INTERNATIONAL CONTAINER DEMAND FORECASTS

Prepared for the Port of Melbourne

23 December, 2022

Update to report dated 31 August 2022

Disclaimer

23 December 2022

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Introduction

Purpose

Scope of the work

To support the Port of Melbourne's long term infrastructure planning, BIS Oxford Economics has been engaged to develop a forecast of container demand and sensitivities around the central forecast. These are designed to reflect a reasonable range of possible future outcomes for containerised trade volumes through the Port of Melbourne over the period from FY22 to FY52.

Note that this approach has been developed to understand the distribution of alternative long-run forecasts from a structural perspective (i.e. trend growth under different assumptions). Explicitly, this has not allowed for variances attributed to business cycle peaks and troughs which creates an additional layer of uncertainty in trading volumes.

The sensitivity analysis focuses on containerised imports and related trade volumes – empty containers and transhipments. Other trade volumes have not been changed as part of this analysis.

BISOE was not asked as part of this project to consider alternative volume profiles associated with Automotive and other RoRo.

This report has been updated from an earlier edition dated 31 August 2022.

Changes include:

- an update to take into account the most recent long-term forecast,

- FY22 actuals,

- a revision to the included container categories in the total TEU count,

- updated macroeconomic outlook,

- questions which have arose regarding the risks, sensitivities and baseline outlook.

Note: These forecasts were produced to reflect the state of the world as of **October 2022**.
The Standard Deviation in annual trading volumes attributed to business cycles has been calculated as 6.4% per annum over the past 30 years, with the average business cycle lasting 4 years (consisting of a 12-month period of negative growth followed by growth >10%).

Summary – Outputs

BISOE assessment of feasible set of alternative outcomes for total container trade at the Port of Melbourne
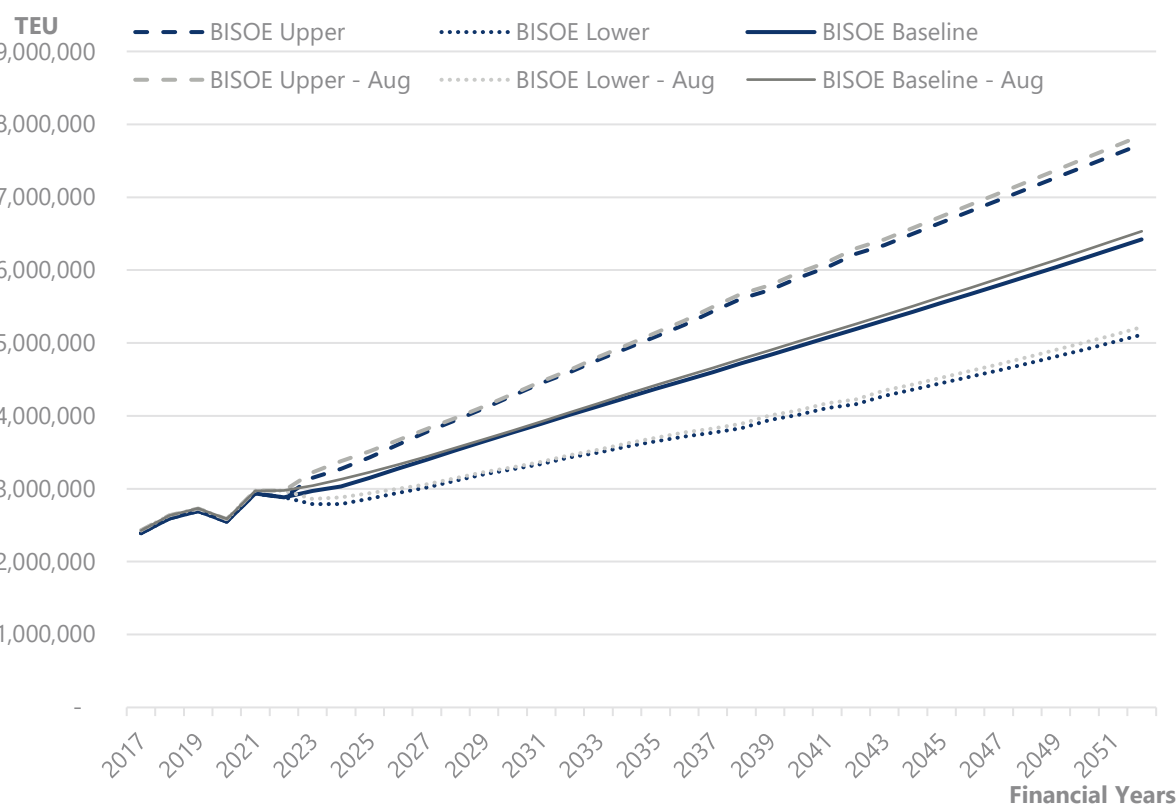
The upper and lower bounds reflect a ~20% variance around the baseline by 2052. This is consistent with a 50% confidence interval.

Within the bounds, the range of possible outcomes reflect varying degrees of economic growth, multipliers and transhipments.

In compound annual growth rate (CAGR) terms, the baseline forecast is for 2.71% growth on average from FY22 to FY52.

The upper bound reflects 0.6% higher CAGR than baseline, while the lower bound CAGR is 0.8% lower than baseline.

Change from earlier editions of this report

The baseline outlook as at October 2022 projects a 3.3% growth in FY23 as compared to FY22. The monthly data from the first five months of FY23, total TEU (excluding Bass Strait Direct) reveal a growth of 6.5%, which supports the recent upgrade in the FY23 outlook from an earlier version of this report.

Note that due to a change in the list of included containers in this calculation, historical volumes have been revised down by an average of 1.4%.

Lower than anticipated volumes in FY22 and a weakening of medium-term consumer spending and housing construction outlooks have lowered the cyclical outlook to FY25, but the trend growth underpinned by labour force productivity and migration flows remain largely unchanged.

Total container trade is the total of container imports, container exports, empty containers, full transhipments and empty transhipments. Bass strait and non-containerised cargo have been excluded from the analysis. Monthly container statistics sourced from https://www.portofmelbourne.com/about-us/trade-statistics/monthly-trade-reports/

Macroeconomics

Introduction

Momentum in the Australian economy is waning

Momentum in the Australian economy is waning, with fast inflation and tighter monetary policy contributing to a slowing in household spending and business investment. Nevertheless, the labour market is in a very strong position and forward- looking indicators of demand look firm, which will support growth through the second half of the year. We forecast growth of 3.8% in CY 2022, moderating to 2.4% in 2023. Trade in services is still recovering from COVID restrictions; growth is strong, but the level of activity remains well below pre-pandemic levels.

The pipeline of residential construction work to be done remains steady, although falling house prices and higher interest rates are weakening the outlook for new projects. For committed projects, disruption to the supply of materials and labour will lead to a more protracted cycle than was previously anticipated. Non-residential construction remains subdued overall, although forward-looking indicators suggest an uptick in activity from H2 2022. Machinery & equipment investment intentions remain firm, but supply chains strains have made the realisation of this demand patchy.

Government spending remains supportive; transport infrastructure projects are continuing, while greater aged care and health spending (including on the vaccine rollout) are boosting government consumption.

The labour market continues to surprise to the upside, with the unemployment rate falling as low as 3.4% in July. High rates of absenteeism due to COVID-related illness or isolation are weighing on total hours worked; with these staff unavailable, firms appear to be looking to hire additional workers to guard against capacity constraints. With the labour market likely either at or beyond capacity and the participation rate at a historically high level, we expect jobs growth will slow.

Consumer price inflation has been boosted by high oil prices and weather-affected food prices. Underlying inflation has also been pushed higher due to surging housing construction costs. Demand-side pressures have broadened, spurring the RBA to aggressively raise interest rates since May.
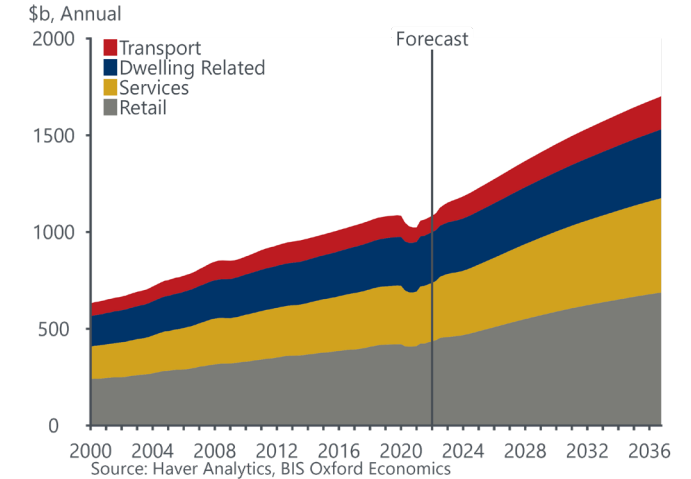
Demand – Household Consumption

Household consumption growth is determined by income growth and households' decisions around how much of this income they choose to save or spend. Through the pandemic, services consumption was severely curtailed by trading and social distancing restrictions. Incomes were well supported by government transfers to households, but other sources of income were subdued. As government support has now tapered, households are expected to run down their savings in order to support spending.

Modest growth in labour incomes has been a headwind for household incomes for several years. But the outlook is more promising; employment has bounced back sharply from lockdowns and forward-looking indicators of labour demand are strong. Moreover, the unemployment rate is at record lows, with limited spare capacity remaining in the labour market. Property-related incomes are yet to fully recover from the pandemic recession but have ticked up of late; rental holidays in 2020 and the collapse in demand due to lost migration provided very strong headwinds to growth that will persist until net overseas migration normalises. Social assistance benefits have now normalized from their pandemic highs, but tax cuts pulled forward to FY21 provided a further boost to incomes.
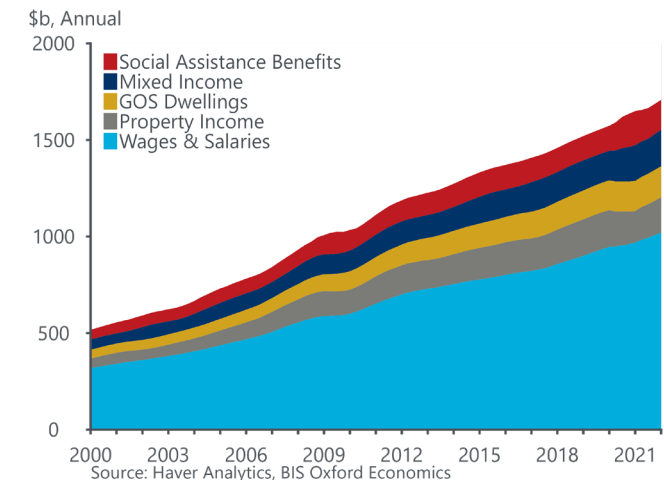
Retail sales surged through the crisis due to a substitution toward goods as services consumption was restricted. Sales have yet to recede from their elevated level, although growth momentum is slowing. We continue to expect consumption will rebalance toward services and away from goods – this process has tentatively started on a couple of occasions, only to be thwarted by lockdowns. High vaccination rates have now largely mitigated this risk. Domestic services consumption stands to gain as restrictions ease further. But the timing of these developments is uncertain and will depend largely on the resilience of consumer confidence through higher inflation and interest rates. The recovery in consumption over the medium term will be very gradual, and dependent on how quickly the spike in the savings rate unwinds.

Note: This is the outlook as at October 2022

Household Consumption
$b, Annual

- Transport
- Dwelling Related
- Services
- Retail

Source: Haver Analytics, BIS Oxford Economics

Sources of Household Income
$b, Annual

- Social Assistance Benefits
- Mixed Income
- GOS Dwellings
- Property Income
- Wages & Salaries

Source: Haver Analytics, BIS Oxford Economics

Demand – Dwelling Investment

Australia has experienced a considerable dwelling investment cycle over the past decade. After several years of stagnant levels of dwelling investment, faster population growth and a sluggish supply response led to large increases in house prices in major cities on the east coast. In response to higher prices, dwelling investment increased sharply and has remained elevated over the past six years.

The government's HomeBuilder program and other state level incentives improving affordability drove another upturn in the dwelling investment cycle. Higher rates of owner-occupier household formation and biting capacity constraints due to materials shortages will lead to a shallower cycle than was first envisaged, but activity will be elevated for an extended period. Dwelling investment is set to make a positive contribution to GDP growth in 2022 and 2023.

Established dwelling prices increased sharply through the pandemic, with low interest rates and relaxed borrowing conditions boosting prices; strength in the detached housing market drove dwelling prices 17.4% higher over 2021. Conditions have since tightened, and prices have started to fall in the largest markets. We expect prices will fall 2.4% in y/y terms in 2022, and a further 4.9% in 2023. The apartment market will remain relatively subdued (although prices are still rebounding) until net inward overseas migration fully recovers, especially student flows.
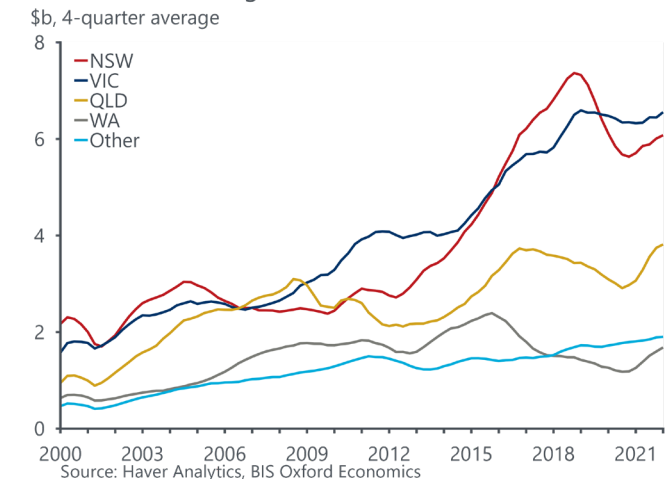
In the longer term, dwelling construction is driven by population growth and household formation (the number of people per dwelling). Our expectations for household formation have increased from a year earlier, while our population forecasts have been revised slightly higher, supporting a higher level of activity.

Note: This is the outlook as at October 2022

Private Dwelling Investment
$b

Source: Haver Analytics, BIS Oxford Economics
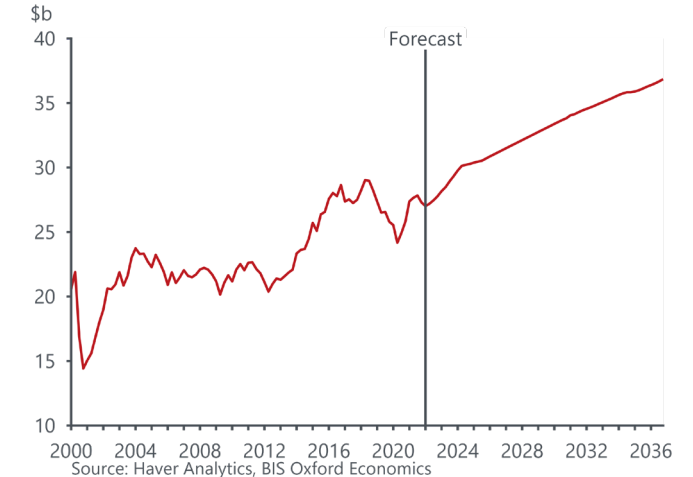
Residential Building Work Done
$b, 4-quarter average

Source: Haver Analytics, BIS Oxford Economics

Demand – Goods Exports

Goods exports have tracked lower since their peak in Q2 2019 in volumes terms. Export capacity constraints will limit the upside for volumes growth in the near term. We expect growth in goods exports will settle at a trend pace of around 2.4% y/y in real terms. However, very strong commodity prices have boosted nominal trade to a record level; the war in Ukraine has led to dislocation in energy markets, driving Australia's terms of trade higher.
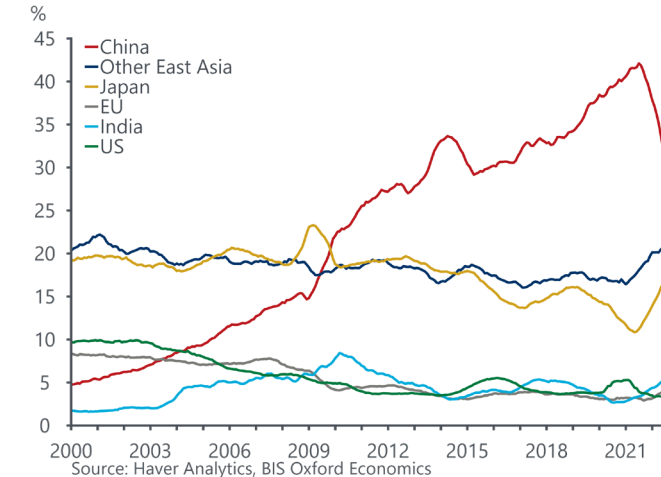
LNG exports have been a driver of growth in recent years but have now plateaued. Outside of LNG, there are few large greenfield projects underway, limiting the upside for resource exports in the near term. Nevertheless, export volumes should remain steady; exports are largely determined by capacity as the marginal costs of production are very low relative to fixed costs. Coal prices have soared to record highs as Europe seeks alternative energy suppliers. However, climate concerns will limit demand and investment in the longer term.

China remains the largest consumer of commodities globally, but over the medium-term India looms as an important source of demand for Australia's resource exports. Despite impressive growth over the past decade, the stock of economic and social infrastructure in China and India remains well below that of advanced economies. Infrastructure investment is steel intensive, with Australian iron ore and coking coal exporters standing to gain from this demand over the medium term.
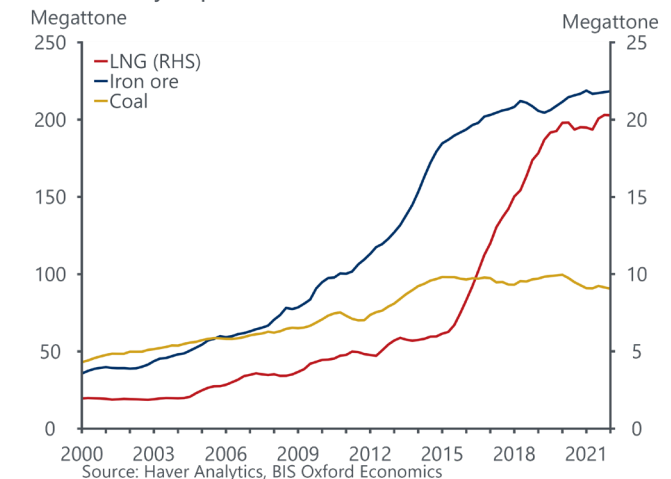
Growth in non-resource merchandise exports is expected to be modest. Rural goods exports have rebounded strongly over the past year, benefitting from greater rainfall. Food prices have been elevated due to the war in Ukraine, but supply lines have resumed, and food prices have drastically fallen. In the longer-term, there is some upside for food and beverage exports as neighbouring Asian economies move toward more consumption-led growth as incomes increase.

Note: This is the outlook as at October 2022

Share of Merchandise Exports

%

- China
- Other East Asia
- Japan
- EU
- India
- US

Source: Haver Analytics, BIS Oxford Economics

Commodity Exports

Megattone   Megattone

- LNG (RHS)
- Iron ore
- Coal

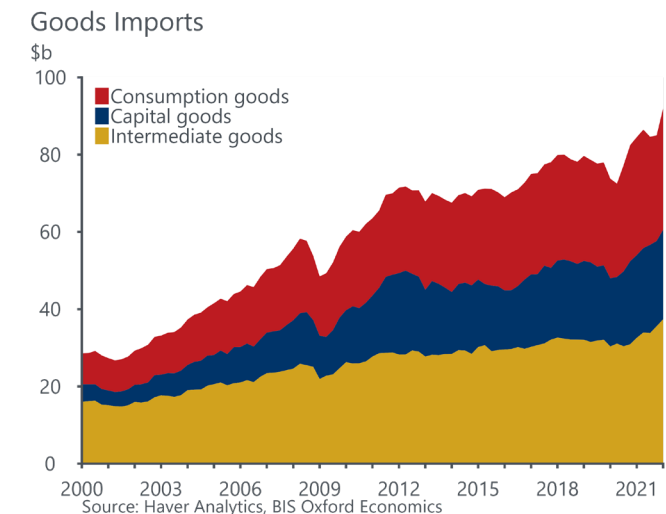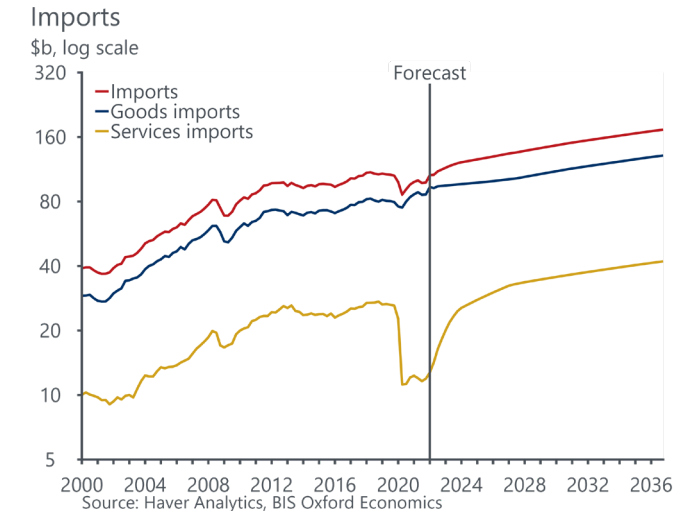Source: Haver Analytics, BIS Oxford Economics

Demand – Imports

Import growth has been quite subdued in recent years due to sluggish domestic demand. In the early 2010s, import growth was driven by capital investment in the mining sector, but this phase of the mining cycle has well and truly passed.

Elevated retail sales through the pandemic led to a sharp destocking of retail inventories. In order to rebuild these inventories, consumer goods imports have picked up very sharply over the past year. Supply chain disruptions have hampered this process and high oil prices are elevating shipping costs, weighing on the volume response. Supply chain bottlenecks still pose a downside risk to import growth in the near term, with additional lockdowns in China a key downside risk.

The strong uptick in machinery & equipment investment has supported capital goods imports, which recovered to their highest level since 2012. Supply issues are weighing on growth in this segment and fiscal support has been wound back. Further, the shift in business investment away from import-reliant machinery & equipment investment and toward intellectual property products will weigh on goods imports in the longer run.

Services imports were enormously disrupted by the pandemic, although they have now picked up from their nadir. Consumer hesitancy around travelling abroad is fading as lockdown restrictions end. Government incentives to support domestic industries will also weigh on imports. In the longer run, services imports will recover, although the import penetration rate for services will remain lower than the import penetration rate for goods because domestic substitutes are more readily available. In the medium term, we see annual import growth settling at around 2.5%.

Note: This is the outlook as at October 2022

Imports
$b, log scale

Source: Haver Analytics, BIS Oxford Economics

Goods Imports
$b

Source: Haver Analytics, BIS Oxford Economics

Risks to the outlook – China lockdowns

The outlook for the Chinese economy has deteriorated somewhat, with risks in the real estate sector mounting and threatening to spill over into greater financial stress. This comes against the backdrop of COVID suppression policies that have derailed momentum in the economy several times over. The looming threat of future lockdowns now appears to be imparting an ever present drag on sentiment and activity.
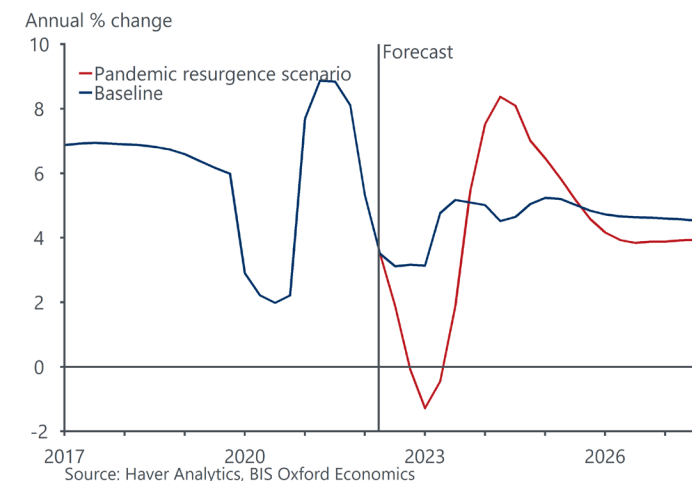
Our baseline forecast is for lockdowns in Chinese cities to gradually become less frequent, stringent and disruptive. The government now aims for "societal zero-Covid" (stopping the spread outside quarantine areas) to reduce the time required to lift restrictions, while making PCR testing part of everyday life in major cities to help maintain business operations.

However, under a scenario where China maintains its 'dynamic zero COVID' policy amid renewed outbreaks, and new variants that limit vaccine effectiveness, we would expect to see lockdowns flare up and disrupt Chinese and global supply networks. The ensuing price inflation and production cuts would lead to a sharp slowing in the Chinese economy – leading to growth of just 0.8% in 2022.
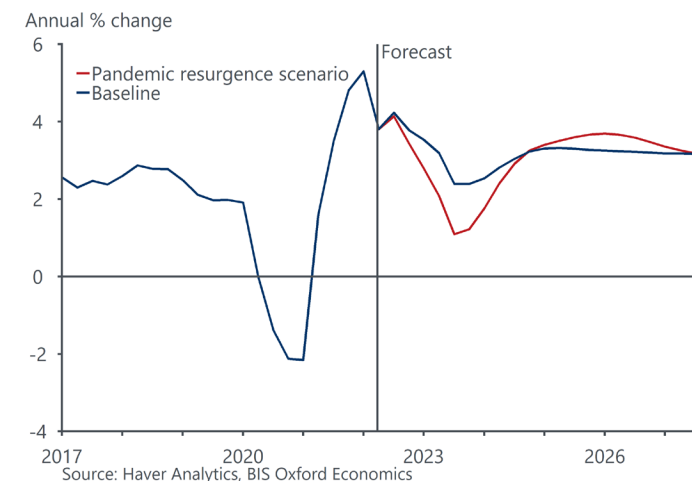
Such a scenario would cause a marked slowing in the Australian economy through several channels. Sharper imported goods inflation would cause a slowing in consumer spending and spur a more aggressive path for monetary policy if inflation expectations increase materially. Export growth would also slow sharply. Any delay to the resumption of tourism and student flows out of China would forestall the nascent services exports recovery. Mining exports would likely be insulated from the slowdown by any fiscal response in China, but other goods exports will face significant headwinds from a slowdown in consumer spending in China.

Note: This is the outlook as at October 2022

China - GDP
Annual % change

Source: Haver Analytics, BIS Oxford Economics

Australia - GDP
Annual % change

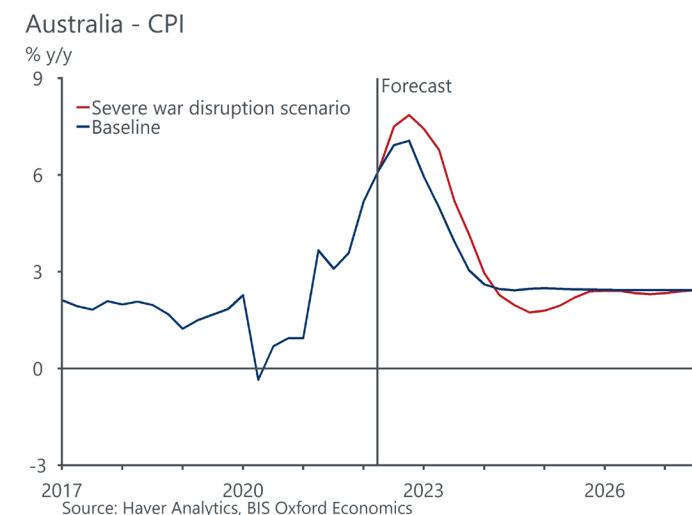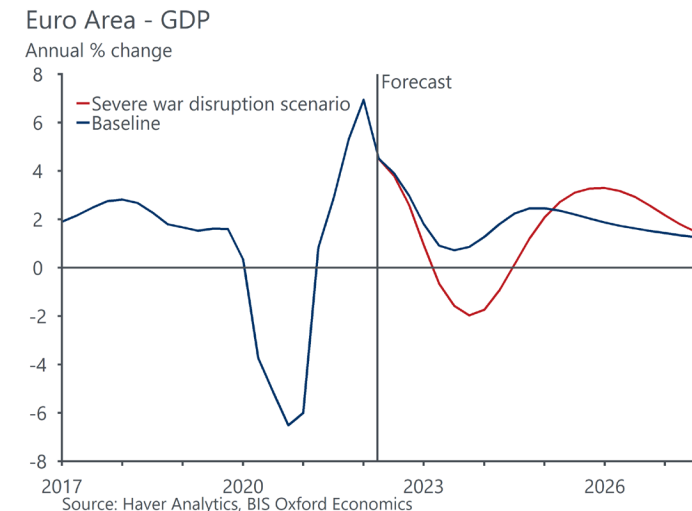Source: Haver Analytics, BIS Oxford Economics

Risks to the outlook – Russia-Ukraine conflict

Russia's invasion of Ukraine has had severe and damaging effects on the global economy. While commodity prices have started to normalize following the initial shock, the dislocation in energy markets will see prices for key commodities such as oil settle at a higher long-run level than we had previously expected. Our baseline forecast assumes that a very protracted military campaign is avoided, although this outcome is becoming less probable as several viable off-ramps from the conflict have been missed. Although most markets have evolved to a new normal around the conflict, risks are obviously skewed to the downside.

The Eurozone economy has enjoyed relatively strong conditions through the northern hemisphere summer, buoyed by stronger tourism activity. But winter will be much more challenging; some form of gas rationing is becoming increasingly likely as flows from Russia become less predictable. We expect economies in eastern Europe and those with a larger industrial sector will be worst affected as governments look to shield households from the worst of the shortages.

Under a scenario where energy supplies are severely curtailed, we would expect to see inflation in the Eurozone soar, pushing up inflation expectations and forcing central banks to tighten conditions. Our most recent scenario analysis points to a 1.8% contraction in output in the Eurozone in 2023 under these conditions, with higher interest rates, faster inflation and energy shortages all contributing to the recession.

Direct linkages through the real economy to Australia would be somewhat minor due to relatively limited trade linkages. However, any boost to commodity prices will make the RBA's tradeoff of tackling inflation while supporting growth more complex, contributing to a downgrade in our outlook for growth in 2023.

Note: This is the outlook as at October 2022

Euro Area - GDP
Annual % change

Source: Haver Analytics, BIS Oxford Economics

Australia - CPI
% y/y

Source: Haver Analytics, BIS Oxford Economics

Risks to the outlook – Higher interest rates

Amid concerns over managing inflation expectations and an assessment that demand-driven inflation has picked up, the RBA lifted the policy rate from its floor in May. Our analysis concurs that although supply factors are still responsible for a large share of inflation at present, demand has picked up and is exacerbating capacity constraints in the economy.

The cash rate has now been increased by 275 basis points over the past seven months to be 2.85%. The RBA has slowed its rate hiking pace, lifting rates by 25 basis points at the October meeting. By shifting to a 25 basis point increment, the Bank is signaling that the peak of the rate hike cycle is near. Our October 2022 outlook was for further increases over the period ahead, with an expectation of further 25 basis points of tightening in November and December.[1]
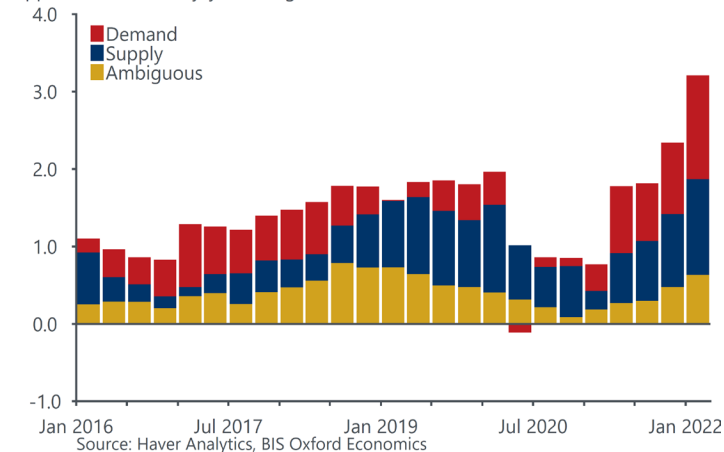
In our view, taking the cash rate much above this level would risk an unnecessarily abrupt slowing in growth in 2023. The labour market is strong, shoring up the fundamentals for consumer spending. But the headwinds to consumer spending are mounting. Fast inflation is contributing to rising cost of living pressures that are squeezing real incomes. But more aggressive policy will do little to curb supply-driven inflation; patience is needed to ride out the adjustment in oil and food prices, which are expected to turn disinflationary over H2 2022. Moreover, higher interest rates already appear to be curbing consumer activity, and the impacts of the rate rises to date are yet to be fully felt. Indeed, there is a large cohort with fixed rate mortgages that will face much higher repayment costs in the coming years.

Consumption deflator
ppt contribution to y/y % change

Inflation and the cash rate
% y/y

Source: Haver Analytics, BIS Oxford Economics

Source: Haver Analytics, BIS Oxford Economics

Note: This is the outlook as at October 2022
Footnote 1: Both rate rises in November and December eventuated as expected.
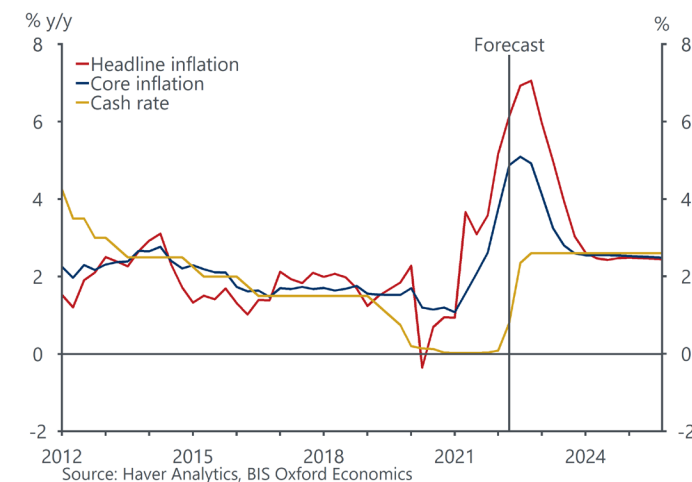
Baseline

Baseline - Summary

Container Volumes – Baseline – Port of Melbourne

TEUs

Legend:
- Containerised Full - inward
- Containerised Full - outward
- Transhipments - Total
- Containerised Empty
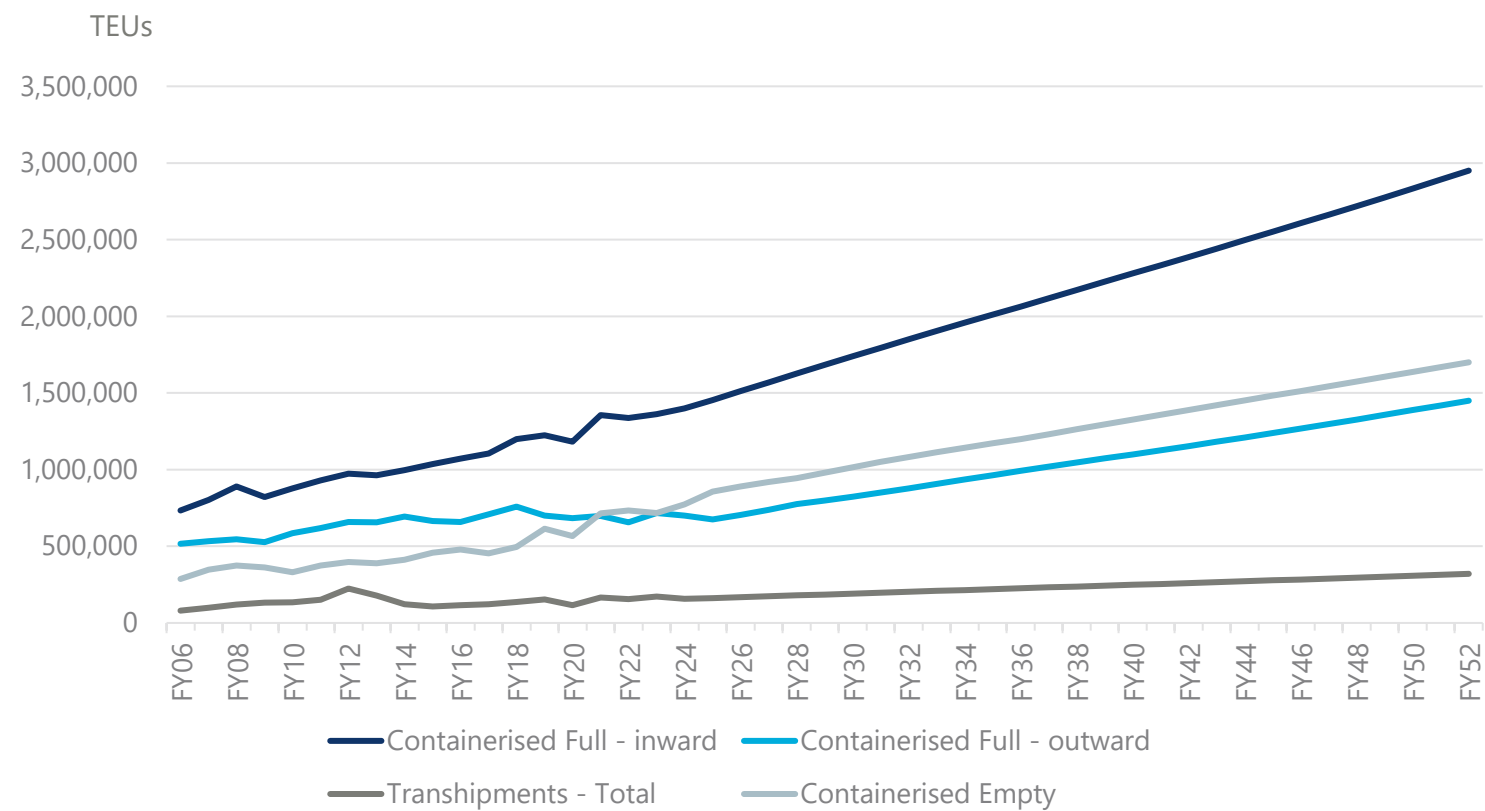
Baseline Results

In our baseline forecasts, the total container trade is forecast to grow at 2.71% CAGR from FY22 to FY52. This compares to a 3.68% CAGR between FY06 and FY22.

Baseline Methodology - Summary

To forecast trade volumes, BISOE has custom-built a structural econometric model, which decomposes trade into different categories and forecasts volumes for each category based on estimated relationships between trade volumes and their underlying microeconomic and macroeconomic drivers.

Further details on the methodologies of each category are provided in subsequent pages.

Container Imports - Methodology

Container Imports are modelled using key economic and demographic drivers

For container imports, BISOE looked at seven distinct import classes which cover almost all TEU volumes. Of these, three are considered to be consumables, one as a capital good, and the remainder intermediate goods.

The three consumer categories are:

- **ICA –** food and beverages predominately for household consumption,
- **IC4 –** non-food household consumables,
- **IOA –** parts required for the continued operation of motor vehicles (mostly tyres).
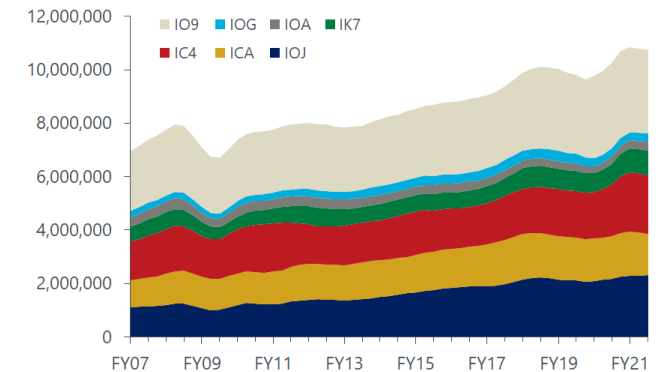
The capital goods category include:

- **IK7 –** containerised machinery and equipment and select intermediate goods (parts for machinery and equipment, and heavy motor vehicles requiring final assembly).
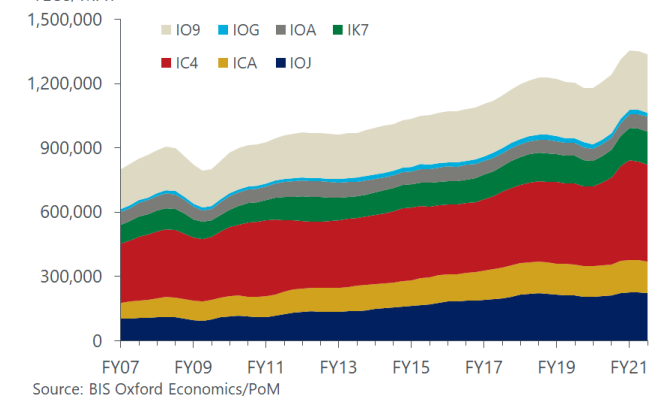
The intermediate goods include:

- **IOJ –** building materials
- **IOG –** steel
- **IO9 –** other intermediate goods.

For each of these commodity groupings, BISOE has estimated the long run relationship between the dominant macroeconomic or demographic factor and the mass of imports at a national level, with further consideration given to the trends in the composition of imported cargo by container sizes and the implications of this will have on TEU volumes distinct from that of the mass of the cargo itself. Furthermore, as the distribution of trade into the country can evolve over time, an assessment of the prospects at each port is considered incorporating trends in dispersion/ concentration among ports for that trade and the demand outlook in the hinterland vis-a-vis the national profile.

Container Imports (mass tonnes), Port of Melbourne
Mass tonnes, MAT

Source: BIS Oxford Economics/Port of Melbourne

Container Imports (TEUs), Port of Melbourne
TEUs, MAT

Source: BIS Oxford Economics/PoM

Note: MAT refers to moving annual total (rolling 12-month sum).

Container Imports – Methodology (cont.)

- The macroeconomic models used by BISOE are re-calibrated monthly, based on newly available data. For most macroeconomic indicators, new data is made available on a monthly basis. Demographic data is a slower process with quarterly releases from the ABS, although it is generally a much slower moving variable thus its less timely release is less of a concern. The trade models are recalibrated half-yearly.

- BISOE checks current forecasts against previous forecasts and changes are logged explaining reasons for changes to the outlook and makes some adjustments to the raw data with a suite of aggregations which align to the categories observed.

- These include:
    - measures of construction (using work done or gross capital formation) which best align with the trade volumes observed
    - retail activity (using retail turnover categories) which best align with the trade volumes observed
    - merchandise import volumes allocated to seven broad groupings
        1. food and beverages for human consumption,
        2. consumer goods,
        3. motor vehicle parts,
        4. capital goods and parts,
        5. processed industrial goods,
        6. iron and steel,
        7. other intermediate goods.
    - These have been calibrated using ABS definitions of end use categories (using Balance of Payments Broad Economics Categories) and have excluded goods which are predominately bulk (using the Port of Melbourne's own trade statistics).

Full Container Imports – Bottom-up outlook

Total TEU forecasts are generated by summing growth within each trade category.

Consumer Goods
34% (of FY22 full direct imports)

At the national level, imports (*mass tonnes*) per million dollars of non-food retail turnover has flatlined post-GFC. However, through COVID-19, mass tonnes per dollar spend has increased sharply as the consumption mix has shifted towards goods (clothing, footwear, furniture, electronics) while overseas travel and social activities has been curtailed.

This shift towards goods consumption will be temporary, and we expect consumption will rebalance toward services. This process has tentatively started on a couple of occasions, only to be thwarted by lockdowns. High vaccination rates and a booster program well underway has ameliorated some of the risk of returning to strict lockdowns that could undermine this rebalancing.

Melbourne's market share for consumer goods imports (as a share of national consumer good imports) has drifted up gradually from 31% to 34% since FY16. Port of Melbourne's market share to remain at its current levels over the forward outlook, having lifted in recent years.

Other Intermediate Goods
21%

Other intermediate goods has exhibited low growth over the last three decades, with mass tonnes per unit of GDP declining consistently. Although the intensity factor has declined in recent years, it is projected to remain flat over the forward period.

Internationally, strength in intermediate goods imports is highly correlated with economic cycles due to their use in manufacturing, but through COVID import volumes were supplemented by unusual surges in plastic, plexiglass, and cleaning products.

The Port of Melbourne's market share has steadily climbed since its low in 2011 at 17%, reaching 21% in by the end of FY22. Over the forward outlook, its share is expected to hold at current levels throughout the forecast period.

Processed Industrial Supplies
17%

Imports of processed industrial supplies, largely reflecting building materials, has lifted sharply through the pandemic. This largely reflects an upturn in the residential investment cycle, induced by HomeBuilder and other incentives. However, acute material and labour shortages are set to persist all the way through 2022, causing project delays and sustaining a high rate of construction cost inflation. This means that the activity is anticipated to hold at an elevated level for an extended period, as builders work through the substantial backlog of work to be done.

A second smaller peak in growth in building material imports is anticipated around FY24 as apartment construction growth begins to gather pace while the backlog of detached housing investment is worked through.

Longer term, processed industrial supply imports now includes a trend component, with growth in mass tonnes per dollar spent on building construction activity growing at around 0.8% p.a. CAGR with pace gradually slowing over time. This trend was externally validated against the international experience of processed industrial supply import relative to dollar spend in building activity.

After increasing through FY14 and FY15, the Port of Melbourne's share of national imports has broadly stabilised since 2016. Given the current residential investment upturn is widespread across the nation, we expect similar stability over the outlook with Melbourne's market share increasing only half a percent to 14% by FY50.

Full Container Imports – Bottom-up outlook (continued)

Total TEU forecasts are generated by summing growth within each trade category.

Capital Goods
12% (of FY22 full direct imports)

Capital good imports have grown sharply through the COVID-19 pandemic. Strong incentives from the Federal Government provided firms with strong incentives to undertake machinery and equipment investment (M&E), given the expanded instant asset write-off scheme allows firms to deduct the entire cost of qualifying assets.

After a stronger period for M&E expenditure and weaker period for building and structures, the near-term is expected to see investment rebalance towards more normal share of investment. Beyond FY22, growth is expected to re-adjust back towards more balanced growth profile for Victorian M&E expenditure.

The 20ft share of containers has been declining, which will continue over the forward outlook albeit at a slower rate. This contributes positively to TEU growth over the outlook.

After gradually declining post-GFC, Melbourne's market share has climbed from a low of 20% in FY15 to just above 26% at the end of the FY22, although with a moderate degree of volatility. Over the outlook, its market share is forecast to increase marginally to 27% by FY50.

Food & Beverages
11%

The Port of Melbourne's market share has gradually declined from 42% in 2009 to 37% in 2022. Its market share is projected to slowly rise back to 39% by FY50 as Victoria's share of population increases.

Post-GFC, imports of food and beverage per capita nationally (in mass tonnes) have increased around 2% p.a. Imports per capita are projected to continue increasing over the forward outlook at a similar pace.

The 20ft share of containers has declined by around 3% p.a. since 2009. This shift is maintained over the forecasts, although with the pace of declines moderating. Ultimately, the continued shift adds to growth in TEUs.

Parts for Motor Vehicles
5%

Forecasts for motor vehicle parts (chiefly lead acid batteries and tyres) are forecast to grow in line with underlying population growth of Australia, as the stock per capita is projected to hold at approximately the same level.

National imports rose through the pandemic. Disrupted supply chains of motor vehicles globally impeded the ability of households to purchase new cars. Sharply rising imports of parts may reflect households' running their current cars for longer as a result and thereby requiring new components (particularly those conducive to wear i.e. tyres).

In the ten years preceding the COVID-19 pandemic, Melbourne consistently lost market share of motor vehicle parts imports from 56% in 2009. It is believed to have troughed in FY22 at 28%, where it is expected to gradually lift to 29% by FY50 as Victoria's share of the population increases.

Iron & Steel
1%

Iron and steel imports have been pulled out of other intermediate goods, and are now driven by a combination of Gross Value Added (GVA) in manufacturing and construction due to its respective roles as intermediate goods in the production process.

Melbourne's share of iron and steel imports is relatively small at around 6%. In the decade preceding the pandemic, its market share steadily climbed from 8% to as high as 11%. Subsequently, it has pulled back through the pandemic to 5.7% as of end of FY22.

Empties (excl. Bass Strait)

COVID related disruptions have now unwound

Empty to Full Export Ratio

Empty to Full Import Ratio

● Import Ratio q ——— Import Ratio MAT
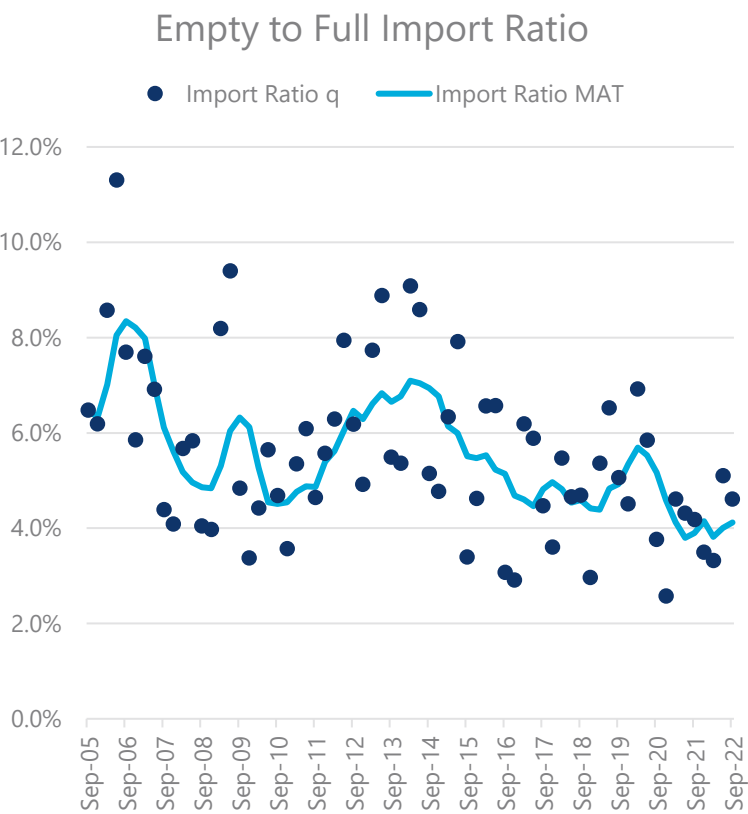
Methodology

Empty imports are calculated as a % of total full imports. Currently, these amount to 4.1% of all imports.

Empty exports are calculated using a difference between the total imports (i.e. full imports and empty imports) less the full exports and **net imports** (i.e. total imports less total exports).

Recent deviations from the long-run average net import levels are seen as temporary due to a host of supply chain issues, and have been unwound during FY22.
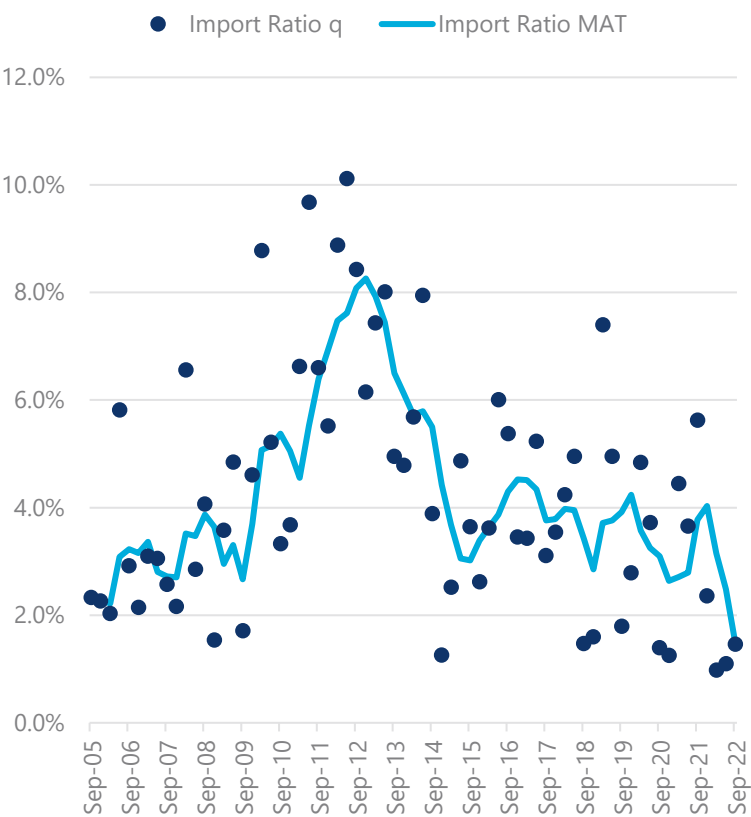
Net Imports

Net Imports

■ Net Imports MAT   ■ Net Imports q
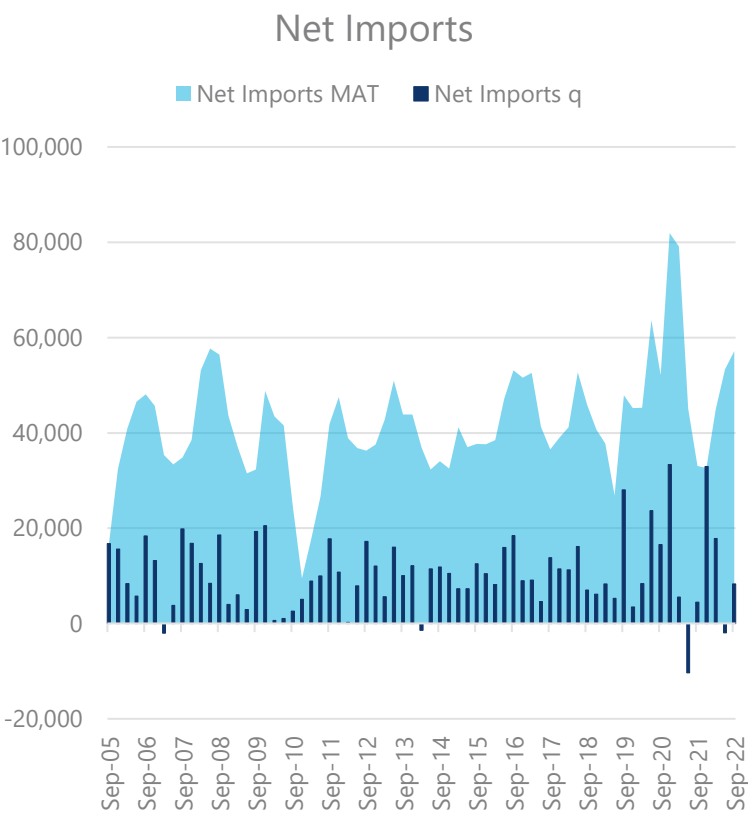
MAT refers to moving annual total (rolling 12-month sum). Q or q, refers to quarterly.

Transshipment

Transhipments are calculated in a similar manner to empties.

Tranship Empty to Direct Empty

Methodology

Import and export transhipments average to be the same each year, and full and empty volumes are calculated as a share of the dominant direction of trade (i.e., full imports and direct empty).

Recent increases in transhipments have been assumed to be permanent adjustment in market share, translating to market share holding at a higher level.

Tranship to Direct Import Ratio
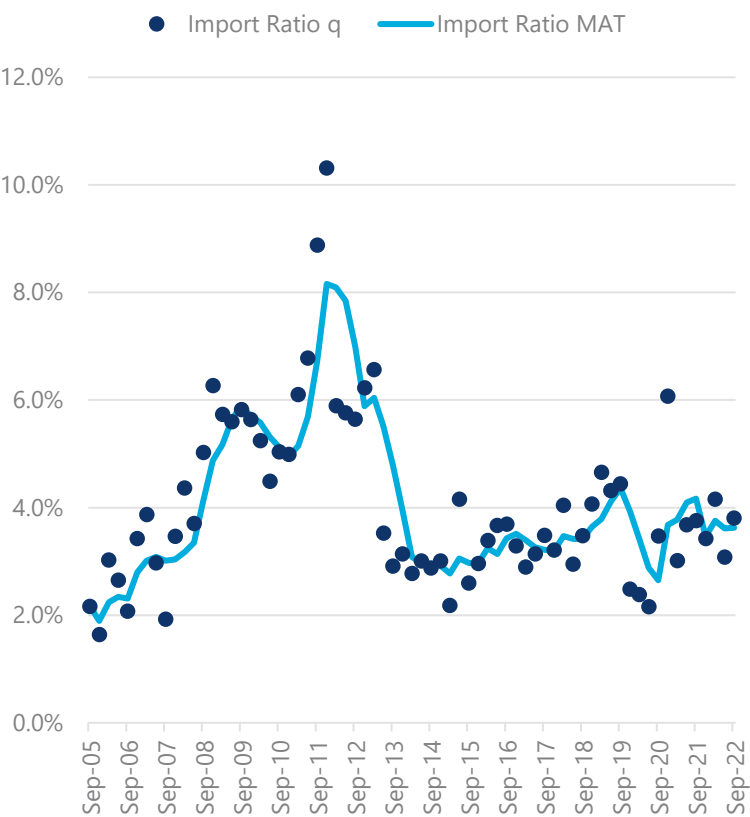
MAT refers to moving annual total (rolling 12-month sum). Q or q, refers to quarterly.

Sensitivity Analysis

Overview

BISOE's preferred approach for assessing long-term container volumes

General approach for modelling

In assessing the future long-term demands for container volumes at the Port of Melbourne, BIS Oxford Economics has adopted a wholistic long-term approach which looks at all container volumes through the Port.

There are three different aspects to international container freight which will be examined in sequence:

(1) Direct Imports = (1a) Full imports + (1b) Empty Imports

(2) Direct Exports = (2a) Direct Imports – (2b) Net Imports

(3) Transhipments = (3a) Tranship Imports + (3b) Tranship Exports

Note that Direct Exports are not modelled directly, rather as a difference between Direct Imports and Net Imports, as the Port of Melbourne's dominate full container flow is inbound. Furthermore, the variance on (2b) Net Imports is small, and is therefore excluded from the sensitivity analysis.

As a result, we only explicitly consider sensitivities to container imports and transhipments, with empties calculated implicitly and container exports unchanged.

Assessing appropriate uncertainty bands and sensitivities

In general, the approach for assessing appropriate sensitivities for each of the explicitly considered container categories – full container imports and transhipments – has been to determine what one might reasonably expect the range of possible outcomes to be.

For container imports, possible outcomes can be influenced by several different factors, such as different economic conditions or rates of import penetration. Here we have sought to determine what possible outcomes would be feasible amongst these contributing factors, before combining them to form alternative trajectories for container imports.

Similarly for transhipments, we have sought to determine a range of possible outcomes for the size of transhipments compared to full container imports.

After determining upper and lower bounds for these categories of container trade, the empties trade can be calculated – with exports and net imports assumed to be unchanged – to determine a set of feasible upper and lower bounds for the total container trade at the Port of Melbourne.

Full Imports

Full imports are modelled using a two step approach

Sensitivities

For scenario modelling, BISOE considers two sensitivities:

1. Economic Growth

2. GDP Multiplier

Long-term differences in **Economic Growth** are assumed to apply equally to Australia (via GDP) and the State of Victoria (via Gross State Product, or GSP). The scenario models are agnostic as to whether this is via changes in the population outlook, or via changes in long-run productivity.

For the **GDP Multiplier**, BISOE uses the forecast change in the ratio of mass tonnes to Victorian GSP developed in the Baseline bottom-up assessment as the central outlook, and from there considers alternative top-down cases based on cross-country analysis.

Containerisation

While containerisation is a key explanatory component of the growth in TEUs above that of imports in mass tonnes, differences from the baseline have been excluded from the scenario modelling.

Containerisation includes changes in mode (from bulk to/from container) as well as changes in the composition of container (i.e. 20ft vs 40ft ISO containers). For exports, the mode change has a material impact on container growth, whereas for imports, it is the shift between 20s and 40s.

As a general rule, the growth in import 40s have vastly outpaced that of 20s, and the mass/TEU exhibits a clear difference between the two container types (but it is consistent over time). All scenarios consider a continuation of the trend towards 40s, which have been observed at all of the major east-coast container ports.

Market share

We have assumed Port of Melbourne's market share remains unchanged from baseline and therefore has been excluded in the sensitivity analysis.

If its market share were to deviate from baseline – either to the upside or downside – we may expect the upper or lower bounds to change.

A note discussing historic and forecast changes in port market shares by commodity grouping is covered later in this report.

Economic Growth

Long-term models of economic growth generally use an additive approach

$$Potential\ real\ GDP\ =\ population\,(15+) \times participation\ rate\ \times\ (1-NAIRU) \times avg\ hours\ worked\ \times\ productivity$$

Common sensitivities are typically around population (on the upside) and on productivity (on the downside), with the combined impact of both representing a standard deviation of 0.3% p.a. (over 30 years, this accounts for a range of ~±10%).

The shape of the uncertainty band is assumed to have the standard deviation increasing at a decreasing rate, converging to the ~±10% range over the medium term. This is consistent with uncertainty in the forecast increasing over term, albeit with the convergence in growth outcomes over longer periods.

For example, the recent discussions by the Federal Treasury department about changes to skilled migration flows mooted to be discussed at the upcoming jobs and skills summit and captured in the forthcoming October Budget represent growth circa 0.2% to the upside on a per annum basis from previous Treasury assumptions, whereas the lower labour force productivity measurements reflect a decline of 0.3% to the downside in the federal outlook. These alternative forecasts are consistent with the assumed uncertainty band.
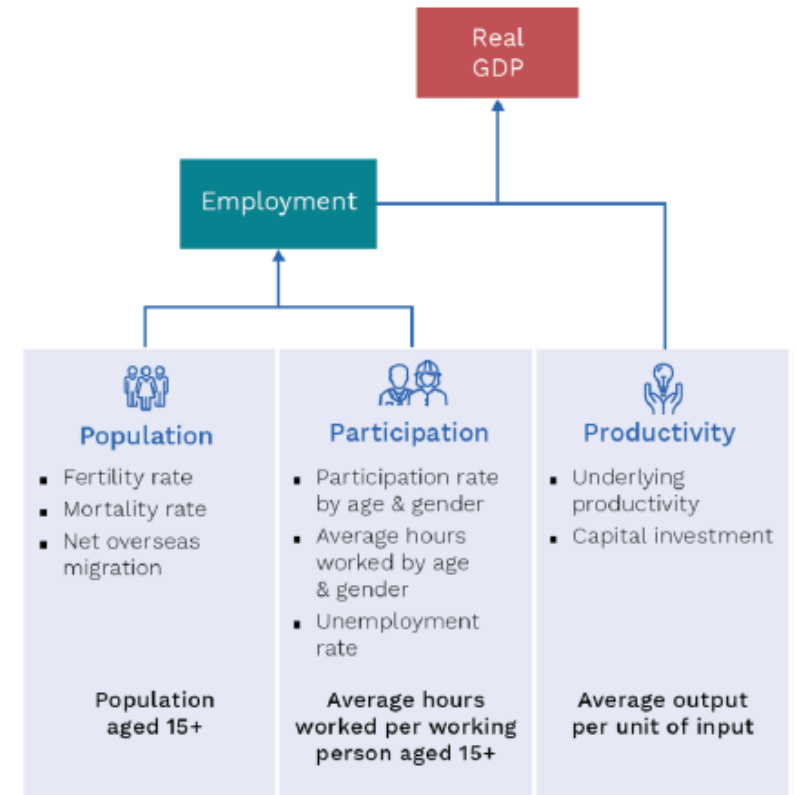
[1] **NAIRU** – non-acerating inflation rate of unemployment. The NAIRU is the lowest unemployment rate that can be sustained without causing wages growth and inflation to rise, and is in essence the long-term sustainable capacity of the labour force.
https://treasury.gov.au/publication/2021-intergenerational-report

GDP Multipliers

BIS Oxford Economics has developed a cross-country comparison of containerised trade using a discrete list of Harmonised Codes[1] which are predominately moved via unitised cargo.

Looking at select developed countries, there is a wide range of intensities and change over time in the ratio of unitised cargo as a share of GDP. However, a number of broad observations may be made:

- Intermediate goods (i.e. building materials and inputs into manufacturing) are the dominant import cargo for the selected countries.

- Over the past two decades, the ratio of unitised imports to GDP within each country have not been uniform or unidirectional, but rather have covered a spectrum of ±3% from a base year.

Tonnes per Unit of GDP (USD PPP)
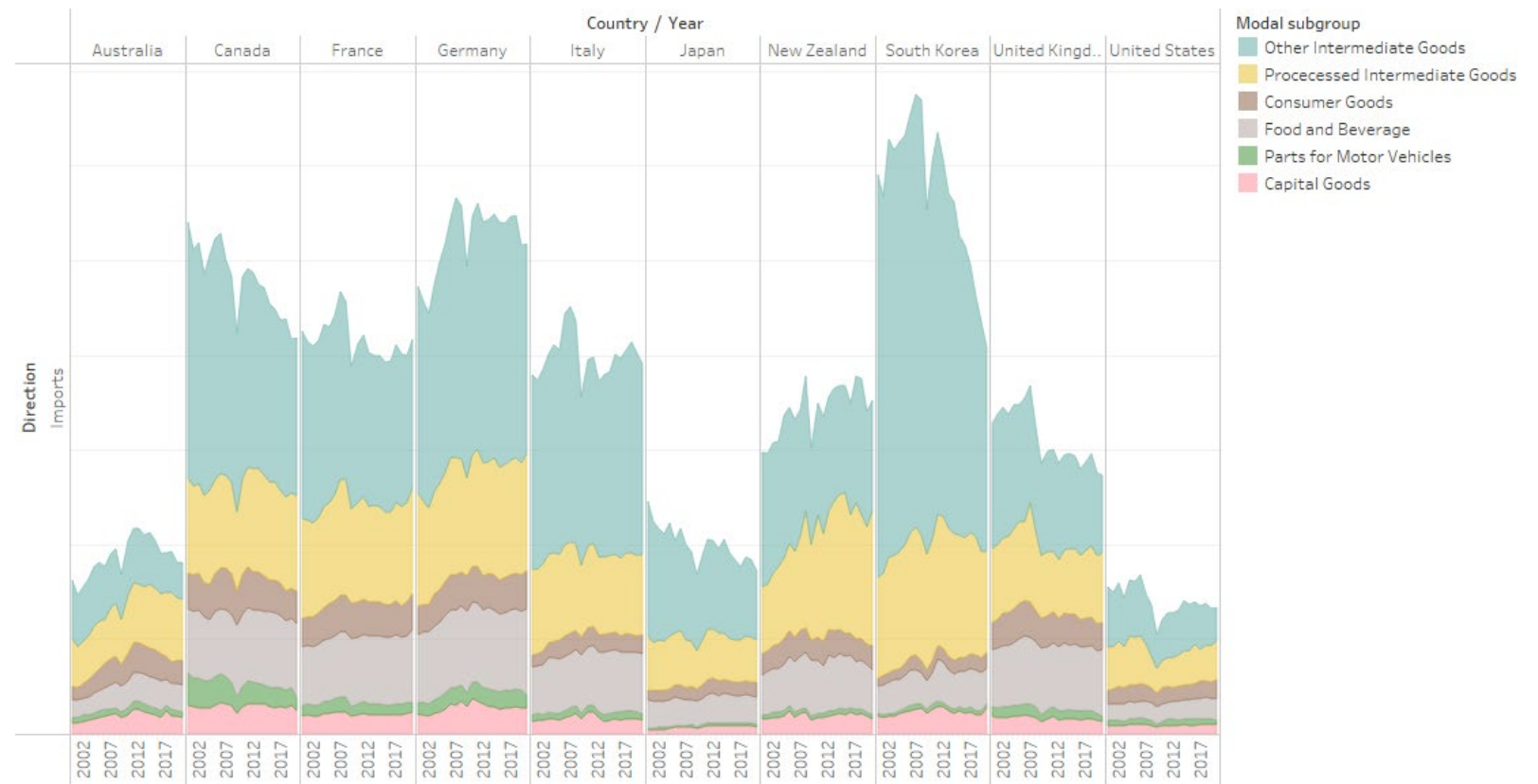
[1] Harmonised codes is the six-digit standard for classifying globally traded products, administered by the World Customs Organisation. http://www.wcoomd.org/en/topics/nomenclature/overview/what-is-the-harmonized-system.aspx

GDP Multipliers

## Methodology for understanding risks around the GDP multiplier

The approach we take to understanding the risks around GDP multiplier as to be applied over the forecast horizon is detailed below.

Firstly, we use a set of 27 comparable economies, that span most of the OECD and with a sample stretching from 2000 to 2020. Using this sample of economies and years, we calculate all growth rate combinations in the ratio of unitised import volumes to GDP i.e. all single year growth, all two-year growth....up to 20-year growth. Here the increments of growth are between 1 and 20.

From here, we are able to estimate standard deviations for all lengths of growth rates across the cross section of economies in the comparable set. This enables us to fit an equation to help understand how the distribution of growth outcomes evolve between single year increments to longer year increments. The rationale for this is to be able to understand the shape of the 'forecast uncertainty' around the GDP multipliers i.e. constantly increasing uncertainty bands or increasing exponentially or increasing at a decreasing rate.

We observe that the variation in growth outcomes increases as the growth increment increases albeit at a declining rate. Importantly, this result defines the shape (concave) and the width of the upper and lower bounds. At a 50% confidence interval, we would expect the import volumes to GDP ratio to fit between ±17% by the end of the forecast horizon.

Ratio of upper/lower to baseline
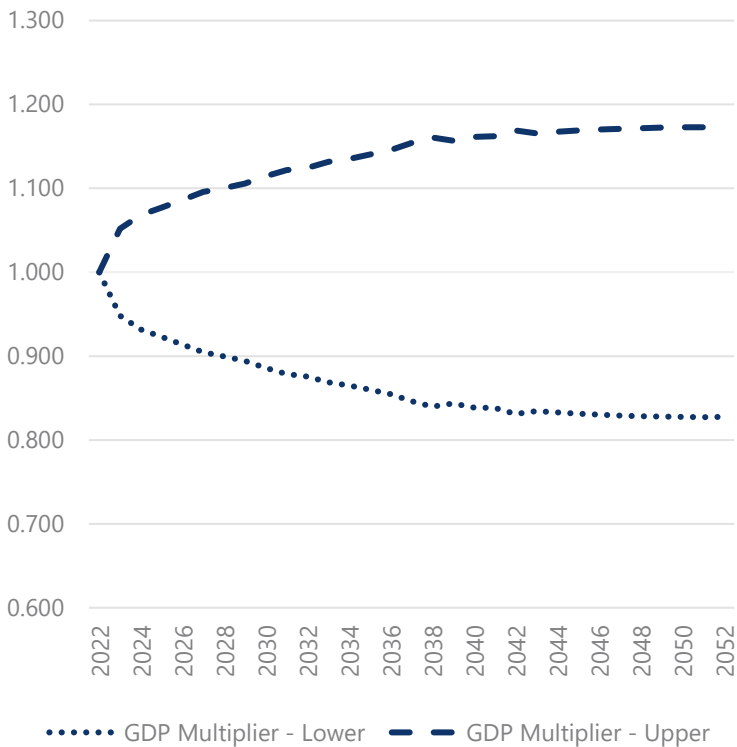
GDP Multiplier - Lower   GDP Multiplier - Upper

Transhipments

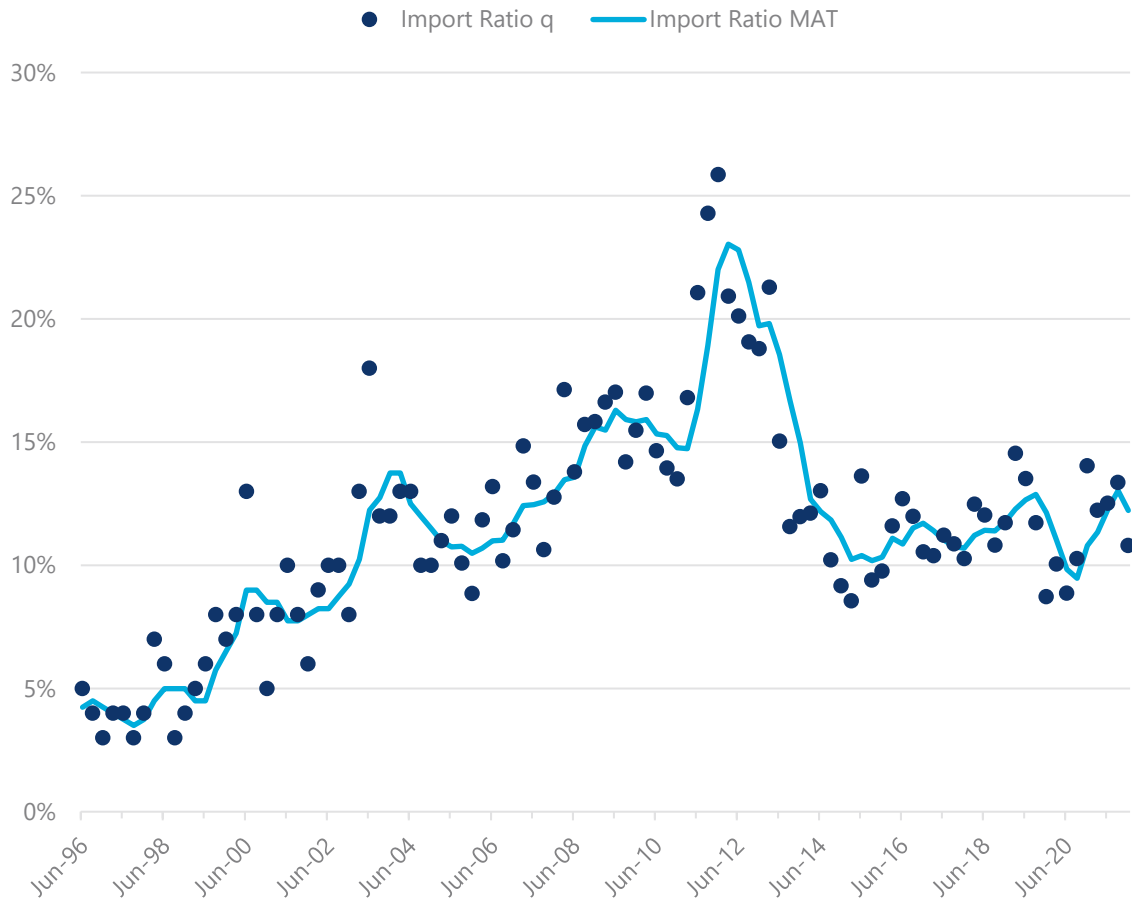## Transhipments are modelled on the dominant direction of trade i.e. full direct container imports

Transhipment cargo is defined as cargo that is unloaded from one vessel in the port and reloaded for export on another vessel *[ref: PoM 2022-23 RTS, p.5 footnote 9]*.

Import and export transhipments average to be the same each year, and full and empty volumes are calculated as a share of the dominant direction of trade (i.e. full imports and direct empty).

Transhipments as a share of full container imports has fluctuated within a much tighter range since 2014, with a mean of 11% of full direct container imports.

Over the period, the standard deviation of the ratio was 0.9%. Over the full sample however, transhipment has moved in a wider range. In 1996, transhipments were only around 5% of full container imports before gradually trending towards a peak of 23% in 2012 and subsequently falling back towards 11% where it has broadly remained since. Using the full sample, the standard deviation of the ratio of transhipments to full direct imports is 4.3%.

Legend: ● Import Ratio q — Import Ratio MAT
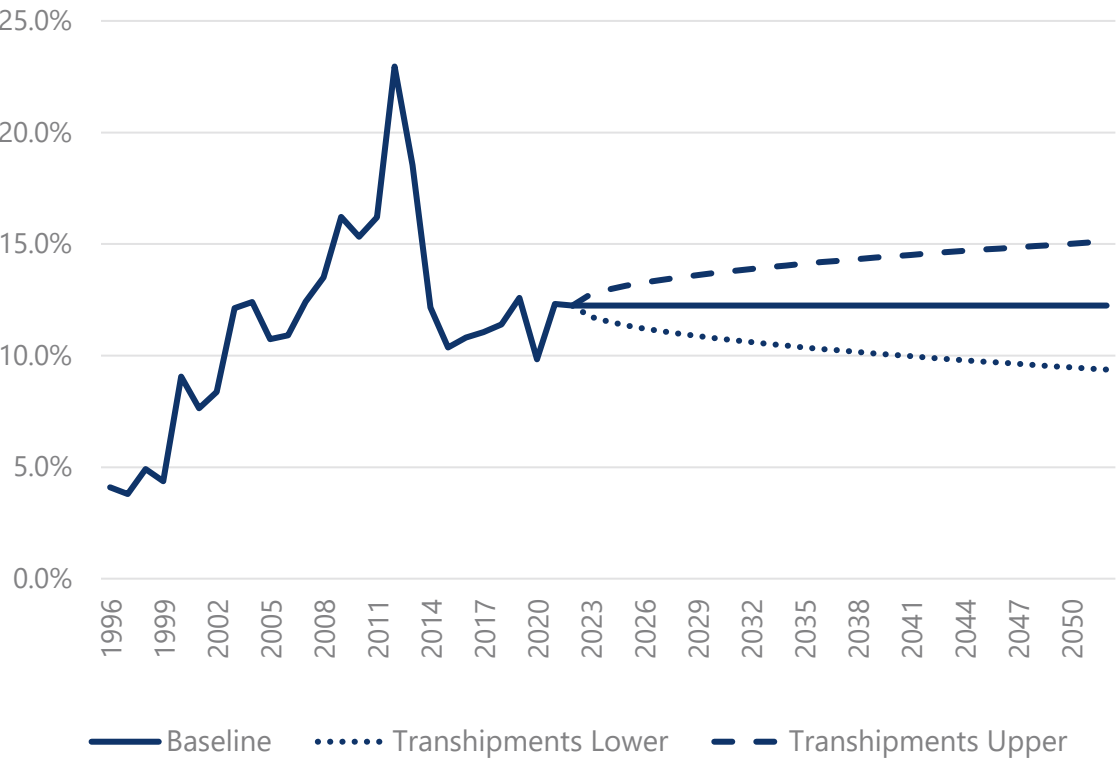
Transshipments

Transhipments are modelled on the dominant direction of trade i.e. full direct container imports

Over the forecasting horizon, we utilise the narrow standard deviation (estimated post-2014) in the short term before increasing towards the full sample standard deviation (estimated 1996 to 2021). The standard deviation increases at a decreasing rate[1] as it converges to 4.3%.

Using this profile for standard and the critical value for a 50% (two-tailed) confidence interval, the ratio of transhipments to full direct would fluctuate at the most ~±1.8% either side.

Importantly, the implications of different full container imports impacts transhipment volumes through this ratio. If the ratio of transhipments is constant but container import volumes were higher or lower, transhipments would be different. Similarly if container import volumes were unchanged but the transhipment ratio deviated from baseline, transhipments would also change. Therefore, the uncertainties from container imports volumes has a multiplicative relationship to transhipments.

Ratio of transhipments to full direct imports

Legend: Baseline ····· Transhipments Lower ‒ ‒ Transhipments Upper

[1] The standard deviation increases at a decreasing rate over time, according to a fitted logarithmic curve that has been estimated according to how the standard deviation of the transhipment to direct full imports ratio has evolved over the history.

Q & A

Domestic Supply Chains

Will the introduction of the Inland Rail network change the risks to the TEU profile?

Yes, the impact of Inland Rail has the potential to redirect volumes away from competing ports to PoM, however the risk is balanced by the potential of PoM to lose market share to the other end of the Inland Rail network (Brisbane).

In 2022, 96.6% of inbound volumes into the Port of Melbourne have specified Victoria as the destination market, and approximately 27% of inbound container volumes (measured in mass) arrived via the Port.

As the primary destination market for most imported cargo is the capital city itself, the Ports emerge as natural monopolies for inbound cargo movements (a slight exception applied for cargo destined for Adelaide, which historically saw significant volumes land-bridged through Fremantle and Melbourne).

Note that this logic does not apply to exports, which are often sourced from regional areas and do not have a natural preference for a single port.

The scenarios developed by BIS Oxford Economics container capacity analysis consider total TEUs, which are:

      Total TEU **=** Direct Imports + Direct Exports + Transhipments

      Direct Exports = Direct Imports – Net Imports

Note that Direct Exports are not modelled directly, rather as a difference between Direct Imports and Net Imports, as the Port of Melbourne's dominate full container flow is inbound.

As such, changes in the market share of export volumes do not impact the capacity requirements of the Port of Melbourne, and further analysis is not required.

Containerised Imports - Port of Import - State of Destination
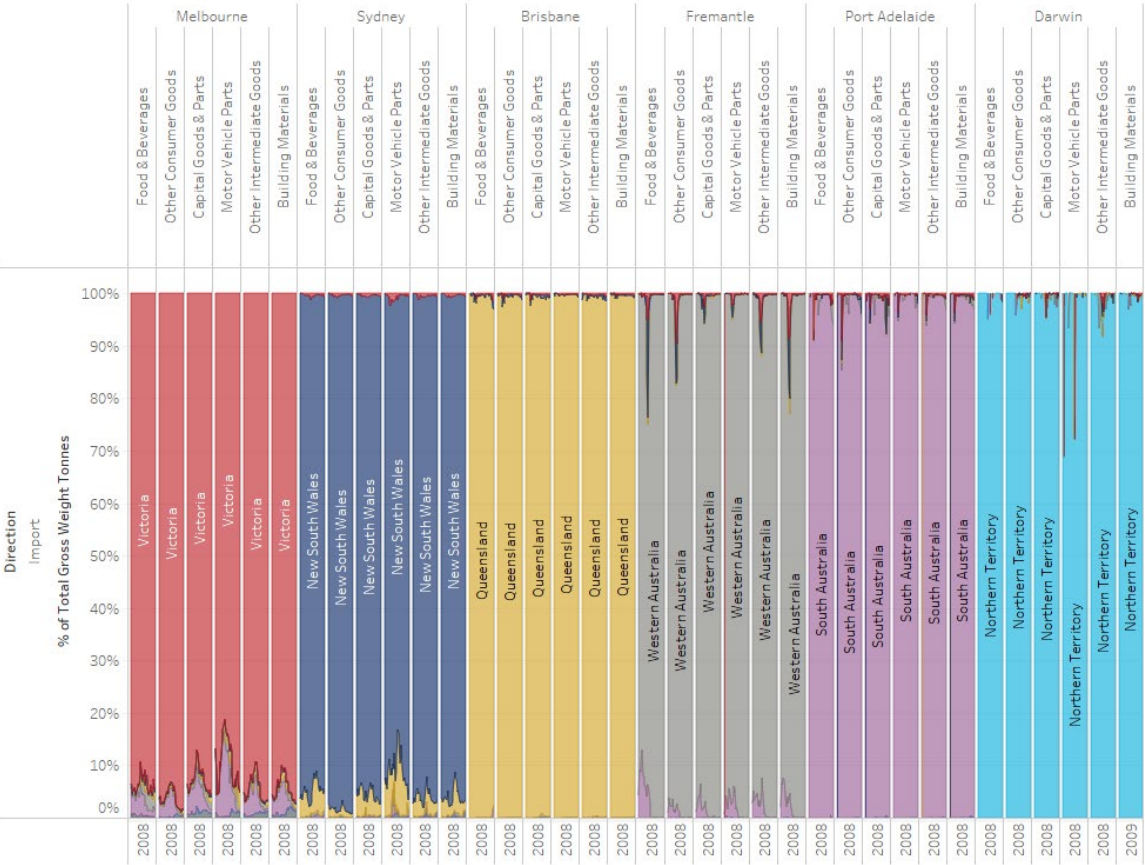
Free Trade Agreements

Will new FTA provide upside risks to the TEU profile?

It is BISOE's view that the impact of additional FTAs will not have a material impact on the import volumes into Australia (and by extension the PoM), as most of the substantive imported commodities have already hit saturation levels (measured as imports as a share of local consumption). The exception here is food where BISOE sees continues growth in import penetration over time.

Declining growth rates

Why do volumes decline over time?

There are **five** substantive reasons as to why a mature economy such as Australia will have diminishing container growth over time.

1. The rate of population growth is easing over time. This comes via two different channels, decreasing natural population growth (Australia's fertility rate is below that of the replacement level) and net overseas migration falling as a share of population (which is driven by an assumption that the level of net overseas migration remains fixed over the long-term). This is a widely held view by most demographic models within Australia.

2. BISOE assume declining labour force productivity and diminishing improvements in labour force participation (due to demographic changes, largely driven by females born after 1975 making up a larger share of the female workforce). Both of these have a larger positive impact over the near term.

3. The diminishing population growth and productivity measures will lead to a smaller share of materials intensive aspects of the economy (such as building construction) over time. This amplifies the impacts of points (1) and (2) above.

4. The import shares of components of the economy which continue to grow (building materials and food) in the BISOE models do not growth exponentially, rather linearly. As such, the outperformance of the growth in imports (vis-à-vis the domestic demand driver) diminishes over time.

5. The positive impact that the shift towards 40ft containers has upon total TEUs (where TEU growth outpaces that of the mass of the cargo itself) diminishes over time as the 40ft share of total containers saturates (it cannot be higher than 100%).