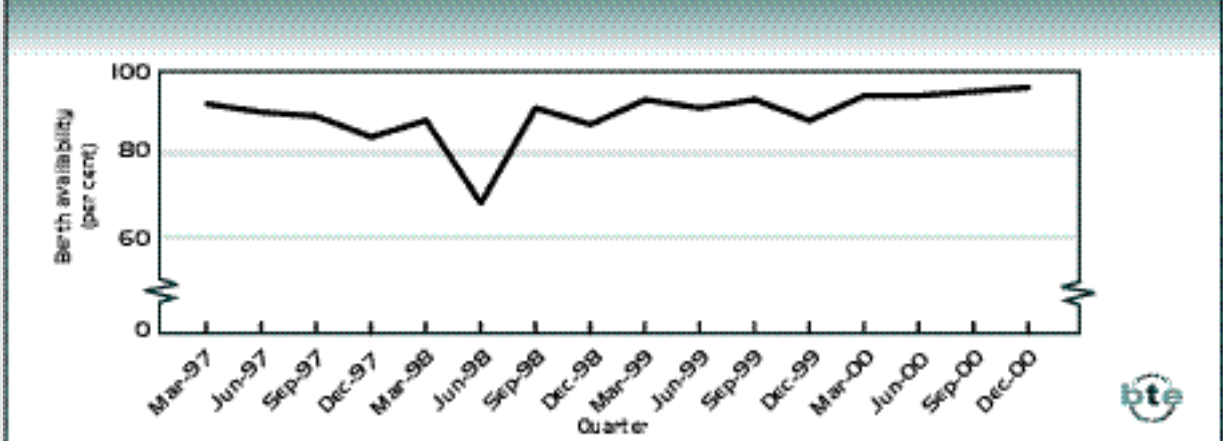
*Note* Inter-port comparisons should be interpreted with caution as there is significant variation between ports in factors such as sample sizes and ship call patterns.

*Sources* Data for a sample of ship calls provided by shipping lines.





**FIGURE 8 BERTH AVAILABILITY AT MAJOR CONTAINER TERMINALS, 1997-2000**



Sources Data for a sample of ship calls provided by shipping lines.

berth, pilot or towage service at the scheduled/confirmed time. The data on other ship waiting time reported in *Waterline* exclude ship schedule adjustments.

**TABLE 3 OTHER SHIP WAITING TIME INCIDENTS AT THE FIVE MAINLAND CAPITAL CITY PORTS, DECEMBER QUARTER 2000**

Incident type	(Number of incidents)							Total no. of incidents
	Ship waiting time (hrs)							
	1	2	3	4	5-10	11-20	>20	
Early ship arrival	3	8	6	6	3	1	0	27
Stevedoring finished early	3	7	2	3	5	3	0	23
Awaiting labour	6	4	1	2	5	1	0	19
Pilot/tug booking not at preferred time	10	6	0	1	0	0	0	17
Crane breakdown	7	2	1	0	0	0	0	10
Other	1	0	2	1	2	1	2	9
Ship repairs or maintenance	0	0	0	0	2	3	1	6
Weather or tides	2	1	0	1	1	1	0	6
Stevedoring finished late	0	1	0	0	0	2	0	3
Late ship arrival	1	2	0	0	0	0	0	3
Industrial action	1	0	0	0	2	0	0	3
<b>Total incidents</b>	<b>34</b>	<b>31</b>	<b>12</b>	<b>14</b>	<b>20</b>	<b>12</b>	<b>3</b>	<b>126<sup>a</sup></b>

a. These incidents affected 89 of the 204 ship calls covered in table 2.

Sources Data for a sample of ship calls provided by shipping lines.

Table 3 summarises the data on other waiting time incidents, which had a duration of at least one hour, in the December quarter 2000. The shipping lines identified a total of 126 incidents (affecting 89 ship calls) for the sample of ship calls over this period. These incidents involved both ship-related and waterfront factors.

The total waiting time attributable to particular incident types reflects the number of incidents and the waiting time associated with individual incidents. The largest single source of other ship

waiting time in the December quarter 2000 was the category of stevedoring finished early, which accounted for 19 per cent of total waiting time. Early ship arrival accounted for 16 per cent of total waiting time, and ship repairs or maintenance were related to a further 15 per cent of total waiting time.

In the December quarter 2000, 44 per cent of ship calls in the sample were affected by other waiting time incidents that had a duration of at least one hour, the same as in the September quarter 2000. The average duration of other waiting time was 6.6 hours per affected ship call in the December quarter 2000, down from 7.1 hours per affected ship call in the previous quarter.

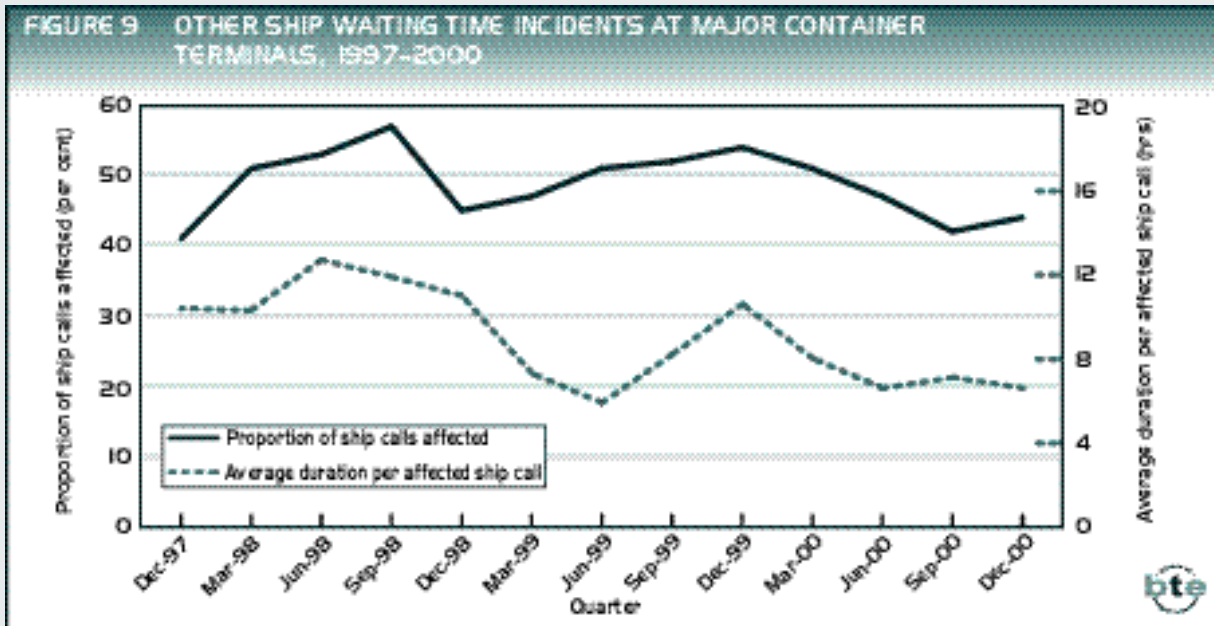
Figure 9 provides information on other ship waiting time over the period since the December quarter 1997. It indicates the proportion of ship calls affected and the average duration of other waiting time per affected ship call in each quarter.

### Stevedoring

Table 4 presents the available information on two aspects of stevedoring reliability at major container terminals—stevedoring rate and cargo receipt. Data were not available for Adelaide.

*Stevedoring rate* provides a partial indicator of the variability of stevedoring productivity at each port. It is defined as the proportion of ship visits where the average crane rate for the ship is within two containers per hour (plus or minus) of the quarterly average crane rate for the terminal. The stevedoring rates were





Sources Data for a sample of ship calls provided by shipping lines.

lower in the December quarter 2000 than in the September quarter 2000 for the four ports for which data were available.

Cargo receipt is the proportion of receipts (exports) completed by the stevedore's cut-off time. It provides a partial measure of one factor that can affect container terminal performance. Cargo receipt in the December quarter 2000 was lower than in the September quarter 2000 for Brisbane, but higher for Sydney, Melbourne and Fremantle.

**Ship arrival**

Table 4 includes data for two indicators of ship arrival advice. Data were not available for Melbourne for the December quarter 2000.

The first indicator is the proportion of ship arrivals within one hour (plus or minus) of the most recently advised arrival time available to the port authority/corporation at 24 hours prior to actual arrival. Compared with the previous quarter, this indicator fell for Sydney, and rose for Adelaide and Fremantle, in the December quarter 2000.

The second indicator is the proportion of ship arrivals within one hour (plus or minus) of the last scheduled arrival time advised inside the 24 hours prior to actual arrival. This indicator fell slightly for Sydney and Adelaide in the December quarter 2000, and increased for Fremantle.

**TABLE 4 STEVEDORING AND SHIP ARRIVAL RELIABILITY INDICATORS, SEPTEMBER AND DECEMBER QUARTERS 2000**

Indicator	(per cent)									
	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec	Jul-Sep	Oct-Dec
<b>Stevedoring</b>										
Stevedoring rate	51	54	54	49	53	44	na	na	38	34
Cargo receipt	84	80	84	88	92	93	na	na	94	99
<b>Ship arrival</b>										
Advice at 24 hrs	na	60	54	52	na	na	58	66	48	51
Advice inside 24 hrs	na	94	97	96	na	na	91	90	83	86

na not available

Sources AAPMA, Patrick and P&O Ports.





**PORT PERFORMANCE—NON-FINANCIAL**

The year 2000 non-financial indicators for the five mainland capital city ports are presented in table 8.

**Cargo throughput**

*Total cargo throughput* at the five ports was 50.5 million tonnes for July–December 2000, compared with 48.3 million tonnes for the previous half-year. This represented an increase of 5 per cent in total cargo throughput for the five ports compared with January–June 2000. Total cargo throughput increased at Sydney (10 per cent), Melbourne (3 per cent) and Fremantle (13 per cent). It declined at Brisbane (3 per cent) and Adelaide (5 per cent).

*Non-containerised general cargo throughput* at the five ports was 2.274 million tonnes for July–December 2000, compared with 2.276 million tonnes for January–June 2000, representing a slight (0.08 per cent) decrease.

*Total container traffic throughput* for the five ports, measured in teus, was 1.697 million teus for July–December 2000, compared with 1.574 million teus for January–June 2000. Loaded teus increased by 9 per cent, with loaded imports increasing by 12 per cent and loaded exports increasing by 6 per cent.

Compared with 1999, the 2000 full year, five-port total container traffic, measured in teus, increased by 12 per cent to 3.27 million teus.

**TABLE 5 NON-FINANCIAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS, 2000**

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle		Five ports <sup>d</sup>	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec
<b>Total cargo throughput ('000 tonnes)</b>	11 859	11 529	11 811	13 005	10 846	11 157	3 604	3 407	10 174	11 447	48 294	50 545
<b>Non-containerised general cargo ('000 tonnes)<sup>a</sup></b>	330	308	348	311	1 092	1 110	168	180	338	364	2 276	2 274
<b>Containerised cargo (teus exchanged)</b>												
Full import	77 990	83 701	242 228	274 119	278 325	307 289	18 049	20 143	62 132	73 078	678 724	758 330
Empty import	32 583	34 317	8 312	8 602	41 992	45 993	9 325	9 923	21 682	21 656	113 894	120 491
Full export	92 838	92 078	139 587	157 448	251 730	265 442	27 581	32 174	61 863	61 508	573 599	608 650
Empty export	20 308	16 151	98 842	97 683	67 456	69 562	4 197	5 790	17 398	22 723	208 201	211 909
<b>TOTAL</b>	<b>223 719</b>	<b>226 247</b>	<b>488 969</b>	<b>537 852</b>	<b>639 503</b>	<b>688 286</b>	<b>59 152</b>	<b>68 030</b>	<b>163 075</b>	<b>178 965</b>	<b>1 574 418</b>	<b>1 699 380</b>
<b>Average total employment<sup>b</sup></b>	234	216	188	183	80	83	151	147	169	167	822	796
<b>Port turnaround time (hrs)<sup>c</sup></b>												
Median result	30	30	35	32	39	36	19	20	23	24	-	-
95th percentile	66	52	67	60	71	65	35	40	49	66	-	-

- not applicable

a. Excludes bulk cargoes.

b. Comparisons between ports are not appropriate because each port authority/corporation has a different structure.

c. Port turnaround times refer only to ships calling at container terminals. Comparisons between ports are not appropriate because each port has a different set of parameters to measure the turnaround time. Normally, only inter-temporal comparison at individual ports is of use.

d. Components may not sum to totals due to rounding.

Source AAPMA.





### PORT INTERFACE COST INDEX

The port interface cost index provides a measure of shore-based shipping costs (charges) for containers moved through the Australian mainland capital city ports. Data for January–June and July–December 2000 are presented in tables 6 to 8. The port interface cost index is based on an indicative approach; that is, the index is not an average of all costs, but is based on those costs typically charged by service providers in most instances.

### Port and related charges

Table 6 provides the parameters used to determine the port and related charges in table 7. These parameters relate to a representative port call by a container ship (Lloyd’s ship classification UCC) in the 15 000 to 20 000 GRT range.

**TABLE 6 PARAMETERS USED IN THE PORT INTERFACE COST INDEX, 2000**

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec
<b>Vessel size</b>										
GRT	17215	17215	17215	17215	17215	17215	17215	17215	17215	17215
NRT	8372	8372	8372	8372	8372	8372	8372	8372	8372	8372
<b>Teus exchanged<sup>a</sup></b>										
Total	484	502	854	892	1042	1070	630	679	620	690
Loaded <sup>b</sup>	370	389	667	716	864	890	486	522	472	519
Empty	114	113	187	176	178	180	144	157	148	171
Loaded inwards	169	185	423	455	454	477	192	201	236	282
Loaded outwards	201	204	244	261	410	412	294	321	235	237
<b>Ship call parameters<sup>a</sup></b>										
Number of port calls	4	5	3	5	3	4	5	4	4	7
Elapsed berth time (hrs)	20	21	38	33	39	36	24	22	22	27

a. Mean value for ships between 15 000 and 20 000 GRT.

b. Components may not sum to totals due to rounding.

Sources BTE estimates based on ship call data supplied by relevant port authorities/corporations and other port service providers.



Table 7 provides the port and related charges at the five mainland capital city ports for January–June and July–December 2000. Port and related charges comprise ship-based charges and cargo-based charges.

### Ship-based charges

Increases in ship-based charges in July–December 2000 occurred across the board. However, on a per teu basis, these increases were depressed by the rise in average number of teus exchanged per ship. The average number of teus exchanged rose at all ports in July–December 2000 when compared to the previous period. The increase was 4 per cent at Brisbane and Sydney, 3 per cent at Melbourne, 8 per cent at Adelaide, and 11 per cent at Fremantle. The average teu exchange at the smaller ports of Brisbane, Adelaide and Fremantle exceeded all previous averages. The average teu exchanges at Sydney and Melbourne were second only to the unusually high traffic encountered in the July–December 1999 period.

On a per teu basis, and compared with the previous period, the overall changes in total ship-based charges in July–December 2000 were:

- at Brisbane—a 4 per cent increase;
- at Sydney—a 5 per cent increase;
- at Melbourne—a 1 per cent increase;
- at Adelaide—a 1 per cent increase; and
- at Fremantle—a 3 per cent increase.

While caution should always be used when making port comparisons on a per teu basis, Fremantle was the lowest-cost port for ship-based charges. From the point of view of ship operators using ships similar to the



**TABLE 7 PORT AND RELATED CHARGES, 2000**

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec	Jan-Jun	Jul-Dec
<b>Ship-based charges (\$/teu)</b>										
Conservancy	4.70	4.59	-	-	-	-	1.91	2.44	-	-
Tonnage	-	-	7.86	8.28	4.31	4.62	6.94	6.86	4.08	4.04
Pilotage	10.61	11.24	3.68	3.72	5.26	5.64	3.73	3.81	3.37	3.33
Towage	15.32	15.89	8.58	9.04	6.60	7.08	19.52	19.38	7.94	8.54
Mooring, unmooring	3.54	3.73	3.69	3.88	0.90	0.97	-	-	1.78	1.75
Berth hire <sup>a</sup>	-	-	-	-	7.31 <sup>r</sup>	6.46	-	-	-	-
<b>Total<sup>b</sup></b>	<b>34.17</b>	<b>35.45</b>	<b>23.81</b>	<b>24.92</b>	<b>24.39<sup>r</sup></b>	<b>24.76</b>	<b>32.10</b>	<b>32.49</b>	<b>17.17</b>	<b>17.66</b>
<b>Cargo-based charges (\$/teu)</b>										
Wharfage	-	-	-	-	-	-	-	-	-	-
Imports	26.00	28.60	60.00	66.00	25.90	29.10	53.00	58.00	47.30	49.50
Exports	26.00	28.60	45.00	49.50	25.90	29.10	53.00	58.00	47.30	49.50
Harbour dues	42.00	46.20	-	-	-	-	-	-	-	-
Berth charge	-	-	-	-	-	-	-	-	13.90	15.29
<b>Total port and related charges (\$/teu)<sup>b</sup></b>										
Loaded imports	102	109	84	91	50 <sup>r</sup>	54	85	90	78	82
Loaded exports	102	109	69	74	50 <sup>r</sup>	54	85	90	78	82
<b>Charges per ship visit (\$/visit)</b>										
Total ship-based charges	16 522	17 813	20 334	22 225	25 425 <sup>r</sup>	26 488	20 228	22 047	10 641	12 193
Empty teus <sup>c</sup>	1 625	1 765	-	-	-	-	-	-	1 140	1 317

- not applicable

r revised

a. Charged by stevedores and itemised separately from basic stevedoring charge.

b. Components may not sum to totals due to rounding.

c. Sum of wharfage, harbour dues and berth charge per empty teu, multiplied by average exchange of empty teus.

Note Port and related charges are based on the parameters described in table 6.

Sources BTE estimates based on: ship call data supplied by relevant port authorities/corporations, and price schedules of relevant port authorities/corporations, towage operators and pilotage service providers.



representative ship in table 6, Fremantle was also the lowest cost port for ship-based charges on a per ship-visit basis.

### Cargo-based charges

In July–December 2000, cargo-based charges for loaded teus increased by 10 per cent at Brisbane, Sydney and Adelaide, by 12 per cent at Melbourne, and by 6 per cent at Fremantle.

### Changes in total port and related charges per loaded teu

Total port and related charges per loaded teu, for the period July–December 2000:

- at Brisbane—increased by 8 per cent;
- at Sydney—increased by 8 per cent;
- at Melbourne—increased by 7 per cent;
- at Adelaide—increased by 6 per cent; and
- at Fremantle—increased by 5 per cent.

### Stevedoring charges per teu

The stevedoring charges used in this issue of *Waterline* are those published in the most recently available ACCC report on stevedoring prices (October 2000). As the report does not include charges beyond the first half of 2000, the July–December 2000 stevedoring charge included in the port interface cost index is provisional and will be updated in *Waterline* 28.



### Land-based charges per teu

Average customs brokers' fees and road transport rates for the January–June and July–December 2000 port interface cost index are included in table 8. These charges are based on data provided by a total of 36 customs brokers and 46 road transport operators. Customs brokers' fees for imports are higher than fees for exports, reflecting the more complex clearance procedures for import containers. During July–December 2000 there were no changes in customs brokers' fees at any of the ports.

Road transport charges increased by 6 per cent at Brisbane and at Adelaide, by 5 per cent at Melbourne, by 2 per cent at Fremantle, and by one per cent at Sydney. One of the parameters used to estimate road transport charges is the time taken to move containers from/to the wharf to/from the customer's warehouse. Both distance and traffic congestion impact on this parameter and therefore, to some extent, help explain the significant difference between road transport charges at Melbourne and Sydney compared with Brisbane, Adelaide and Fremantle.

### Indices for individual ports

Table 8 indicates that, between January–June and July–December 2000, there were increases in total port interface costs ranging from one per cent to 3 per cent across the five ports. However, this should be interpreted with caution, given the provisional nature of the reported stevedoring charges. Moreover, the use of a single stevedoring charge for all ports reflects the scope of the available information which is not disaggregated on an individual port basis. In practice, container stevedoring charges tend to vary between ports.

**TABLE 8 PORT INTERFACE COSTS, 2000**

Indicator	Brisbane		Sydney		Melbourne		Adelaide		Fremantle	
	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec	Jan–Jun	Jul–Dec
<b>Import</b>										
Ship-based charges	34	35	24	25	24 <sup>r</sup>	25	32	32	17	18
Cargo-based charges	68	75	60	66	26	29	53	58	61	65
Stevedoring	173 <sup>r</sup>	173 <sup>p</sup>	173 <sup>r</sup>	173 <sup>p</sup>	173 <sup>r</sup>	173 <sup>p</sup>	173 <sup>r</sup>	173 <sup>p</sup>	173 <sup>r</sup>	173 <sup>p</sup>
Customs brokers' fees	123	123	149	149	138	138	132	132	138	138
Road transport charges	190	202	296	299	260	272	173	183	203	208
<b>Import total<sup>a</sup></b>	<b>589<sup>r</sup></b>	<b>608</b>	<b>701<sup>r</sup></b>	<b>711</b>	<b>622<sup>r</sup></b>	<b>637</b>	<b>563<sup>r</sup></b>	<b>578</b>	<b>592<sup>r</sup></b>	<b>600</b>
<b>Export</b>										
Ship-based charges	34	35	24	25	24 <sup>r</sup>	25	32	32	17	18
Cargo-based charges	68	75	45	50	26	29	53	58	61	65
Stevedoring	173 <sup>r</sup>	173 <sup>p</sup>	173 <sup>r</sup>	173 <sup>p</sup>	173 <sup>r</sup>	173 <sup>p</sup>	173 <sup>r</sup>	173 <sup>p</sup>	173 <sup>r</sup>	173 <sup>p</sup>
Customs brokers' fees	77	77	111	111	89	89	73	73	67	67
Road transport charges	190	202	296	299	260	272	173	183	203	208
<b>Export total<sup>a</sup></b>	<b>542<sup>r</sup></b>	<b>561</b>	<b>648<sup>r</sup></b>	<b>657</b>	<b>572<sup>r</sup></b>	<b>588</b>	<b>505<sup>r</sup></b>	<b>520</b>	<b>521<sup>r</sup></b>	<b>530</b>

p provisional pending updating of stevedoring charge by the ACCC

r revised

a. Components may not sum to totals due to rounding.

Notes 1. Based on parameters described in table 6.

2. Waterline data on customs brokers' fees and road transport charges are collected for the purpose of monitoring trends in charges over time. They should not be used for inter-port comparisons, as sample characteristics may vary between ports.

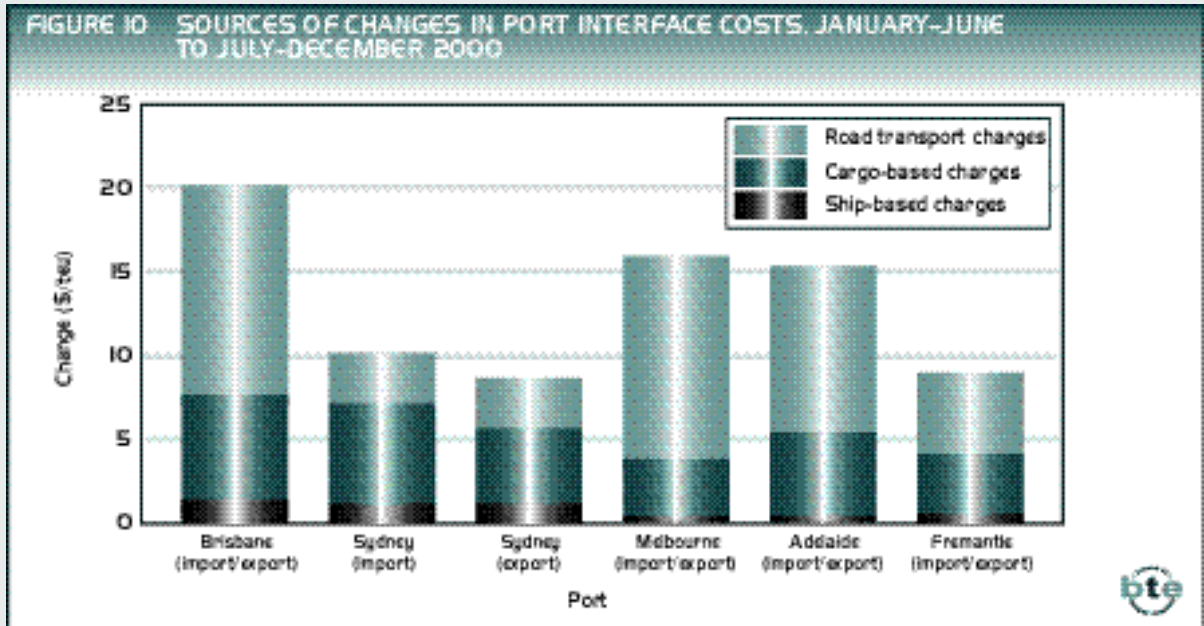
3. The stevedoring charge used in Waterline is monitored by the ACCC and is the weighted average for Brisbane, Sydney, Melbourne, Adelaide, Fremantle and Burnie. Stevedoring charges vary between ports and detailed data for individual ports are not publicly available.

Sources BTE estimates based on: ship call data supplied by relevant port authorities/corporations; price schedules of relevant port authorities/corporations, towage operators and pilotage service providers; surveys of customs brokers and road transport operators; and stevedoring charge data supplied by the ACCC.





The factors contributing to the changes in port interface costs at each port are shown in figure 10.

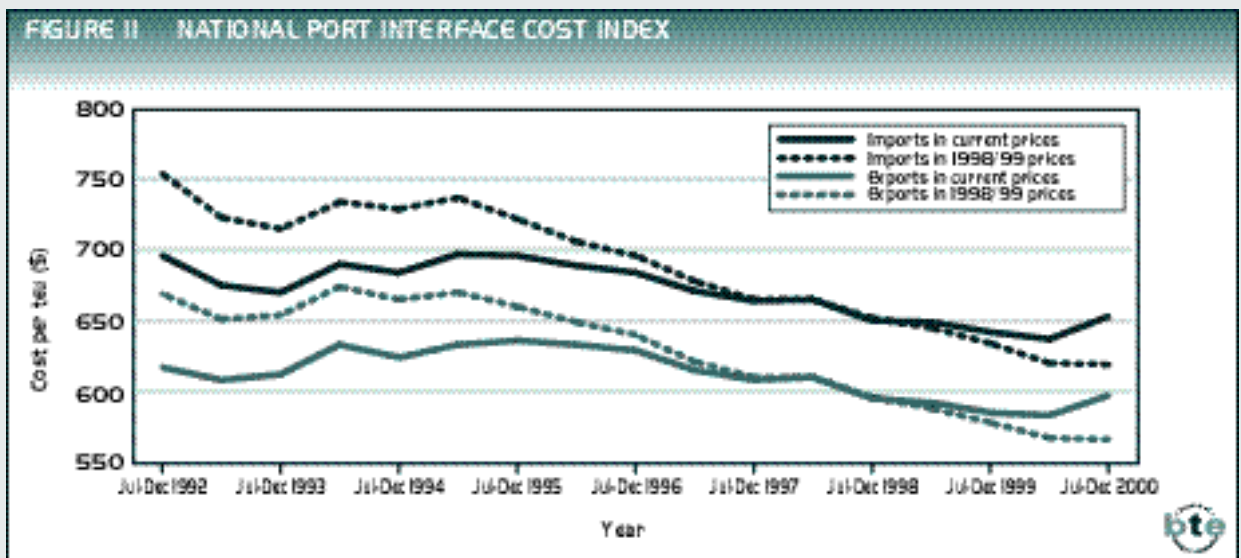


Sources BTE estimates based on: price schedules of relevant port authorities/corporations; towage operators and pilotage service providers; and surveys of customs brokers and road transport operators.

**National index**

Figure 11 provides the national port interface cost index back to 1992. There was a 2 per cent increase in the national index between January-June and July-December 2000. In current prices, national import charges increased from \$637 (revised from \$646) to \$653 per teu, and export charges increased from \$583 (revised from \$592) to \$597 per teu.

In real terms (1998/99 prices, using ABS chain volume and current price statistics to calculate the deflator), the National Port Interface Cost Index charge per imported teu has declined by 18 per cent since 1993, and the charge per exported teu has declined by 15 per cent.



Sources BTE estimates based on: ship call data supplied by port authorities/corporations; price schedules of port authorities/corporations; towage operators and pilotage service providers; surveys of customs brokers and road transport operators; stevedoring charges supplied by the ACCC; and ABS 5206.032 National Accounts table.







## DEFINITIONS (containers / teus)

For definitions on the full range of stevedoring productivity indicators used in *Waterline*, please refer to page 2.

### **Containers / teus—Stevedoring Productivity article**

Container and teu numbers cover movements at container terminals exclusively, and only in conjunction with ships that are categorised as fully cellular according to the stevedoring productivity definitions (see p. 2).

### **Teus—Port Performance Non-Financial Indicators article**

Teu numbers cover movements over the entire port and on the full range of ships.

### **Teus—Port Interface Cost Index article**

Teu numbers are associated with a very limited range of ships; namely, ships that are within the 15 000–20 000 GRT range and are additionally categorised as container ships on the Lloyds Register.

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## ABBREVIATIONS

AAPMA	Association of Australian Ports and Marine Authorities
ABS	Australian Bureau of Statistics
ACCC	Australian Competition and Consumer Commission
BTE	Bureau of Transport Economics
GRT	Gross registered tonnage
NRT	Net registered tonnage
teu	Twenty-foot equivalent unit
UCC	Container ship

## PORT IMPACT STUDIES

The BTE has recently released the results of two port impact studies covering Mackay and Gladstone. The studies use the general framework that was described in BTE Report 101 *Regional Impact of Ports*. They were undertaken through a sponsorship arrangement involving the Association of Australian Ports and Marine Authorities (AAPMA), the Mackay Port Authority and the Gladstone Port Authority.

### Study results

BTE Working Paper 46 presents the results of the study of the Port of Mackay. The estimates cover the impact of Mackay port-related activities (excluding trade facilitation effects) on the Mackay Region in 1999-2000. They indicate output of \$56 million, value added of \$32 million, household income of \$17 million, and 501 jobs (full-time equivalent). The employment impact represents around 1.0 per cent of total employment in the Mackay Region.

BTE Working Paper 47 presents the results of the study of the Port of Gladstone. It covers the total impact (direct and flow-on effects) of Gladstone port-related activities (excluding trade facilitation effects) on the Fitzroy region in 1999-2000. The impact estimates include output of \$224 million, value added of \$139 million, household income of \$68 million, and 1758 jobs (full-time equivalent). The employment impact represents around 2.3 per cent of total employment in the Fitzroy Region.

### Further information

Copies of Information Papers 46 and 47 are available free of charge from the BTE on (02) 6274 7210 or [bte@dotrs.gov.au](mailto:bte@dotrs.gov.au). More information about the BTE's work on port impact studies can be obtained from Kym Starr on (02) 6274 6857 or [kym.starr@dotrs.gov.au](mailto:kym.starr@dotrs.gov.au).



**TABLE 9 CONTAINER TERMINAL PERFORMANCE INDICATORS, SELECTED AUSTRALIAN PORTS—  
PRODUCTIVITY IN TEUS PER HOUR**

	Dec-96	Mar-97	Jun-97	Sep-97	Dec-97	Mar-98	Jun-98	Sep-98	Dec-98	Mar-99	Jun-99	Sep-99	Dec-99	Mar-00	Jun-00	Sep-00	Dec-00
<b>Five Ports</b>																	
Ships handled	907	865	891	907	963	909	845	1020	942	942	968	979	933	875	808	840	814
Total teus	519 206	441 687	483 372	549 247	585 474	527 881	514 409	633 107	612 019	573 444	602 501	660 593	726 590	678 046	666 967	708 433	731 936
Crane rate	21.2	22.8	22.8	23.2	23.3	23.5	23.6	24.4	24.2	25.5	25.9	25.4	24.8	26.6	30.4	33.2	34.2
Elapsedrate	n/a	23.1	23.8	26.0	25.8	na	na	na	na	na	na	30.1	30.8	33.3	40.0	38.0	37.6
Ship rate	27.2	29.0	29.5	31.0	30.8	29.6	31.3	31.3	34.7	36.2	37.3	37.7	37.8	41.7	49.5	50.8	53.2
<b>Brisbane</b>																	
Ships handled	141	156	164	162	177	170	168	192	180	176	193	224	232	219	178	187	179
Total teus	62 904	47 471	65 572	73 184	71 043	58 857	74 023	87 373	84 200	75 444	88 311	96 944	106 096	97 431	90 932	103 654	107 812
Crane rate	20.6	20.0	20.5	20.2	20.5	21.6	21.6	22.5	20.9	22.6	23.4	23.3	24.6	26.4	30.5	33.4	34.0
Elapsedrate	21.1	20.3	20.6	21.2	20.8	19.9	21.5	23.6	24.7	26.3	26.7	24.7	27.0	29.8	33.4	30.0	29.7
Ship rate	24.9	22.7	23.3	24.0	24.2	23.0	25.4	27.5	28.7	30.6	32.2	31.2	33.1	36.1	42.3	45.1	44.5
<b>Sydney</b>																	
Ships handled	249	251	249	243	266	238	219	267	230	221	243	259	244	221	218	223	211
Total teus	174 982	158 323	167 705	183 978	201 535	176 496	168 234	209 619	203 042	187 287	203 536	226 784	260 927	229 014	224 445	237 843	240 720
Crane rate	19.6	22.3	22.6	23.5	23.5	22.5	21.8	21.6	20.4	23.2	24.0	23.7	22.1	24.8	30.9	33.1	33.2
Elapsedrate	n/a	22.7	23.6	28.0	28.2	25.6	26.1	25.4	24.8	29.6	29.3	30.6	30.1	34.0	44.1	40.5	39.0
Ship rate	28.9	32.2	32.7	36.1	35.5	33.1	33.9	32.0	32.3	38.8	38.0	38.9	36.8	43.0	55.4	53.9	55.8
<b>Melbourne</b>																	
Ships handled	282	230	249	268	281	276	234	309	274	271	282	278	266	247	217	227	218
Total teus	202 376	162 156	177 070	208 200	223 465	207 346	185 803	242 456	219 549	206 727	215 379	241 775	257 147	243 277	236 306	253 568	255 022
Crane rate	22.4	23.6	23.5	23.6	23.6	24.3	24.3	26.1	27.7	27.5	28.1	27.4	26.5	27.9	30.3	33.5	34.7
Elapsedrate	22.1	24.3	25.1	26.0	25.2	25.3	26.8	28.4	31.7	30.2	33.1	32.4	33.4	33.8	40.5	40.9	41.1
Ship rate	27.2	28.7	29.7	29.9	28.7	28.6	30.7	31.9	39.7	36.9	39.7	39.9	40.4	43.0	49.4	53.8	57.6
<b>Adelaide</b>																	
Ships handled	74	69	65	68	66	60	66	63	74	73	66	62	62	56	56	62	63
Total teus	23 351	21 963	20 933	25 982	25 188	22 280	27 975	25 493	32 556	31 326	29 569	28 271	30 597	27 736	30 551	30 945	35 339
Crane rate	24.0	24.6	26.0	26.1	26.0	27.5	27.7	27.6	28.7	30.0	27.9	27.2	27.2	29.4	27.8	29.1	32.2
Elapsedrate	27.7	30.2	35.1	35.2	35.4	36.3	36.5	34.5	36.2	36.8	36.3	34.7	35.9	36.8	36.7	37.0	37.2
Ship rate	28.3	30.9	36.0	36.2	36.5	37.6	37.8	36.0	37.6	39.7	37.6	37.2	38.8	39.7	41.1	41.0	41.5
<b>Fremantle</b>																	
Ships handled	161	159	164	166	173	165	158	189	184	201	174	156	129	132	139	141	143
Total teus	55 593	51 784	52 092	57 903	64 243	62 922	58 374	68 166	72 672	72 660	65 706	64 819	71 823	80 588	84 733	82 423	93 043
Crane rate	21.5	23.3	22.9	23.1	23.6	24.5	26.7	27.9	25.7	26.6	27.3	26.1	27.2	27.4	30.5	33.5	36.5
Elapsedrate	18.6	19.7	19.5	21.0	22.2	na	na	na	na	na	na	25.8	27.9	33.0	36.0	32.4	33.6
Ship rate	24.2	25.0	24.0	25.5	28.8	26.4	29.8	30.2	31.7	32.0	33.4	35.3	38.8	41.6	44.7	43.2	48.7

na not available  
 Notes 1. Data from CSX World Terminals at Brisbane are incorporated from the December quarter 1999 onwards.  
 2. For data back to the December quarter 1969, refer to Waterline 15.

Sources Patrick, P&O Ports and CSX World Terminals.





# Waterline

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