



BIS OXFORD
ECONOMICS

PORT OF MELBOURNE FORECAST MECHANICS

FORECASTS TO 2019-20

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Purpose

The accompanying **spreadsheet** to this document is to forecast wharfage volumes through the Port of Melbourne. These volumes are broken down into key line items including full container imports, full container exports, motor vehicle imports, etc. The spreadsheet presents each line item with its own distinct workings to predict future volumes.

The purpose of this **document** is to explain the workings and the assumptions that go into the accompanying spreadsheet.

Overview

The accompanying spreadsheet presents our forecasts of Port of Melbourne wharfage volumes. Here, the forecasting approach is presented.

Broadly, this involves breaking down imports and exports into commodity categories and then assigning each category with a macroeconomic driver. For example, food imports are assigned a food retail-trade driver.

Generally, the annual percentage changes of the relevant driver are then directly assigned to each category. Thus, growth from the base year for each commodity category will track growth in the driver from the same base year.

All drivers are based in constant price terms.

The following slides detail each worksheet sequentially, explaining the process used in each.

In the following slides, descriptions of **inputs/assumptions are coloured in red** while **sources of inputs/explanations of the basis behind forecasts are presented in purple**.

Sheet 1: 'Revenue'

Revenue Summary

The revenue tab summarises the forecasts out to FY20 by revenue line item. Linked cells are to other worksheets.

Worksheet

Wharfage volumes	Year Ending	Jun-16	Jun-17	Jun-18	Jun-19	Jun-20
Containerised - Full - outward	TEU	657,810	708,538	759,946	701,723	734,377
Containerised - Full - inward	TEU	1,072,624	1,105,845	1,199,795	1,267,091	1,292,787
Containerised - Full - Bass Strait	TEU	191,615	190,268	202,043	212,406	217,738
Containerised - Empty	TEU	479,777	454,675	495,962	636,979	632,294
Containerised - Empty - Bass Strait (incl transhipment)	TEU	77,418	75,209	93,779	89,665	89,313
Containerised - Empty returns	TEU	2,910	2,951	3,680	3,518	3,504
Non-containerised / general	tonne or cm	2,564,994	2,692,591	3,403,106	3,584,105	3,714,056
Accompanied passenger vehicles	tonne or cm	0				
Motor vehicles	tonne or cm	6,719,255	6,802,600	7,271,292	6,932,355	7,296,444
Liquid bulk	tonne or cm	2,618,259	2,602,487	2,868,747	2,802,693	2,861,259
Dry bulk - inwards - overseas and coastal	tonne	3,443,632	3,324,602	3,770,036	3,721,318	3,619,664
Dry bulk - outwards - overseas and coastal	tonne	261,643	973,809	912,065	77,996	377,984
Transhipment - Full - outward	TEU	57,242	60,411	71,367	82,134	83,800
Transhipment - Full - inward	TEU	40,167	42,110	45,788	56,556	58,221
Transhipment - Full - Bass Strait	TEU	36,144	37,209	39,144	43,020	44,355
Transhipment - Containerised Empty (excl Bass Strait)	TEU	18,608	19,827	16,239	13,946	13,946
Transhipment - Motor vehicles and break bulk	tonne or cm	8,943	14,233	90,424	128,353	128,353
Transhipment - Non-containerised / general	tonne	3,201	1,072	8,389	10,122	10,122

Legend

Hard Coded (Historic)
Linked (Forecasts)
Calculation



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 2: 'Full_out'

Full Exports (excluding Bass Strait)

This worksheet features two distinct tables. Table 1 provides historical and forecast TEUs (columns B to P). The forecasts are based on Table 2, which provides historical and forecast macro/industry drivers (columns T to AE). Cells in **green** are hardcoded data. Cells in **orange** are calculations.

In Table 1, TEU volumes are broken down into distinct product groups as these often feature distinct **consumption, production, and trade drivers**. This breakdown is based on Port of Melbourne data. In Table 2, we use **drivers from our economic database and model. These drivers are based on calculations and analysis built on top of ABARES and ABS consumption, production, and trade data***. These are indexed to begin at 100 in FY06. The growth rate in each driver is derived externally in our economic model.

The columns in the Table 1 (TEUs) correspond with the columns in the Table 2 (Drivers). For example, "Agriculture" TEU exports in the **1st** column of Table 1 are driven by the "Agriculture Production" driver in the **1st** column of Table 2. Similarly, "Timber" TEU exports in the **10th** column in Table 1 are driven by the "Non-commodity Manufacturing" driver in the **10th** column in Table 2.

The growth rate in each driver in Table 2 is directly applied as the forecast growth rate for TEU volumes in table 1.

Total exports are in column P (with forecasts in rows 18 and 19).

NB: Where drivers are the same (eg, there are several "Non-Commodity Manufacturing" drivers), differences in FY19 reflect manual adjustments to reflect year-to-date data for growth in TEUs in the Port of Melbourne.



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 3: 'Full_in'

Full Imports (excluding Bass Strait)

This worksheet features two distinct tables. Table 1 provides historical and forecast TEUs (columns B to I). In Table 1, TEU volumes are broken down into distinct product groups as these often feature distinct drivers. The product groups are forecast individually in Table 2 based on their association with a **macro/industry driver** (columns M to AA). In Table 2, drivers are based on **ABS data (Cat no 8501.0 and 5206.0)**.

Cells in **green** are hardcoded data. Cells in **orange** are calculations. Cells in **yellow** are projections based on recent trends and partial FY19 data.

The breakdown in Table 1 is based on Port of Melbourne data. Table 2 is presented in terms of the natural logarithm to facilitate analysis. **The growth rate in each driver is derived externally in our economic model.**

As drivers are generally based in real dollar terms but the output of interest is in TEUs, we have estimated changes in the trend in **\$/TEU** using the series in columns O, S, W, and AA. Changes in this trend reflect composition shifts to products that feature a lower volume per \$ and/or a shift towards 40 foot containers as opposed to 20 foot containers.

Our forecasts of growth in each product group are then based on the recent trend in \$/TEUs and the growth in the underlying economic driver.

Total imports are in column H (with forecasts in rows 19 and 20).



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 4: 'Bass Strait'

Imports + Exports (Bass Strait only)

This worksheet follows the same logic as sheet 1: 'Full_out' and sheet 2: 'Full_in'. Cells in **green** are hardcoded data. Cells in **orange** are calculations. Cells in **yellow** are projections based on recent trends and partial FY19 data.

The analysis of **imports** is focused in Table 1 and Table 2. Table 1 provides historical and forecast import TEUs (columns B to P). The forecasts are based on Table 2, which provides historical and forecast macro/industry drivers (columns R to AC).

In Table 1, TEU volumes are broken down into distinct product groups as these often feature distinct **consumption, production, and trade drivers**. This breakdown is based on Port of Melbourne data. In Table 2, we use **drivers from our economic database and model**. **These drivers are based on calculations and analysis built on top of ABARES and ABS consumption, production, and trade data***. These are indexed to begin at 100 in FY06. The growth rate in each driver is derived externally in our economic model.

The columns in the Table 1 (TEUs) correspond with the columns in the Table 2 (Drivers). For example, "Agriculture" TEU exports in the **1st** column of Table 1 are driven by the "Agriculture Production" driver in the **1st** column of Table 2. Similarly, "Timber" TEU exports in the **10th** column in Table 1 are driven by the "Non-commodity Manufacturing" driver in the **10th** column in Table 2.

The growth rate in each driver in Table 2 is directly applied as the forecast growth rate for TEU volumes in table 1. Total imports are in column P (with forecasts in rows 18 and 19).



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 4: 'Bass Strait'

Imports + Exports (Bass Strait only), continued

NB: Where drivers are the same (eg, there are several “Non-Commodity Manufacturing” drivers), differences in FY19 reflect manual adjustments to reflect year-to-date data for growth in TEUs in the port of Melbourne.

The analysis of **exports** is focused in Table 3. Growth in Bass Strait exports is primarily driven by **demand for consumer goods**, we have therefore used **private consumption expenditure (ABS cat 5206.0)** as the core driver.

Table 3 is presented in terms of the natural logarithm to facilitate analysis. The growth rate in the driver is **derived externally in our economic model**.

As drivers are generally based in real dollar terms but the output of interest is in TEUs, we have estimated changes in the trend in **\$/TEU** using the series in column AH. Changes in this trend reflect composition shifts to products that feature a lower volume per \$ and/or a shift towards 40 foot containers as opposed to 20 foot containers. Cells in **yellow** are projections based on recent trends and partial FY19 data.

Our forecasts of growth are then based on the recent trend in **\$/TEUs** and the growth in the underlying economic driver.

Total Bass Strait trade is then the sum of imports and export. This is presented in column AJ (with forecasts in rows 19 and 20).



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 5: 'General Cargo'

General Break Bulk and Wheeled Unitised

This worksheet provides historical and forecast roll-on roll-off trade and break bulk excluding motor vehicles. Cells in **green** are hardcoded data. Cells in **orange** are calculations. Cells in **yellow** are projections based on recent trends and partial FY19 data.

Roll-on roll-off trade is presented in columns B and C (Table 1). Growth is assumed to track growth in Bass Strait trade for both imports and exports as this component of trade is focused between Victoria and Tasmania.

Break bulk trade is presented in columns E and F (Table 2). Growth here is based on recent trends, partial FY19 data, and professional judgement where applicable.

Total trade is in column H (with forecasts in rows 18 and 19).



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 6: 'Empty'

Empty Containers: Exports and Imports

This worksheet provides historical and forecast Empty container movements in TEUs. 4 tables are presented. Tables 1 and 2 provide non-Bass Strait empty container movements. Tables 3 and 4 provide Bass Strait empty container movements. Cells in **green** are hardcoded data. Cells in **orange** are calculations. Cells in **yellow** are projections based on recent trends and partial FY19 data.

Non-Bass Strait Trade:

Empty imports are forecast using the **historical relationship between full imports and empty imports as these tend to co-move**. Forecasts of full imports (column B) are drawn from Sheet 3: "Full_in".

Empty container exports are forecast using the fact that **empty container movements must make up the gap between full imports and full exports – because containers that can't be filled with exports must be sent back empty**. Net container imports (total imports less total exports, Column H) are projected forward and then the previously forecast import and export volumes are used to identify the necessary empty export volumes.

Column J identifies total movements of empty containers by summing the imports and exports of empty containers.

Bass Strait Trade:

Tables 3 and 4 follow the same logic as tables 1 and 2. Column T identifies total movements of empty containers by summing the imports and exports of empty containers.



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 7: 'Other Bulk'

Motor Vehicles, Liquid Bulk and Dry Bulk Trade

This worksheet provides historical and forecast bulk movements in Revenue Tonnes. Cells in **green** are hardcoded data. Cells in **orange** are calculations. Cells in **yellow** are projections based on recent trends and partial FY19 data.

Table 1 covers **Motor Vehicle Trade**. This is split into imports (column D & column G) and exports (column I & column J) which are in turn split into “New Motor Vehicles” and “Transport Equipment + Second Hand Motor Vehicles”.

New motor vehicle imports (the primary trade) is forecast using the same method used in Sheet 3: “Full_in”. That is, growth in imports (column D) is related to growth in an underlying drivers - **motor vehicle sales** (source: FCAI*) in column E - , with an adjustment to account for variation between the underlying driver and imports (column F). The other, smaller components of motor vehicle trade (columns G, I, and J) are projected forward using recent trends and adjusted to account for partial FY19 data. Total motor vehicle trade is summed in column B.

Table 2 covers **Liquid Bulk Trade**. Imports are derived in our **economic database/model** and presented in columns M. Growth is based on underlying demand (primarily petroleum - motor vehicle use and efficiency, etc.) as well as changes in supply where applicable (refinery closures, etc). Forecasts of Exports are based on recent trends and partial FY19 data.



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 7: 'Other Bulk'

Motor Vehicles, Liquid Bulk and Dry Bulk Trade, continued

Table 3 covers **Dry Bulk Trade**. Imports are broken down into “Building Materials” (Primarily Cement and Gypsum, column S) and “Other” (column T). **Building material imports are derived externally in our economic database/model and based on building activity (demand) and production capacity (supply)**. Other imports are projections based on recent trends and partial FY19 data.

Exports are broken down into “Wheat”, “Barley”, and “Other” (columns W:Y). Wheat and barley exports are derived externally in our **agricultural production database** which examines area sown and changes in yield to project future exports. This is based on **compiled data from a wide range of sources including ABARES, ABS, BOM and industry association data**. Other exports are projections based on recent trends and partial FY19 data.



Key:

Inputs/assumptions in red

sources of inputs/explanations in purple

Sheet 8: 'Transshipments'

Container Transshipments

This worksheet provides historical and forecast transshipments. Cells in **green** are hardcoded data. Cells in **orange** are calculations. Cells in **yellow** are projections based on recent trends and partial FY19 data.

Full Container based transshipments (columns B to Q) are derived by relating both import and export transshipments to growth in in-bound (direct) TEUs. Using the same approach developed in Sheet 3: "Full_in", growth in the underlying driver (direct imports) is related to growth in transshipments by explicitly isolating the relationship (columns D, H, M, Q).

For **empty container** transshipments as well as **other** non-container transshipments, the outlook is based on recent trends and partial FY19 data.



Appendix: Input Assumptions Summary

The table below summarises the drivers employed in the accompanying spreadsheet.

References to the BISOE economic model refer to series that are constructed in our database that serve to explain underlying movements in sectors of interest but may not reflect a public data series.

Professional judgment is employed throughout. This allows us to account for factors that are difficult to quantify and therefore difficult to explicitly model. For example, we know there is a strong trend globally towards using 40-foot containers (as opposed to 20-foot containers) but the shape of trend is difficult to quantify. Thus we make sure our forecasts are consistent with this factor, making manual adjustments where necessary.

Sheet	Input/assumption	Source/basis
Revenue	Linked to other sheets	N/A
Full_out	BISOE custom series on industrial production and demand.	Based on historical link between production volumes and trade
Full_in	Retail turnover, investment and production (ABS)	Based on historical link between demand and trade
Bass Strait	Demand for consumer goods (ABS), BISOE custom series on industrial production and demand.	Based on historical link between demand/production volumes and trade
General Cargo	Bass Strait trade, recent trends	Based on prominence of RoRo trade in the Bass Strait
Empty	Full imports and full exports	Balancing equation
Other Bulk	Motor vehicle sales, BISOE custom series on agricultural production and building activity	Federal Chamber of Automotive Industries, BISOE economic model (for forecasts)
Transhipments	In-bound (direct) TEUs, recent trends	Based on historical link between transhipment and direct volumes

