BIS OXFORD ECONOMICS

Energy Queensland

COST ESCALATION FORECASTS TO 2024/25

OCTOBER 2019

BIS Oxford Economics

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October 2019

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+3.6%

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REAL COST ESCALATION FORECASTS TO 2024/25

On 15 August 2019, BIS Oxford Economics was engaged by Energy Queensland to provide updated price forecasts of labour, materials and construction costs that are relevant to the Queensland electricity distribution industry for the period 2019/20 – 2024/25 (FY20-FY25), with specific reference to the next regulatory period of FY21 to FY25. Forecasts for wage escalation will be used by Energy Queensland to develop the real price changes over its upcoming regulatory period, which, in turn, will be used by the business to construct its operating expenditure forecasts. Forecasts of price escalation factors for material costs, which are key inputs to various asset classes, and construction costs will be used by Energy Queensland to develop its capital expenditure over the next regulatory period.

BIS Oxford Economics expects total wage costs for the Australian Electricity, Gas, Water and Waste Services (EGWWS or 'Utilities) sector — as measured in the Wage Price Index — will grow (escalate) by an average of 3.6% y/y over the five years to FY25, 0.3% higher than the national 'All Industries' average over the same five-year period.

The electricity, gas and water sector is a capital intensive industry whose employees have higher skill, productivity and commensurately higher wage levels than most other sectors. Strong union presence in the utilities sector will ensure outcomes for collective agreements, which cover around 65% of the non-managerial full-time workforce, remain above the wage increases for the national 'all industry' average.

Furthermore, increasing demand for skilled workers from the mining and construction industries – who compete for similarly skilled workers as the utilities industry – will also put upward pressure on wages in the utilities sector. The mining sector is now embarking on a strong upswing in investment and will need additional workers to operate new mine sand facilities. Meanwhile, rising demand from higher activity in the non-residential building and civil engineering construction sectors (the latter as infrastructure projects ramp over the next few years), will also add to labour demand and wage pressures, although this will be somewhat offset by the current downturn in residential building. However, when residential building recovers from FY22 and the three construction sub-sectors synchronise, wage pressures will intensify over FY22 to FY24. Construction wages – which BISOE recommends Energy Queensland use the cost escalation indicator for outsourced contracted labour – are set to accelerate over the FY22 to FY24 period, and push above the national average at the peak, although they will continue to lag the national average in the near term.

The outlook for materials prices to FY25 is mixed. Copper, a key material for the electricity industry, is expected to see particularly real price growth of 1.0% on average over the 5 years to FY25 in A$ terms, buoyed by infrastructure spending on renewable energy projects and increased demand from China. Note that although we have provided separate forecasts for commodities by BISOE and the Department of Industry and Resources (Office of the chief

Economist), the AER has in the past shown a preference for 'market' or 'consensus' price forecasts. We have used the regular forecasts from the Consensus Economics '*Energy & Metals Consensus Forecasts*' (EMCF) and the exchange rate forecasts from Consensus Economics. Their forecasts are quoted here. Real aluminium A$ prices are also set for solid growth of 2.1% in real terms over the 5 years to FY25. Conversely, real Brent Crude Spot prices are expected to decline by -1.2% on average over the 5 years to FY25, although there is considerable uncertainty around global oil prices. Steel prices (using the Australian Steel Beams & Sections PPI) are also forecast to decline by an average of -3.4% pa over the 5 years to FY25, largely because of lower iron ore prices.

+1.9%

Non-hydro electricity IPD growth

Non-hydro electricity construction costs set to lag CPI.

National Engineering Construction IPD, non-residential bundling IPD and Queensland non-residential building IPD are expected to grow faster than the CPI inflation between FY21 to FY25. The engineering construction IPD will be driven by oil prices, the recovery in wage growth, and the movement of other materials prices to long run levels. However, the non-hydro electricity IPD is forecast to lag the increase in CPI (i.e. fall in real terms) largely due to the decline in real steel and oil prices, despite rising real construction wages and coper and aluminium prices. Non-residential building costs are expected to be contained in the long run, due to relatively modest wage and inflation growth.

1. INTRODUCTION

On 15 August 2019, BIS Oxford Economics was engaged by Energy Queensland to provide updated price forecasts of labour, materials and construction costs relevant to electricity distribution networks in Queensland from FY18 to FY25. Forecasts of wages will be used by Energy Queensland to develop the real price changes over its upcoming regulatory period, which, in turn, will be used by the business to construct its operating expenditure forecasts. Forecasts of price escalation factors for material costs, which are key inputs to various asset classes, and construction costs will be used by Energy Queensland to develop its capital expenditure over the next regulatory period. Forecasts of both nominal and real price growth of the relevant inputs are provided.

In keeping with my instructions, I (Richard Robinson) confirm that I have undertaken this engagement having regard to the Guidelines for Expert Witnesses in Proceedings in the Federal Court of Australia and the requisite statement to this effect is included in Appendix 1. I have been assisted in the preparation of this report by Husam ElTarifi (Senior Economist) Nic Ng (Economist) at BIS Oxford Economics. Notwithstanding the assistance from the other economists, the opinions in this report are my own and I take full responsibility for them.

The Australian Bureau of Statistics is the primary data source for the consumer price index, wages, employment, real gross value added and investment (including engineering construction) data, and for a range of other economic variables. The data used in the projections is the latest available as at early September 2019 and includes the June quarter 2019 WPI data release. Other inflation and interest rate data were sourced from the Reserve Bank of Australia, and forecasts for comparison were sourced from the Reserve Bank of Australia, the Office of the Chief Economist, the Treasury, the Queensland Treasury and Consensus Economics.

Forecasts of the economic variables in this report were mostly sourced from BIS Oxford Economics reports, including *Economic Outlook*, *Long Term Forecasts: 2019 – 2033, Mining in Australia 2019-2033 September 2019 Update, Engineering Construction in Australia 2019* and *Building in Australia 2019-2033*, along with other unpublished forecasts and from BIS Oxford Economics internal research and modelling.

The previous Summary section presents an overview of the outlook for the labour, materials and construction costs including numerical forecasts which are presented in summary tables.

Section 2 provides a macroeconomic outlook for Australia and Queensland. This section also has forecasts of key economic variables plus a discussion of the drivers and logic underpinning the forecasts. Section 2 essentially provides a context for our Australian wage forecasts including wage forecasts by state and by industry.

Section 3 discusses BIS Oxford Economics' national, Queensland and electricity, gas, water and waste services wage growth, and rural versus urban wage growth.

Section 4 discusses BIS Oxford Economics' exchange rate and construction costs forecasts, specifically aluminium, copper, oil and steel.

Section 5 presents construction cost forecasts, including the engineering construction implicit price deflator (IPD), non-hydro electricity IPD, national non-residential building IPD and Queensland non-residential building IPD.

2. MACROECONOMIC OUTLOOK

2.1 AUSTRALIA OUTLOOK

The Australian economy has experienced 27 years of uninterrupted growth since the FY91 recession. Population growth is among the highest of the developed economies, which has helped underpin household consumption and demand for dwelling and infrastructure construction. Government debt is comparatively low by global standards, with the national (Commonwealth) government and the larger state economies of New South Wales and Victoria maintaining AAA credit ratings. Overall, economic risks are low and the Australian economy is situated in the fast growing Asia Pacific region.

Nevertheless, growth in GDP and particularly domestic demand has been lower over the past seven years than the previous two decades. The main factor dragging down growth has been a major decline in mining investment, which has coincided (and contributed to) weakness in non-mining business investment.

Australia's economic growth has slowed over the past year, with GDP growth easing to 1.4% through-the-year to June 2019, and year-average growth slipping to 1.9% for FY19. This followed a rebound in growth to 2.9% in FY18, after only 2.3% in FY17 and an average of 2.6% over the 6 years from FY13 to FY18. Annual growth is expected to remain subdued at around 2.3% in FY20, before subsequently picking up to 2.6% in FY21 and then subsequently strengthening over FY22 and FY23.

Sluggish domestic demand growth to continue

The recovery in domestic demand, which grew 3.5% in FY18, drove Australia's GDP last year, but it will now act as a drag on overall GDP in the near term with domestic spending growth back below 2% in FY19 and expected to remain below 2% in FY20.

Household spending continues to be held back by sluggish income growth; rising employment is supportive, but wage increases remain tepid and other sources of income (government transfers, rental income and interest earnings in particular) have stagnated. The low savings rate is also an impediment to further growth in consumer spending. While lower interest rates and income tax cuts will be supportive, we continue to be cautious about the near-term outlook.

Residential construction activity has turned down sharply and the cycle has much further to run - we expect dwelling investment will be a large drag on GDP growth, and to a lesser extent employment growth, in 2019 and 2020. However, house price falls appear to be moderating in Sydney and Melbourne, and there are tentative signs that turnover is stabilising, which we expect to drive an upturn in dwelling approvals and commencements going into H2 2020.

The main sources of growth in the domestic economy will come from moderate growth in non-mining investment and a recovery in mining capital expenditure from FY20. Conditions remain conducive to a pickup in business investment – utilisation rates are high and monetary conditions are accommodative – but deteriorating confidence and uncertainty around the global outlook may give

firms reason to pause. Mining investment has now troughed after a long decline, and the absence of the drag will support growth. Mining is also starting to recover, boosted by higher commodity prices. The continued recovery in mining, concentrated in Western Australia and Queensland and supported by further commodity price rises and an improved investment climate, will contribute to net exports. Major LNG projects in Western Australia will be the key positive contributor further out.

Despite rising global economic risks, we remain cautiously optimistic about the outlook for new business investment. Public demand continues to provide support to growth, with the NDIS rollout and increased education spending boosting government consumption. Growth in public investment will slow a little as the NBN rollout winds down, but there is a strong pipeline of work in transport projects on the east coast. Growth in both export volumes and values has been strong, underpinned by resource exports and pushing the current account into surplus in Q219.

Net export to continue to underpin growth in near-term, despite global headwinds

Over the next 2 years, GDP will be boosted by net exports, with solid growth in export volumes forecast, despite some moderation in global growth. Underpinning this will be new LNG and oil capacity (as recently completed projects ramp up), and moderate increases in capacity in other key commodities. Also contributing is strong growth in services exports, led by inbound international tourism and education, which is being supported by a more competitive AUD. The outlook for manufacturing and rural exports is also positive (droughts notwithstanding), with both sectors taking advantage of Australia's comparative advantage in high quality, high value-added output.

The acceleration in global growth over the past two years has also been supportive, boosting export volumes and initiating a recovery in commodity prices. However, the global economy has experienced a cyclical slowing in growth over the last year across both developed economies and emerging markets. To some extent the moderation was inevitable, with many developed economies experiencing faster-than-trend growth in the first half of calendar 2018, but it also reflects a number of headwinds including the US-China tariff escalation, political uncertainty in Europe, and the end of fiscal stimulus in the US.

Central banks have relaxed monetary policy since the start of the year, the Chinese authorities have intervened to support domestic growth momentum, and expansionary fiscal policy has been implemented across a number of key Asian markets. Overall, the global economy expanded by 3.6% in calendar 2018 (PPP measure). We are projecting growth of 2.9% in 2019, with the slowdown in growth in the US, China, Europe and India becoming apparent. Nevertheless, global growth is expected to improve and average 3-3.5% over 2020 to 2024.

Over the long term we maintain our view that global growth will be structurally weaker than it has been in the past. Falling population growth and limited improvements in productivity will weigh on trend growth, and we expect the world economy to expand by an average of 3.3% p.a. over the next five years.

Australia's trading partner growth (weighted by export proportions) is forecast to grow at a faster rate of 3.6% over the next five years, due to the high weights of China, East Asia and India (all of which are expected to outpace the average pace of global growth) in Australia's export mix.

Synchronisation of investment to drive stronger growth from FY22

By early next decade, the investment cycles – which are currently offsetting each other and out-of-sync – are all expected to move into upswing, although there will be differences in the strength and timing across the residential, business and public investment components. The strengthening in investment will lead to an increase in the pace of employment growth and, with the labour market tightening, an increase in wages, household incomes and consumer spending. In addition, with the government's budgetary position improving due to increased taxes, the government is expected to loosen fiscal policy – either via increased recurrent or capital spending or tax cuts, or more likely a combination of all three.

The upshot is that growth in domestic demand will strengthen to around 3.8%, while export growth is forecast to moderate as the increase in LNG production increases hit capacity, although services and non-commodity exports are expected to continue to grow. However, much stronger imports (in line with domestic demand) will see net exports detract from growth. Nevertheless, GDP growth is forecast to lift and average above 3% over FY22 and FY23

The labour market continues to perform well. Despite a small tick up in the unemployment rate of late, employment growth remains healthy. Nevertheless, price pressures remain weak; wage growth is trending higher, albeit slowly and from a low rate, while CPI inflation is very weak at 1.6%y/y Following another soft wages print in Q1 and analysis which suggests that the natural rate of unemployment is well below 5% (implying there remains significant spare capacity in the economy) the RBA Board lowered the cash rate in June and July 2019 and again in October to 0.75%. The policy statement signalled that further cuts will likely be necessary to stimulate jobs and wages growth, and with the outlook worsening globally we now expect more cuts, with the cash rate to fall to a record-low of 0.5% by mid 2020.

With wages growth well below historical averages, domestic cost push pressures are expected to remain limited in the near term. Underlying inflation is forecast to rise from 1.4% now to 1.9% in FY21. A lack of inflation and continuing slack in the labour market is expected to see the RBA hold rates at the expected record lows of 0.5% until mid-2021, before rising to 1.75% by late-2023 as wages and CPI inflation rise back toward historical averages, and the unemployment rate falls back below 5%. 10-year government bond rates will also gradually rise back over 2% by 2023, from under 1% now. Australian long-term bond rates are expected to track the rise in US bonds over the next few years, with US bond rates expected to rise as a result of the deterioration in the US budget deficit.

Overall, average annual GDP growth over the five years to FY24 is forecast to be 2.9%, which will be an improvement on the 2.5% average of the 5 years to FY19. Growth will also be far more domestically oriented, with Gross National

Expenditure forecast to average 3.2%, compared to only 2% in the 5 years to FY19.

Mild slowdown in mid-2020s, before economy moves to trend growth

The tightening of monetary policy will precipitate an overall slowing of economic growth in the mid-2020s. At the same time, we also expect a cyclical slowdown in non-residential building and mining investment, as a number of large projects are completed at the same time, while the completion of some large public infrastructure projects will also see a stalling of public investment. The upshot will be a sharp deceleration in domestic investment and spending growth, leading to an easing in GDP growth back below to an average of 2.3% over FY24 and FY25. Longer term, as consumers and businesses re-adjust to the 'normalcy' of higher interest rates – although at much lower levels than the 2000s and early 2010s – investment and consumer spending will return to long term trend (or potential) rates of growth over the second half of the 2020s.

Population and Productivity

Population growth picked up slightly over three years to FY17, due to higher levels of overseas migration, and is currently at 1.7% per annum. Although relatively high levels of overseas migration are expected to persist over the medium to long term, the annual rate of population increase is projected to slowly decelerate, easing to 1.5% in FY25.

At the same time, the population is forecasted to continue to gradually age, as the 'baby boomers' (those born between 1945 and 1965) move into retirement and life expectancy increases. This means the labour force is expected to continue to grow at a slower rate than the overall population - although labour force participation among the 65+ age groups is forecast to increase over time, it is not expected to be enough to offset the decline in growth of prime-aged (25-55 year olds) workers. Accordingly, this means that growth in employment is forecast to gradually decelerate.

Productivity growth is also expected to be slower over the long term than the historical average of 1.5% per worker. Indeed, over the past 15 years, non-farm GDP productivity per worker has only averaged 0.8% per annum. However, a large increase in the proportion of part-time workers over this period has understated the productivity improvements, with productivity growth per hour worked averaging 1.0%. Productivity growth (GDP per employee) is expected to lift from a declines over the past two years of -0.1% in FY18 and -0.4% in FY19 to +0.4% in FY20, and then an average of 1.1% over FY21 to FY25 supported by the ramping up of mining production and the recovery in non-mining investment. But structural drags, including diminishing benefits from past positive forces such as globalisation and a slowing pace of technological progress, are expected to weigh on productivity over the medium to long term. This will lead to productivity growth falling back to 0.9% in FY25.

2.2 QUEENSLAND OUTLOOK

Queensland State Final Demand (SFD), staged a healthy recovery over FY17 and FY18, turning from contraction in FY15 and FY16 to solid growth of 3.6% in FY18 – just above domestic demand growth for Australia of 3.5%. Gross State Product (GSP) also rebounded to 3.4% (above national GDP growth of 2.9%),

despite a large negative external contribution caused by surging imports and weak export growth. However, SFD growth has slowed over the past year, with annual growth falling to 1.1% in FY19. Employment growth has also eased over the past year, from 4.1% in FY18 to 1.5% in FY19. Queensland's unemployment rate remains above the national average, at 6.4% versus 5.3% (August 2019).

The recent weakening in SFD is expected to be temporary, with SFD forecast to rise to 2.8% in FY20 and around 4% in FY21 – over 1% more than the Australian average in each of the next 2 years. Conversely to the other large states, the state's investment cycles are expected to synchronise earlier and drive a stronger upturn over the next two years:

Population growth is now at 1.9%, after slower population growth over recent years (with a low of 1.2% in FY15) limited spending growth. Accelerating population growth is being driven by higher interstate and international migration inflows. The rising population will provide some support to aggregate household spending, although weak wages and subdued employment growth will continue to constrain consumer spending over the next two years.

Residential investment fell 3% in FY18 and over 2% in FY19, following a 4-year upswing, and a further modest fall in new dwelling building activity are expected over FY20 due to oversupply (particularly in the unit segment), although higher population growth will help to limit the housing decline. Furthermore, the falls in new dwelling buildings work will be largely offset by higher alterations and additions activity. A recovery in new dwelling construction is forecast to get underway in FY21.

The reduced drag from falling mining investment has helped the turnaround in SFD and GSP. Mining investment is now turning around, led by increases in coal-related engineering construction, mining equipment purchases and exploration, with further solid increases expected over the next few years. However, after resource exports made a significant contribution to GSP over recent years (and helped keep GSP positive), they have now stalled as the Gladstone LNG plants have finished ramping up and as some export gas has been diverted back to the domestic market. There have also been some disruptions to coal and other resource exports over the past year.

Non-mining business investment is now recovering, particularly in the trade-exposed sectors (which are being boosted by the more competitive AUD). Equipment and intellectual property products (IPP) investment will continue to increase over the next two years, before strengthening even further through the early 2020s. Private non-residential building rebounded in 2018, but then has fallen sharply over FY19. Another strong rebound is forecast over the next 3 years, before easing.

New public investment has gradually turned around over the past three years, after falling by a third over the previous six years. Although Queensland's state government finances are constrained by high debt, growth will pick up further and strengthen appreciably over the next few years, led by roads, rail, water and sewerage, electricity and particularly non-dwelling building projects, although the completion of the NBN will mute the overall improvement in the near-term.

After strong exports over the four years to FY17, export growth stalled in FY18. However, with the AUD expected to remain in a US68-78cents band, the competitive AUD will boost the tradeable sectors of agriculture, tourism (including parts of Retail Trade), manufacturing and mining, with export growth expected to recover and sustain moderate growth over the medium term.

Overall, GSP growth is expected to ease to around 2.7% over FY19 due to weaker SFD, before stronger SFD pushes GSP toward 3% in FY20. SFD is forecast to average over 4% over FY21 to FY23, with GSP expected to an average around 3.6% in the early 2020s. Employment growth is forecast to strengthen markedly over the next four years, aided by higher population growth, strong economic growth and plenty of spare capacity in the labour market. Similar to Australia, the Queensland economy will suffer a growth slowdown over FY24 and FY25, due to a synchronised downturn in investment and slower employment growth.

3. WAGES AND INFLATION OUTLOOK

3.1 WHOLE ECONOMY WAGE OUTLOOK

3.1.1 Choice of the Wage Price Index as the measure of Labour Costs

BISOE chose to use the Wage Price Index (WPI) as the key measure of labour costs, and forecasted Electricity, Gas, Water and Waste Services WPI. The key motivations for this are (a) greater data availability, and (b) the WPI is more stable than AWOTE and is a better measure of underlying trends.

3.1.2 National

The key determinants of nominal wages growth are consumer price inflation, productivity, the relative tightness of the labour market (i.e. the demand for labour compared to the supply of labour), and compositional (structural) changes in the labour market following the end of the mining investment boom.

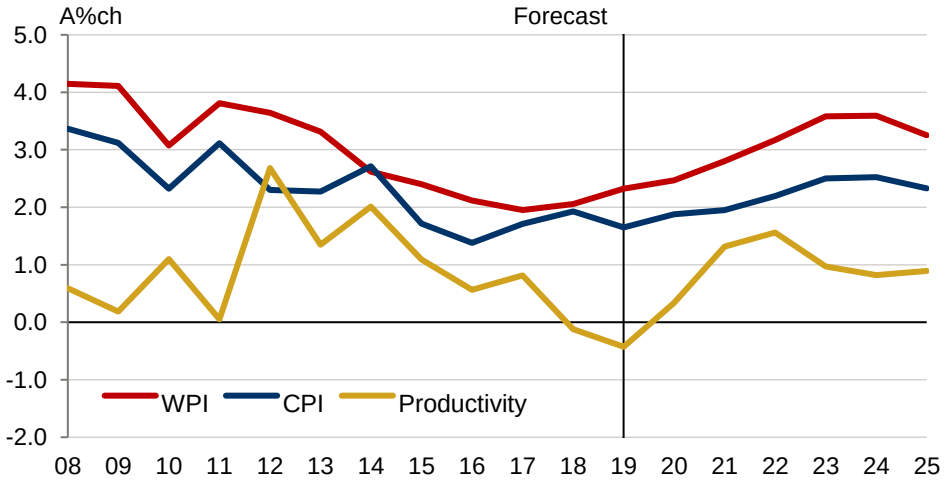
Wages growth has slowed markedly over the past 5 years, primarily due to weaker demand for labour, caused by both cyclical and structural factors. Among the underlying structural changes causing this unspectacular wage growth are increasing market flexibility and casualisation of the work force (what is commonly coined the 'gig-economy'), falling union membership, slower productivity growth and the effects of lower inflation expectations.

Low wages growth is both a product of and key cause of low underlying inflation. Low wages are keeping business costs down and thus muting upward price pressures, while a significant section of pay deals are being set in line with CPI inflation – especially for employees on awards.

The unemployment rate and underemployment rate are key indicators of the amount of slack in the labour market. The unemployment rate has been just above 5% recently. Historically this rate was seen as close to the NAIRU, (the Non-Accelerating Inflationary Rate of Unemployment or the `natural rate of unemployment'), but our latest research suggests that the natural rate has decline in recent years, as a result of falling rates of unionisation and increasing casualisation. Given this, we still see spare capacity in the labour market. Compounding this, Australia's underemployment rate remains at historic highs – averaging 8.4% over the past year. The high underutilisation rate – the sum of unemployment and underemployment – reflects considerable slack in the labour market, which limits the bargaining power of workers and reduces pressure on wages.

Looking ahead, we expect employment growth to weaken over the next two years. There has been a slowdown in the growth of job advertisements recently (a good leading indicator for employment growth), and the recent high frequency indicators have confirmed our view that the economy is growing at a solid but not spectacular pace. Jobs growth will weaken due to the worsening downturn in residential investment, slower growth in government spending and subdued consumer spending. With employment growth set to remain modest and unemployment to drift up marginally, upward pressure on wages will be limited.

Fig. 1. Wage, Inflation and Productivity Growth, Annual Average, Australia



Year Ended June

Source: BIS Oxford Economics, ABS data

The latest data suggests that we have moved off the bottom of the current wage cycle, with the wage price index (WPI) rising from its lows of 1.9% in June 2017 to 2.4% in the June quarter, 2019. These increases may have been helped by higher increases in the minimum wage decisions and collective bargaining outcomes over the past year.

3.1% increases in the National Wage Case and recent higher enterprise agreements will push wages up

At the Annual Wage Review in June 2019, the Fair Work Commission awarded a 3.1% increase to the National Minimum Wage (NMW), down from the 3.5% awarded in 2018, but still higher than recent wage increases in the other pay setting segments. In its recent decisions, the panel estimated around 23% of the labour force have their pay set by awards (including around 13% of full-time workers). The minimum award rises take effect from the 1st July 2019. However, the effects may reach a much larger number of employees, potentially up to 40% in total, because wage increases in some enterprise agreements and individual arrangements are linked or benchmarked in some way to the review's outcome.

There has also been an improvement in the outcome of enterprise agreements (via collective bargaining) – under which 38.4% of the workforce receive their pay increases (see figure 5) - since the low of 2.2% set in September quarter, 2017. Average annualised wage increases (AAWIs) formalised in the enterprise agreements have averaged 2.8% over the past year (latest data from the Department of Jobs and Small Business). It's likely that these outcomes could have been influenced by the 2017 and 2018 national wage cases which awarded 3.3% and 3.5% (which was appreciably higher than the 2.4% and 2.5% increases awarded in the previous two years). The improving labour market may have helped lead to the recent higher outcomes in collective agreements. However, so the recent improvement in formalised agreements will take time to manifest in overall wage outcomes. The AAWI in current

operating agreements is 2.7%, and, given the average duration for the collective agreement is around 3 years, overall wage agreements in the collective bargaining segment – which cover 38% of the workforce – are likely to see limited increases on the 2.7% recorded in the latest data.

The remaining 48% of employees have their pay set by individual arrangements, whether it be individual contracts or some other form of salary agreement, which may include incentive-based schemes. Aggregate wage growth has slowed significantly since December 2012 due to a collapse in wage increases awarded to the workers who are on individual agreements (contracts) with their employers. Workers on individual agreements, whose wage rises respond more to prevailing labour market conditions, have been at the mercy of slackness in labour market and by the structural and cyclical weaknesses outlined above and is the main reason why WPI increases are near record lows.

Nevertheless, we expect a continuation of the higher NMW to filter to overall improvements in pay rises in the collective bargaining and individual arrangements segments to gradually lift the wage price index (WPI) from 2.1% in FY18 to 2.3% in FY19 to 2.5% in FY20 and 2.8% in FY21 – which is in line with most other forecasters but below Commonwealth Treasury forecasts of 2.75% and 3.25% for these two years. Other wage measures – average weekly earnings (AWE) and average weekly ordinary time earnings (AWOTE) - will also pick up over the next two years, slightly faster than WPI due to compositional effects and bonuses and incentives linked to recent higher profits.

Wage growth is then predicted to accelerate from FY22, as tighter conditions in the labour market feed through. The forecast increases in profits, combined with rising price inflation and declines in unemployment, will push up wages over FY22 to FY24. The WPI is projected to increase 3.2% in FY22 and peak at 3.6% in both FY23 and FY24, before subsequently easing as economic growth slows around the mid-2020s – while AWE and AWOTE are forecast to rise to around 4.2% around 2023.

In the long run, wage growth is determined by productivity growth and inflation. We expect that AWE growth will level off at its long run level of around 3.7%, driven by non-farm productivity growth of around 1.2% and inflation of around 2.5%. In terms of the wage price index, long run growth in the WPI is expected to be around 0.3% less than AWE, in line with the average historical trends over the past two decades since the introduction of the WPI.

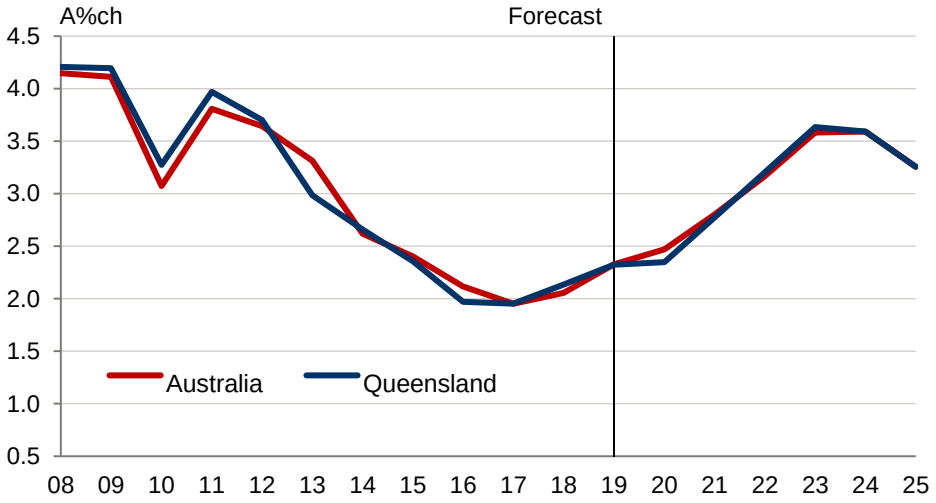
3.1.3 Queensland

Growth in total ‘all industries’ wages at the state level usually depends on the relative strength of the state economy and labour markets, compared to the national average. Historically, wage growth in Queensland has tracked very closely to the national average, with a correlation coefficient of 0.95 over the past two decades. The sectoral composition of Queensland’s economy is very similar to the national economy, and the state will experience many of the same wage pressures, including the mining and non-mining recoveries, and long term drags such as increased casualization, the ageing population and a structural

decline in productivity growth. As such, wage growth in Queensland is forecasted to continue to move with national wage growth.

Queensland wage growth is expected to lag the national average in FY20, then align with the national average out to FY25.

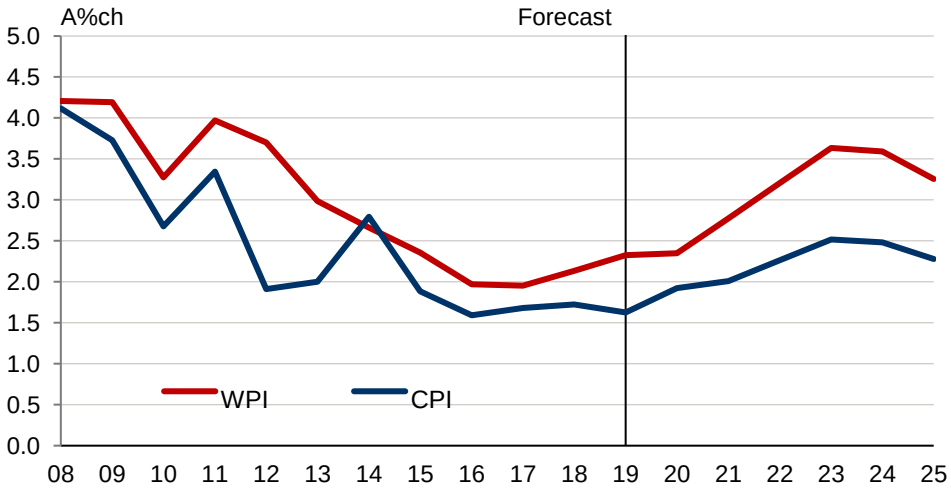
Fig. 2. Wage Price Index Growth, Annual Average, Queensland and National



Year Ended June

Source: BIS Oxford Economics, ABS data

Fig. 3. Inflation and Wage Growth, Annual Average, Queensland



Year Ended June

Source: BIS Oxford Economics, ABS data

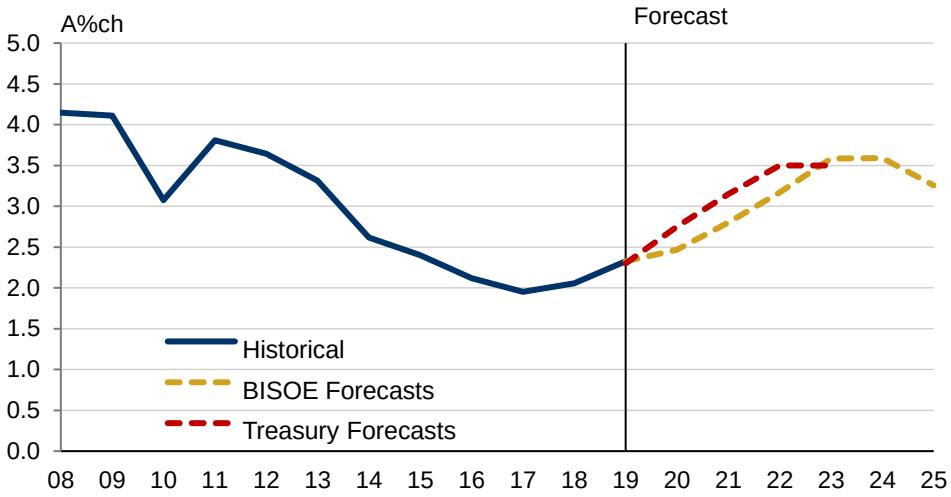
3.1.4 Comparison to Treasury Wage Outlook

National level

Compared to our projections, The Federal Treasury is forecasting a stronger rebound in wage growth for the whole economy. In the 2019-20 Budget, the Treasury projected continued improvements in the economic environment,

which they expect will support further growth in employment and an acceleration in wage inflation. We are less optimistic about the outlook, and expect to see a much more gradual acceleration in wage inflation in FY20 and FY21, although BISOE and Treasury forecasts align in FY23.

Fig. 4. National WPI Forecasts: BIS Oxford Economics and The Treasury



Year Ended June

Source: BIS Oxford Economics, ABS data, The Treasury

3.2 ELECTRICITY, GAS, WATER AND WASTE SERVICES WAGE OUTLOOK

The EGWWS wage price index growth has consistently been above the national (all industries) average since the index's inception in 1997 and averaged 0.6% higher over the past 17 years (see Table 4.2 and Fig 4.1). Since the collapse in wages growth following the end of the mining boom, the EGWWS WPI has continued to outpace the all industries average, increasing by an average of 2.6% over the past 6 years, 0.4% higher than the 2.2% national average. While growth in average weekly ordinary time earnings (AWOTE) of the electricity, gas, water and waste services sector has displayed considerably more volatility over the past two decades (mainly related to compositional effects), AWOTE growth in the sector has also usually been higher than the national average over the past six years (see Table 4.2).

Wages growth in the EGWWS sector is invariably higher than the total Australian national (all industry) average.

To a large extent, this has been underpinned by strong capital works program in the utilities sector since the beginning of the last decade until 2012/13 (resulting in robust employment growth over the same period), strong competition from the mining and construction workers for similarly skilled labour and the powerful influence of unions in the utilities sector.

In addition, the electricity, gas and water sector is a largely capital intensive industry whose employees have higher skill, productivity and commensurately higher wage levels than most other sectors. Further, the overall national average

tends to be dragged down by the lower wage and lower skilled sectors such as the Retail Trade, Wholesale Trade, Accommodation, Cafés and Restaurants, and, in some periods, also Manufacturing and Construction. These sectors tend to be highly cyclical, with weaker employment suffered during downturns impacting on wages growth in particular. The EGWWS sector is not impacted in the same way due to its obligation to provide essential services and the need to retain skilled labour.

Strong Union presence in the utilities industry and higher collective agreements outcomes pushes utilities wages above the All Industry average.

Trade unions are typically able to negotiate higher-than-average wage outcomes for their members through collective bargaining, resulting in stronger wage growth than the all-industry average. Across the EGWWS sector, there are a number of utilities unions such as the Communications, Electrical and Plumbing Union (CEPU) and Australian Services Union (ASU), which have a history of achieving high wage outcomes for the sector. Other unions active in the sector include the Australian Workers Union (AWU).

As at May 2018, 64.6% of full-time non-managerial employees in the EGWWS industry have their wages set by collective agreements, considerably higher than the national average of 38.4%. Over the past 10 years, a higher proportion of workers on collective agreements is associated with higher wage growth, with a correlation coefficient of +0.6 (see Figure 6). As we expect that the EGWWS industry will continue to have higher levels of unionisation than the national average, we expect that unions in the EGWWS industry will continue to be able to negotiate for higher wages for a substantial proportion of EGWWS employees, resulting in EGWWS wages growing faster than the national average.

Collective bargaining dominates the pay setting arrangements in the utilities sector, while the relative absence of workers relying on (often) low-increase awards (set in the National Wage Case) means the overall average level of total utilities wages (in A$ terms) will generally be higher than the all industries average. Over the outlook period, we expect collective agreements in the EGWWs sector to achieve average increases of 3.7%, compared to 3.4% for all industries. This finding is supported by the terms of the current Energy Queensland Union Collective Agreement 2017, which provides guaranteed annual salary increases of 3.0% from 1 March 2018, 3.0% from 1 March 2019 and 3.0% from 1 March 2020 – above our forecast for Australian WPI growth over the same period.

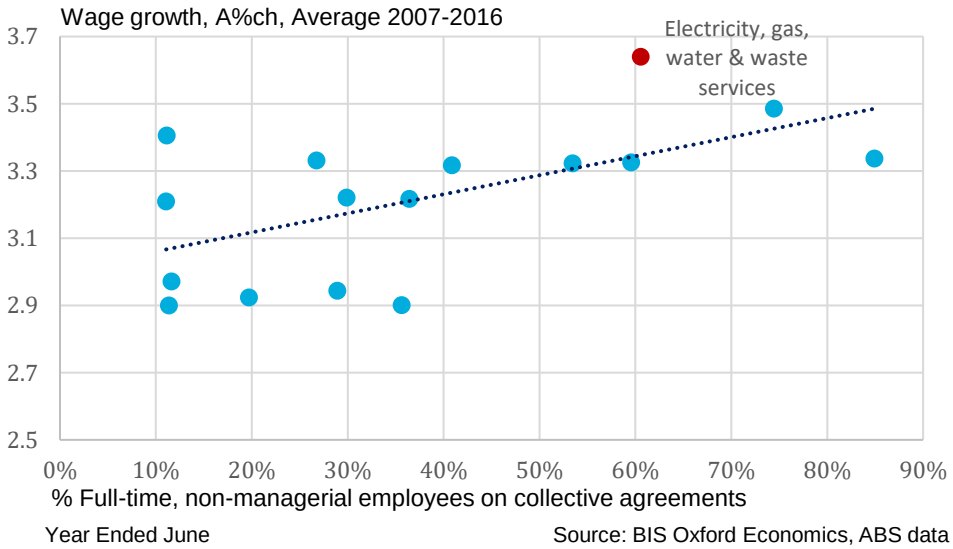
BIS Oxford Economics analysis shows collective agreements in the EGWWS sector have been on average around 1.5% higher than CPI inflation over the decade to 2010 (excluding the effects of GST introduction in 2000/01). In the five years to 2010 when the labour market was very tight, collective agreements were on average 1.7% above the CPI. Given the strength of unions in the sector and a still strong demand for skilled labour, collective agreements are forecast to remain around 1.4% above the ‘official’ CPI over the forecast period, which is lower than previous periods.

Fig. 5. Proportion of full-time non-managerial employees by wage setting method and industry, Australia, May 2018

Industry	Award only	Collective agreement	Individual arrangement
Professional, scientific and technical services	4.1%	5.9%	89.9%
Rental, hiring and real estate services	17.5%	10.7%	71.7%
Wholesale trade	9.8%	16.1%	74.1%
Other services	25.9%	17.8%	56.3%
Administrative and support services	24.9%	18.8%	56.2%
Retail trade	18.5%	22.7%	58.8%
Construction	7.8%	30.9%	61.3%
Manufacturing	13.2%	29.0%	57.8%
Arts and recreation services	7.7%	38.9%	53.3%
Information media and telecommunications	5.3%	34.5%	60.3%
Finance and insurance services	2.5%	33.9%	63.6%
Health care and social assistance	33.9%	43.9%	22.2%
Transport, postal and warehousing	8.9%	50.4%	40.7%
Electricity, gas, water and waste services	**1.5%**	**64.6%**	**33.9%**
Education and training	6.3%	84.6%	9.1%
Public administration and safety	9.9%	84.1%	6.0%
All industries	13.1%	38.4%	48.5%

Source: BIS Oxford Economics, RBA, ABS Data

Fig. 6. Average wage growth and unionisation rates by industry, 2007-2016



Year Ended June

Source: BIS Oxford Economics, ABS data

As well as increases in CPI, increases in collective agreements under enterprise bargaining are also influenced by a combination of inflationary

expectations, the recent profitability of relevant enterprises, current business conditions and the short-term economic outlook, and, as mentioned, by the industrial relations 'strength' of relevant unions. Because the average duration of agreements runs for two-to-three years, BIS Oxford Economics bases its near-term forecasts of Enterprise Bargaining Agreement (EBA) wages on the strength of recent agreements, which have been formalised or lodged (i.e. an agreement has been reached or approved) over recent quarters.

We expect EBA outcomes to show modest growth over the next two years but remain above inflation and the 'all industries' average given that the demand for skilled labour remains strong and particularly given the recent high enterprise agreement outcomes in the construction sector. This will influence negotiations in the EGWWS sector, as some skills can be transferable.

We believe investment in the sector, particularly engineering construction, has been the key driver of employment growth in the sector over the past decade. Our analysis has shown employment has a stronger relationship with utilities engineering construction rather than utilities output.

Wage increases under Individual agreements rebounded in FY19 and these and EBAs will strengthen due to stronger demand for skilled labour from Mining and Construction sectors.

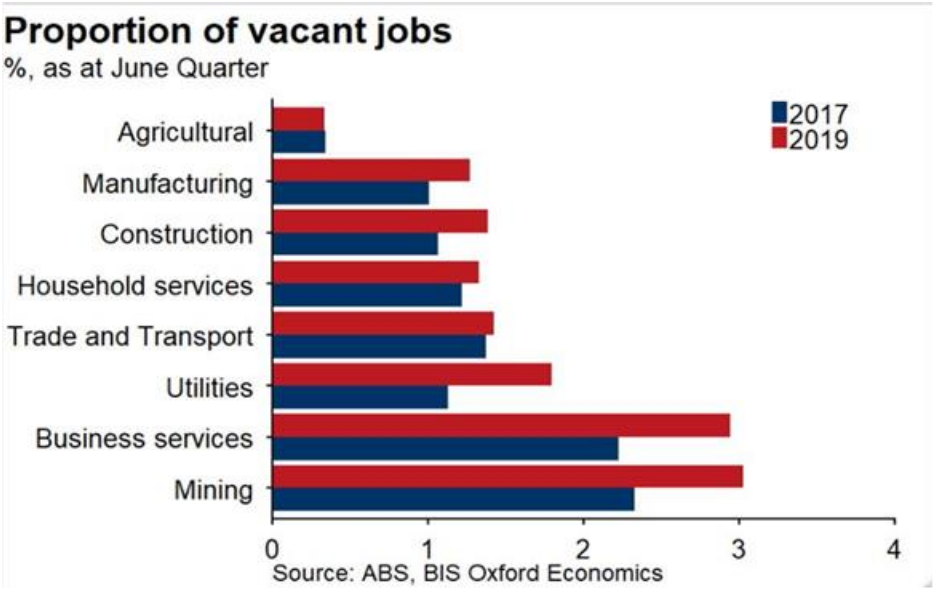
Increases in individual agreements (or non-EBA wages) are primarily influenced by the strength of the labour market (especially the demand-supply balance of skilled labour), inflationary expectations, the recent profitability of relevant enterprises (which influences bonuses and incentives, etc.), current business conditions and the short-term economic outlook.

Wage growth from individual agreements is estimated to have slowed appreciably over the three years to FY18, although we believe there were compositional effects that negatively impacted the estimation for this segment. Nevertheless, some of this reflected the general weakness in the economy and the full-time labour market at that time. However, we estimate that wage increases in the individual agreements segment rebounded in FY19 to around 2.5% as skilled labour shortages began to manifest. Indeed recent vacancies data from the ABS has shown a marked increase in job vacancies over the past two years, with vacancies also lifting in the Mining and Construction sectors (see figure 7). Currently there are pressures building: a recent survey by the Australian Industry Group found that 3 in 4 employers reported an increasing shortage of technicians and trade workers, and employees with STEM skills. These are essential workers in the utilities sector. Other business surveys are reporting similar findings in terms of increasing difficulties in sourcing skilled workers.

Although we expect the overall labour market to soften over the next 2 years, we subsequently expect an acceleration of employment growth through FY22, which will outpace population and labour force growth and the unemployment rate is expected to drop below 5% early 2022. Hence, we expect to again witness the re-emergence of skilled labour shortages and competition for scarce labour particularly from the mining and construction sectors, which will push up wage demands in the utilities sector. Mining investment is now picking up and is forecast to see significant increases over the next 4 years to FY23,

before easing. Meanwhile, there is similar strong growth underway in the non-residential building and civil infrastructure segments in the Construction sector,

Fig. 7. Job Vacancies as % Employment by Industry



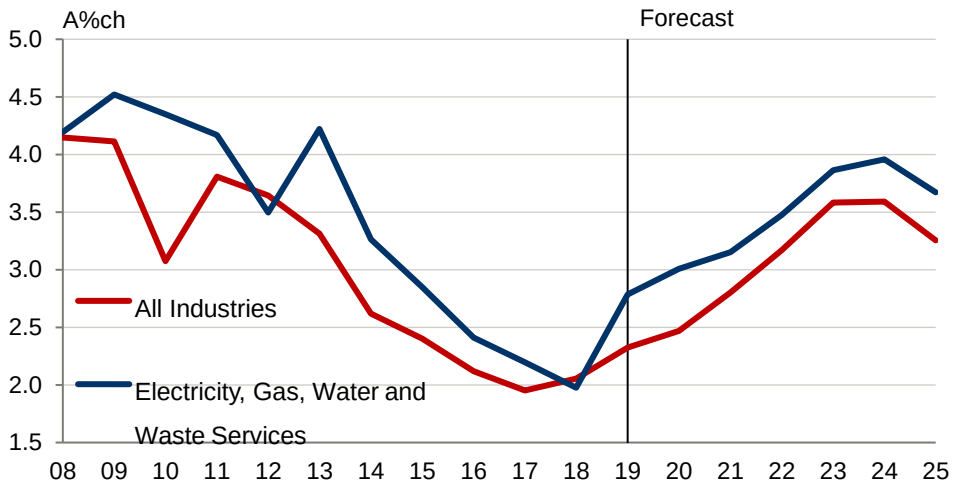
although these are somewhat offset by the current residential building downturn. However, with residential construction expected to recover over FY22 to FY24, there will be a synchronised upswing in the overall construction sector over FY22 and FY23, leading to strong labour demand in that sector.

With strong competition for similarly skilled labour from the mining and construction industries, firms in the utilities sector will need to raise wages to attract and retain workers. In other words, the mobility of workers between the EGWWS, mining and construction industries means that demand for workers in those industries will influence employment, the unemployment rate and hence spare capacity in the EGWWS labour market. Businesses will find they must 'meet the market' on remuneration in order to attract and retain staff and we expect wages under both individual arrangements and collective agreements to increase markedly over the next few years.

Utilities wage growth is forecast to continue to outpace the national 'all industries' average over the forecast period.

Overall, in terms of underlying wages growth in the utilities sector for total Australia — expressed in wage price index (WPI) terms — BIS Oxford Economics is forecasting an average of 3.6% per annum (0.3 percentage points higher than the national all Industries WPI average of 3.3% per annum) over the five years to FY25, which is Queensland' Energy's next regulatory period. In real terms this equates to an average growth rate of 1.4% pa over the 5 years to FY25.

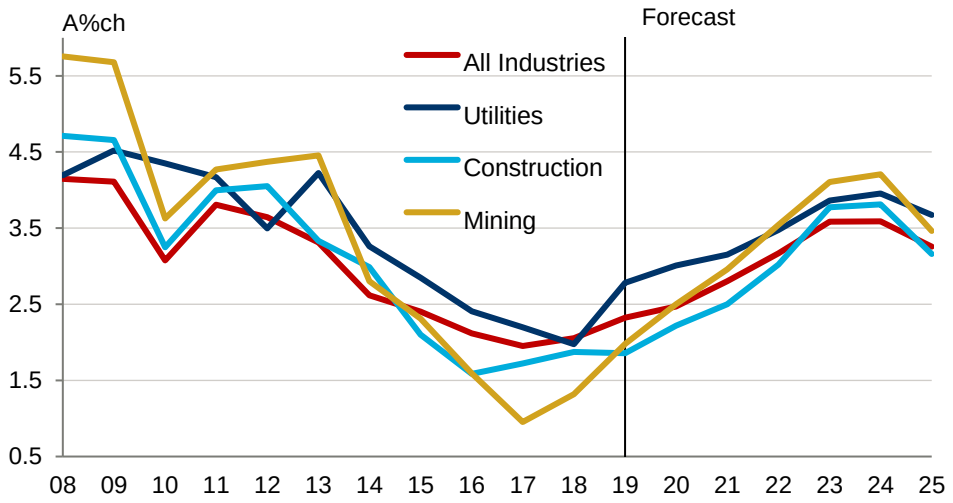
Fig. 8. Wage Price Index Australia All Industries and Electricity, Gas, Water and Waste Services



Year Ended June

Source: BIS Oxford Economics, ABS data

Fig. 9. Electricity, Gas, Water and Waste Services, Construction, Mining and All Industries Wage Price Index, Australia



Year Ended June

Source: BIS Oxford Economics, ABS data

3.2.1 Queensland EGWWS wages v. national EGWWS wages

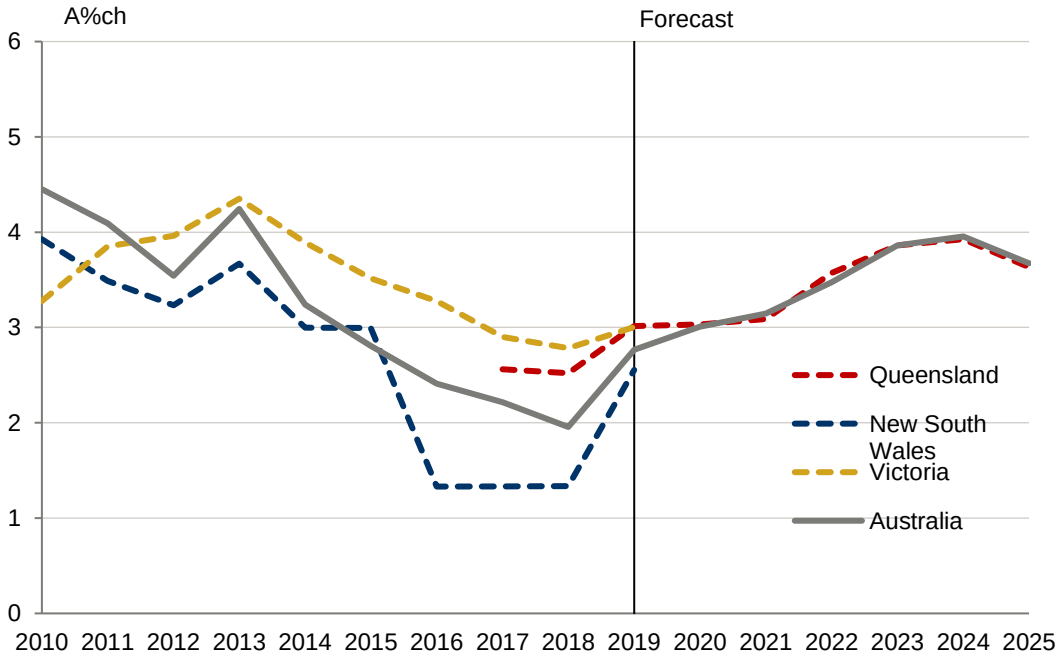
BISOE recommends that Queensland EGWWS WPI growth be used as the primary labour cost escalation forecast for network-related labour, both for operations expenditure (opex) and capital expenditure projects (capex), fro those employees within the enterprise. The Queensland EGWWS WPI is now published by the ABS (since early this year), with data for this series available back to the March quarter 2016.

For out-sourced contracted labour (primarily for capex projects), we recommend construction WPI wages be used as the labour escalation indicator. A description of these forecasts is in section 3.4.

Queensland EGWWS WPI forecasts have tracked above the national EGWWS average over the past 3 years, although this was partly due to surprisingly low wages growth in the NSW utilities sector (see figure 10). Higher increases in collective agreements in recent years also boosted Queensland utilities wages. We expect Queensland utilities wages to largely track the national average over the forecast period, given that our research has found that the collective agreements currently in place for EGWWS workers in different states mandate broadly similar wage increases over the short term. For example, the ACTEWAGL and Combined Unions Enterprise Agreement 2017 states that employees in the Australian Capital Territory will have an increase of salary of 3% on or after 1 July 2017, 1 July 2018, and 1 July 2019, very similar to the remuneration agreement negotiated in the Energy Queensland Union Collective Agreement 2017.

Overall, Queensland EGWWS WPI is forecast to average 3.6% over the five years to FY25, the same as the national EGWWS average.

Fig. 10. Electricity, Gas, Water and Waste Services Wage Price Index, New South Wales, Victoria and Queensland



Year Ended June

Source: BIS Oxford Economics, ABS data

3.3 RURAL VERSUS URBAN WAGE GROWTH PATTERNS

The existence of an urban wage growth premium is well established.[1] Theories of the wage premium include cities attracting higher skill and ability workers, the productivity advantage for firms in cities and the job mobility advantage of urban workers.[2]

However, although wage levels in Australia are higher in urban areas than in rural areas in general (with the exception of some high income rural mining areas[3]), the pace of wage growth across the regions has been broadly similar over the past two decades.

A 2017 working paper published by the Grattan Institute found that income growth rates are not 'obviously worse' in regional areas of Australia than in urban areas, and that although cities have higher average incomes, the gap in incomes is not widening between cities and the regions.[4] Further, the 2017 Analysis of Wage Growth published by the Treasury found that although people in Brisbane earn around 5 to 10 per cent more than those in the rest of Queensland, growth in capital city and regional area wages have been similar over the past two decades.[4]

Utilities Union Collective Agreements also provide evidence that wage growth in the utilities industry has also been broadly similar between rural and urban areas in Queensland. Prior to the Energex-Ergon merger, both the Energex Union Collective Agreement 2015, which primarily influences utilities wages in urban South East Queensland, and the Ergon Union Collective Agreement 2015, which primarily influences utilities wages in regional Queensland, specified a 3.0% wage adjustment for the following three years.

Hence, there is strong evidence that urban and rural wage growth has been broadly similar in Australia and Queensland over the past two decades, and in the Queensland utilities industry over the past few years. We are forecasting this trend to continue, and therefore do not expect to see a significant divergence in labour cost escalation between rural and urban areas over the forecast horizon.

3.4 CONSTRUCTION WAGES OUTLOOK

Our research has shown that construction activity (i.e. work done in the sector) normally has a strong influence on construction wages, although changes in wages tend to lag construction (in work done terms) by around one to two years. Hence, our wage forecasts are based on BIS Oxford Economics forecasts of construction activity at the national level and by state (which

[1] Paul Verstraten, Gerad Verweij and Peter Zwaneveld, *Why do wages grow faster in urban areas? Sorting of high potential factors,* (Netherlands: CPB Netherlands Bureau for Economic Policy Analysis, 2018).
[2]Jeffrey Yankow, Why do cities pay more? An empirical examination of some competing theories of the urban wage premium, (Journal of Urban Economics, 2006).
[3] Australian Bureau of Statistics, Perspectives on Regional Australia: Variations in Wage and Salary Income between Local Government Areas (LGAs), 2003-04 to 2008-09, (2012).
[4] John Daley, Danielle Wood and Carmela Chivers, *Regional patterns of Australia's economy and population,* (Melbourne: The Grattan Institute, 2017).

includes residential and non-residential building, plus engineering construction) as well as predicted movements in the construction wages at the national level.

Construction wages at the national level and in Queensland have weakened dramatically since FY12 and are well below the robust increases during the construction boom of the latter half of last decade. While collective agreements in the sector have maintained their relative high increases over the past 4 years – between 4% and 5% – wages growth in the individual agreements segment have been very weak. Construction employees in the individual agreements segment account for around 61% of construction employees, dominating the method of pay-setting within the sector. However, with the overall labour market beginning to tighten, and construction activity levels remaining strong, we expect wages growth in the sector to continue to improve, after picking up from their lows of 2016. Nevertheless, construction activity is set to again weaken over FY20 and FY21, and this will limit the improvement in construction wages growth over the next two years.

Construction wages are expected to accelerate over FY22 and FY23, driven by the recovery in residential building activity which is expected to rise out of its trough from FY22, while high levels of non-dwelling building and rising engineering construction will underpin higher wages due to strong labour demand and expected widespread skill shortages in the construction industry. Declines in construction activity over FY24 to FY25, coupled with a general weakening across overall labour markets will then cause construction wages growth to ease over FY25.

3.5 CPI OUTLOOK

3.5.1 National

Consumer price inflation has been subdued for the past four years, with the substantial depreciation of the A$ (which would normally increase inflation) between 2013 and 2016 coinciding with a sharp correction in oil prices (which reduced both petrol prices and freight costs) and falling internal price pressures. Underlying inflation fell below the Reserve Bank's target 2-3% band in March 2016 and has stayed there, while headline inflation has also remained (mostly) below 2% since late 2014.

Tradeables inflation has been especially weak since the June quarter 2014. Stagnant world prices for manufactured goods, reduced transport costs, margin compression by exporters globally, and potential hedging by importers have combined to limit price rises for imported consumer goods. Furthermore, the appreciation in the Australian dollar over the 18 months to December 2017 reduced import prices, although the A$ depreciation over the past year has partially reversed this trend, leading to rises in tradeables inflation of 1.1% over FY19. rises in tradeables inflation have been driven mainly by food, motor vehicles, consumer durables and overseas travel and accommodation.

Meanwhile, non-tradeables inflation – which now constitutes almost two-thirds of the CPI – averaged 3.1% through FY18, before easing to 2.0% through FY19. Driving non-tradeables inflation in FY18 were sharp rises in electricity and gas prices, cigarettes and tobacco (due to hikes in excise taxes), child care, house purchases, health services, education and insurance services. In

FY19, non-tradeables inflation have been contained by dismal wages growth, which has kept down unit labour costs, limiting cost-push inflationary pressures.

Overall, the headline CPI inflation rate recently peaked at 2.1% in the June quarter, 2019, largely due to a spike in petrol prices, before declining through FY19 and bottoming at 1.3% in the March quarter 2019, largely due to a sharp decline in petrol prices. In the June quarter 2019, the inflation rate then increased to 1.6%. Nevertheless, with inflationary pressures building globally and the economy gradually absorbing the remaining spare capacity, we expect inflation to rise from here, albeit only gradually and slowly.

Putting upward pressure on the headline rate will be further planned increases in tobacco excise duty. Tobacco excise duties are legislated to increase by 12.5% each year on September 1 of each year from 2017 through to September 1, 2020. This combined with the bi-annual indexation of the tobacco excise to average weekly ordinary time earnings and aligning the tax treatment of roll your own tobacco and cigarettes, will add significantly to headline CPI – around 0.25% points to the annual rate.

In the near term, upward price increases will come from the depreciation of the A$ since early 2018, with the exchange rate declining from over US79 cents in January 2018 to around US68 cents in the September 2019. Our forecast is for the A$ to remain below US70 cents until early 2021, before gradually rising.

The drought and higher food import prices (from the lower $A) are also expected to push up food prices over the near term, reversing a key factor which has muted prices over recent years – food accounts for over 10% of CPI basket (excluding meals out and takeaway food). Food inflation has averaged close to 3% p.a. over the past two decades but had been very weak over the past five years (averaging only 1.2% p.a.), due to intense competition between the major supermarkets and falling or weak global agricultural prices. The supermarkets cannot keep cutting prices (and either their own margins or suppliers' margins), while world agricultural prices will pick up over the medium term as global oversupply dissipates.

Offsetting these inflationary pressures will be the benign oil price outlook and soft growth in wages over the next two years. Headline CPI inflation is forecast to gradually pick up over the next two years, but still remain below 2%. It is our view that inflation will subsequently accelerate, pushing above 2% in FY22 and then rise to around the 2.5% mid-point of the RBA's band during FY23 as economic growth increases, profits, employment and wage growth strengthen, and inflationary pressures re-build. The rise in the A$ toward US78 cents in late FY23 will provide some offsetting pressures between FY20 and FY24. An expected softening in the economy around mid-decade will see price and wage pressures weaken, before again rising to 2.5% over the latter half of the 2020s.

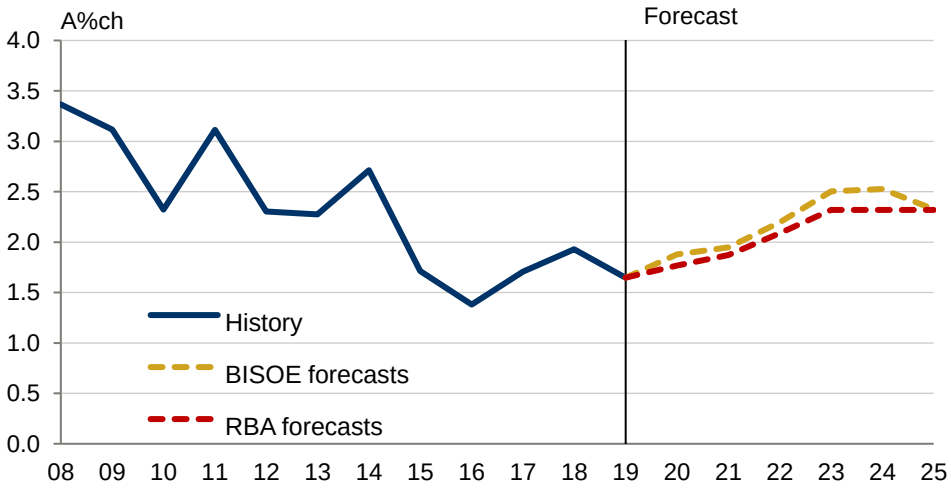
3.5.2 RBA CPI Forecasts are used to calculate real wages

To calculate real wage increases, we deflate nominal wages growth by deducting expected inflation over a 10-year period, using the CPI forecasts from the Reserve Bank of Australia (RBA). The RBA's August 2019 'Statement on Monetary Policy' forecast the headline CPI rate at "1¾ per cent" in the December quarter 2019 and 2% in the June quarter 2020 – giving an average

of 1.75% for FY20. The RBA then forecasts headline CPI to remain at 1.75% in December 2020 and then to rise to "2 percent" in both the June 2021 quarter (giving a year average of 1.9% for FY21), holding at 2% in the December quarter 2021. We then impose the mid-point of the RBA's target band, 2.5%, as the projection for the June quarter 2023, giving a year average CPI rate of 2.1% for FY22.

Expected inflation for the next 10 years is derived by using the geometric mean of RBA forecasts for the next three years, with the 2.5% mid-point of the RBA's inflation target band (i.e. 2 to 3%) used for the remaining 7 years – to give an average of 2.3% for FY23 to FY25. This methodology has been adopted by the AER (Australian Energy Regulator) in their recent revenue decisions. For example, see Transgrid Draft Determination 2018-23, Attachment 3, page 142.

Fig. 11. CPI Forecasts: BIS Oxford Economics and Reserve Bank of Australia



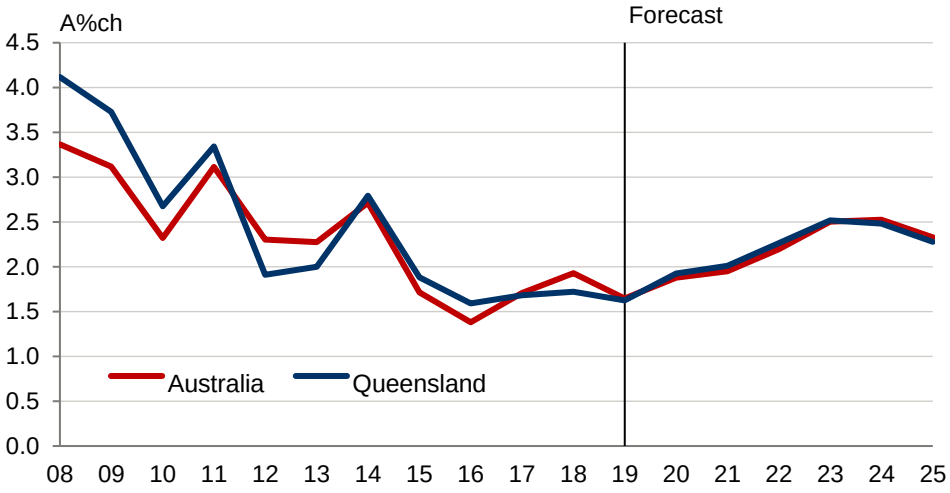
Year Ended June

Source: BIS Oxford Economics, ABS data

3.5.3 Queensland

Historically, Queensland inflation has tracked closely to the national average, with an inflation correlation coefficient of 0.95 over the past two decades. For most states, divergences in CPI inflation tend to track (or lag slightly) differences in economic growth, especially state final demand and national domestic demand. Accordingly, we expect the stronger growth in Queensland SFD over FY20 to FY22 to see slightly stronger growth in the Brisbane CPI over FY21 and FY22, before aligning with national average over FY23 to FY25.

Fig. 12. CPI Forecasts: Australia and Queensland



Year Ended June

Source: BIS Oxford Economics, ABS data

4. MATERIALS COSTS OUTLOOK

4.1 EXCHANGE RATE OUTLOOK

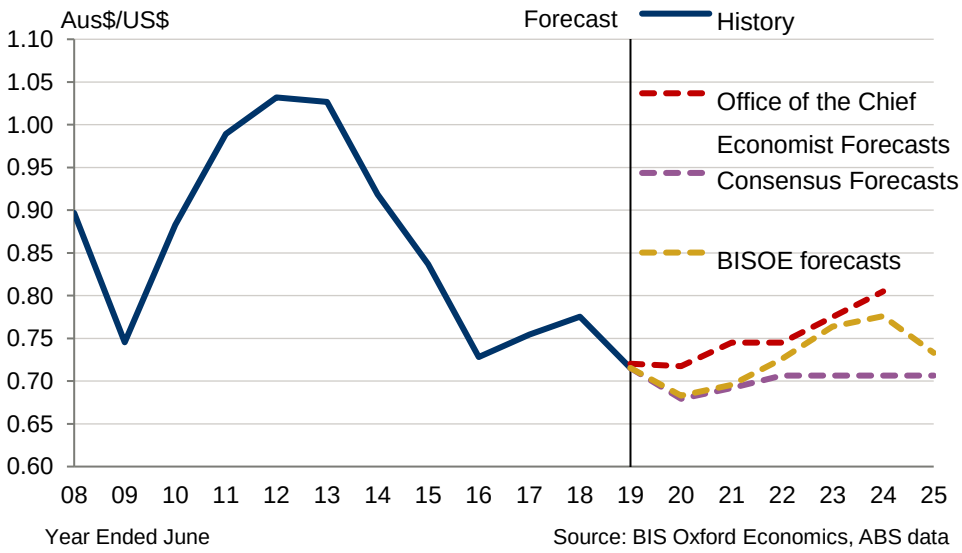
Exchange rate forecasts are based on BIS Oxford Economics forecasts of the A$/US$, which are in turn heavily influenced by movements in Australia's basket of commodity prices and interest rate relativities between Australian and overseas interest rates (particularly US interest rates). BIS Oxford Economics forecasts of commodity prices are based on supply-demand fundamentals in each commodity market, short-term and longer term global economic growth and historical real (after-inflation) prices in US$ terms. They are then converted to A$ prices using our exchange rate forecasts.

After strengthening through 2017, the AUD has steadily lost value against the trade weighted basket of currencies and is currently[5] sitting at US68 cents. A recent shift by markets back to positive US sentiment (boosting the US dollar) and the relatively subdued domestic outlook and falls in commodity prices are weighing on the currency.

The exchange rate is forecast to remain in a narrow band of US68-73 cents over the next three years, before improving commodity prices and rising Australian interest rates push the dollar to an average of US 76 cents in FY23 and an average of US78 cents in FY24. Lower commodity prices and local interest rates are then expected to push the exchange rate back down to around US73 cents over FY25.

The consensus exchange rate forecasts are derived from the latest Consensus Economics '*Asia Pacific Consensus Forecasts*' publication, which predicts an appreciation back above US70 cents by FY22.

Fig. 13. Exchange Rate Forecast Comparison



[5] As-of end-September 2019.

4.2 BASE METAL PRICE OUTLOOK

Base metal prices recorded multi-year lows in late 2015/early 2016 as a result of an easing in global demand and especially chronic oversupply in a number of commodities. However, base metals prices staged a strong recovery, peaking in FY18 before weaker global economic growth and rising uncertainty, magnified by the US-China trade war, dampened base metals across the board over the past year.

The base metal markets moved higher in the past month as a modest improvement in global risk appetite buoyed the whole commodities complex. While recent economic data for China has been poor, renewed hopes that the global trade war will moderate has eased some nerves as China and the US return to the negotiating table.

Nevertheless, base metals prices, while expected to gradually improve over the next 2 years, will still be subject to heightened uncertainty and volatility. Uncertainly around China's economic prospects, weaker growth in emerging markets, and the trade dispute with the US will continue to directly impact metal prices in the short term. A key positive in the near-term will be the significant stimulus measures by Chinese authorities to offset the impact of US tariffs and the slowing domestic economy.

The gradual slowdown in the world economy is expected to constrain general demand growth in the longer term. However, the outlook for the majority of base metals looks positive, with prices generally rebounding or remaining at elevated levels. Most metals are set to benefit from increased industrial activity in the US and increased demand from China and India.

4.2.1 World Aluminium Prices

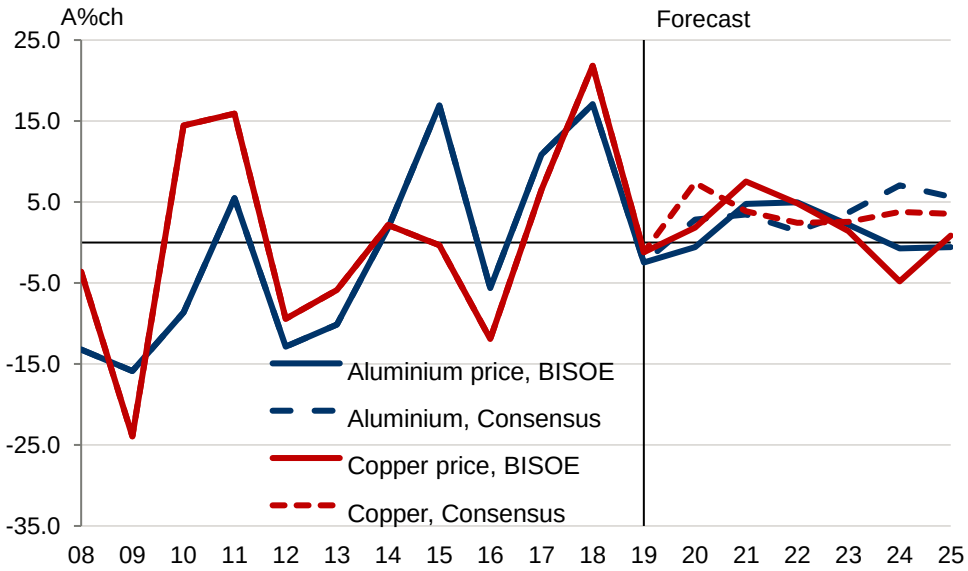
Aluminium prices declined by 20.7% over the year to June and have declined further to around US$1,750/t in September. Aluminium has lagged behind the base metals rally this month, a signal of its weaker fundamentals. Demand weakness was highlighted by a 10% q/q fall in the Japanese premium for Q4 deliveries, which was no surprise given the backdrop of poor car sales in China and other countries. Similar to copper, the supply side remains challenged, which is helping to underpin prices. Smelters have seen margins squeezed by lower aluminium prices and higher raw material prices, which are leading to closures. Global aluminium production fell by 1.3% y/y in July – a significant turnaround from the 5% growth in Q4 2018.

Aluminium prices are forecast to rise, mainly as global consumption is projected to outpace global production into 2020, leading to further falls in global stocks. A key factor is cuts to aluminium and alumina production in China over their winter, as the government looks to curb serious air pollution in a number of major cities. The Chinese government is also closing old, inefficient, and dirty smelters. Potentially offsetting these cutbacks is the possible restarts of idled capacity (especially in the US as high import tariffs take effect), higher production at smelters in other countries, and any softening of China's production curtailment policies.

In the medium term, overall consumption will be driven by vehicle sales and Chinese investment into machinery, buildings and vehicles. Coupled with rising consumption from their rising middle class, this will keep China as the largest consumer of aluminium, while India is following a similar path with a rising middle class boosting its own consumption. Prices are forecast to trend upwards underpinned by a combination of rising input costs (especially electricity and gas, the latter used in alumina refining), and a growing middle-income population within emerging economies – where per capita consumption of aluminium is expected to lift towards the levels of OECD per capita consumption.

Like other commodities, local aluminium producers will benefit from the lower Australian dollar, expected to average between US$0.68 to US$0.78 over the period to FY23, although high electricity prices pose the biggest threat to the industry in Australia. According to the latest Consensus Economics' '*Energy & Metals Consensus Forecasts*' (EMCF) publication, aluminium prices in US$ terms are forecast to grow by nearly 4% per annum on average over the next 6 years, reaching around US$2400/t by FY25. In $AUD terms prices are forecast to reach around AUD$3400/t by FY25, with a similar rate of per annum growth. Using these price forecasts and the Consensus Economics' exchange rate and RBA inflation forecasts, this translates into more modest yearly growth of around 2% in real prices on average over the next 6 years. It should be noted that the AER prefers consensus forecasts of wage and commodity prices, rather than a single forecaster (such as BISOE).

Fig. 14. Nominal World Aluminium and Copper Metals Prices (AUD), Annual Average Growth



Year Ended June

Source: BIS Oxford Economics, ABS data

4.2.2 World Copper Price

Copper is an industrial metal and its usage is seen as a barometer of industrial activity and economic growth. Copper prices reached a high of almost US$7,200/t in mid-2018 but have since collapsed, along with the rest of the base metals complex, driven by demand concerns in China and emerging economies and escalating trade tensions.

Copper prices have slowly started to reflect the market's relatively good fundamental position. Supply was constrained by a weak global pipeline of mine projects, and production in Chile was down 1% y/y in both May and June, partly due to strike action. The latest Copper Study Group data flagged up to 1% fall in global copper mine production in the first five months of 2019. The Group estimates a market deficit of 190kt in the same period. Spot treatment charges (which fall during periods of tightness) are currently down 14% y/y. We expect the copper market to be in deficit this year and prices still look oversold.

A number of factors will keep prices relatively high, including solid growth in industrial production and increased technology applications –such as electric vehicles - in the US, Europe, Asia and increasing future demand from China. However, downside remains including if weaker than expected demand emerges from China, or global production increases faster than anticipated. Over the forecast period, copper prices are expected grow moderately to average around US$7,644/t in FY25. In $AUD terms, this translates to an average price of around AUD$10,800/t by FY25. As a nominal figure, prices are forecast to grow at around 4% per annum on average in AUD$ or around 2% in real terms, when taking into account RBA inflation forecasts.

4.3 WORLD OIL PRICE (BRENT OIL SPOT)

Benchmark Brent oil prices peaked at US$81/barrel in October 2018, before plummeting to around US$50/bbl in late December. Prices then progressively recovered to US$71/bbl in May 2019, before again dropping to US$65/bbl (monthly average) in June. Prices temporarily rose above US$70/bbl in response to drone attacks on Saudi Arabia's oil facilities at Abqaiq and Khurais which led to a brief panic about potential supply shortages. It was feared that 6% of global oil production might be out of action for a significant period, but latest information suggests that the key bottleneck Abqaiq - the oil stabilisation plant - will recover from 40% of capacity to 100% by end-September. In-line with this, Brent oil price declined to around US$62/bbl.

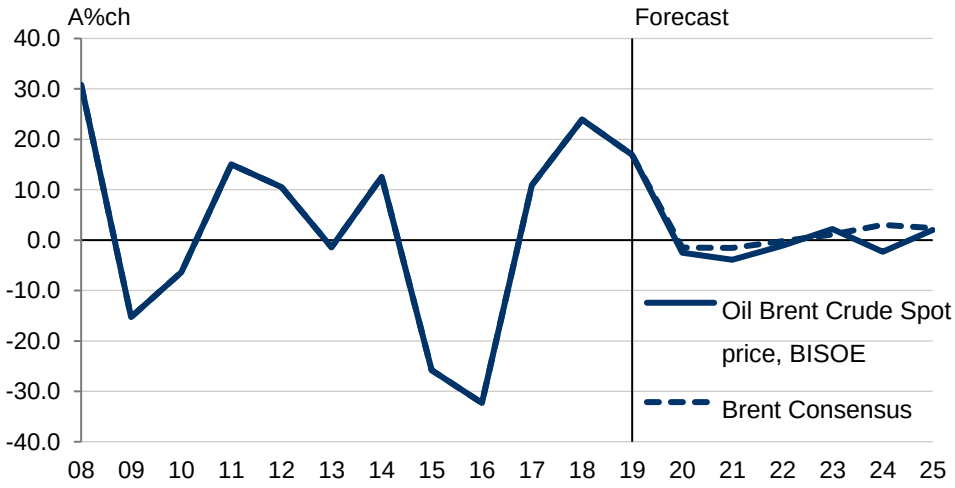
It should also be noted that this disruption took place at a time when the oil market was relatively well supplied and trying to reduce inventory back to more normal levels. Previously, we expected a broadly balanced oil market in 2019 and 2020 and the latest changes to our Saudi oil production forecast do not make any material difference to this view. Overall, the drone attacks leave the oil market more vulnerable to further unexpected problems and the risk of further sharp price spikes has clearly risen, but for now the picture has not changed dramatically from where we were previously.

China (currently accounting for 12% of the world consumption) will remain a key source of demand, with increased ownership of cars a growth driver,

although this will be partially offset by steadily reorienting away from the oil intensive manufacturing industry to a services driven economy and implementing tighter pollution controls.

Prices are expected to fall (in both US$ and AUD$ terms in the short run). However US$ oil prices are forecast to rebound from FY22 as the growth in supply eases, with increasing shale oil production costs also expected to push up prices over the medium term. In US$ terms prices are set to regain strength to current levels of around US$70/bbl by FY25. In nominal terms, AUD$ prices are forecast to decline less substantially before rebounding from FY23 onwards to average AUD$99/bbl in FY25. Growth is forecast to average around 0.5% and -1.5% per annum on average over the next 6 years in nominal AUD$ terms and real AUD$ terms, respectively.

Fig. 15. Nominal World Oil Brent Crude Spot Price (AUD), Annual Average Growth



Year Ended June

Source: BIS Oxford Economics, ABS data

4.4 STEEL PRICE: STEEL BEAMS AND SECTIONS PPI

For steel prices, we have forecast the Steel Beams and Sections producer price index (PPI) from ABS, as these types of steel are used extensively by electricity networks such as Queensland Energy – rather than using hot rolled coil as the proxy price, as it is the base material for sheet steel, which is not used in electricity networks.

Steel prices are strongly tied to the price of its raw materials (iron ore and coking coal), exchange rates, manufacturing wages, transport and energy costs. Domestic construction activity also has an influence on prices, with price pressures increasing during upswings and booms, and decreasing during down turns.

Higher iron ore and coking coal prices have seen steel beam prices grow at an average rate of 3.6% per annum over the three years to FY19. Metallurgical (coking) coal prices remained steady between the March and June quarters

2019 at about US$206/t before easing in the September quarter to US$189/t. Average export prices (fob) increased by an estimated 2.2% in FY19 to US$167/t, but are expected to ease over the next 2 years reaching US$143/t in FY21. This forecasted downward pressure on steel prices in FY20 and FY21 is due to anticipated increases in worldwide production. A stronger demand outlook after FY21 particularly from emerging economies such as India is expected to help lift prices. Meanwhile, in response to the decline in prices over the next 2 years, production is expected to decline in exporting countries outside of Australia. Metallurgical coal prices (average export) are expected to rise back to US$163/t by FY23, translating to AUD$213/t, before tapering off to US$154/t (AUD$210/t) as margins rebound and supply recommences.

Iron ore prices remain elevated following major supply disruptions earlier in the year. This has resulted in the highest prices since 2014. The tragic collapse of the tailings dam at Vale's Brumadinho mine in Brazil and imposition of other production restrictions has severely curtailed exports from Brazil. Meanwhile, weather events impacting Australian exports in Q1 also added to market tightness.

Weak Chinese economic data in August has increased the prospect of further stimulus from the government, which should support steel and iron ore demand. Demand for iron ore was robust in August, as China's iron ore imports rose 6% y/y. Port stocks are also down 20% y/y in September but rose by 2% m/m and appear to have stabilised for the time being. Mills' margins have improved slightly but are still 90% y/y lower in September and tight margins will squeeze iron ore demand. Nevertheless, the demand outlook may improve due to seasonal factors as construction activity picks up this month and next. But the escalation in tariffs between the US and China may dampen the outlook.

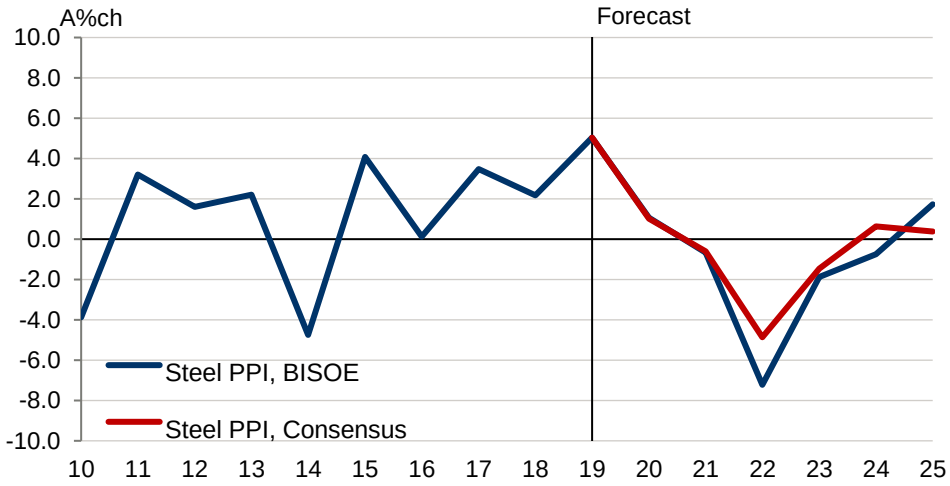
Chinese production of iron ore has picked up, rising 14.3% y/y in July. Output remains well below levels in 2017 due to strict environmental regulation, but it is responding to higher iron ore prices. However, Brazilian exports disappointed in August and were down 15% y/y and 12% m/m, although supply is showing promising signs of recovery. In contrast, Australia's exports from Port Hedland rose by 7% y/y in August, a new record for that month.

Iron ore prices recovered some of last month's severe losses on speculation that demand may improve slightly this month and next. But supply will continue to recover through the rest of the year while the demand outlook will weaken further as steel production growth slows (unless there are significant stimulus measures). Prices may remain elevated this year but will weaken in 2020 as the deficit reduces. When coupled with weakening iron ore demand, particularly from China, we anticipate iron ore prices falling from FY20 to FY22. In the longer run new capacity is set to enter the market from the new wave of iron ore projects in Western Australia, continuing the downwards slide of iron ore prices to a trough of just over US$60/t (AUD$82/t) by FY25.

Overall the Steel Beams and Sections PPI is forecast to grow by 1% in FY20. However, the index is then forecast to fall from FY21 to FY23 as falling input prices reduce the cost of steel production. Steel prices are then expected to flatten over FY24 to FY25 as low coal and iron prices are combined as steel demand, particularly from China, slows. In nominal terms, the index is forecast to decline by nearly 1% per annum on average over the next 6 years to FY25.

Accounting for inflation, this translates into a decline of nearly 3% on average each year in real terms.

Fig. 16. Steel Beams and Sections PPI, Annual Average Growth



Year Ended June

Source: BIS Oxford Economics, ABS data

5. CONSTRUCTION COSTS OUTLOOK

5.1 ENGINEERING CONSTRUCTION COSTS IN AUSTRALIA

The engineering construction IPD has accelerated over the past 2 years. While rising oil and steel prices played a role, so too did pressures on local resources such as quarry products, concrete and labour. BISOE estimates that engineering construction IPD growth remained in line with growth experienced in FY19 at around 4%.

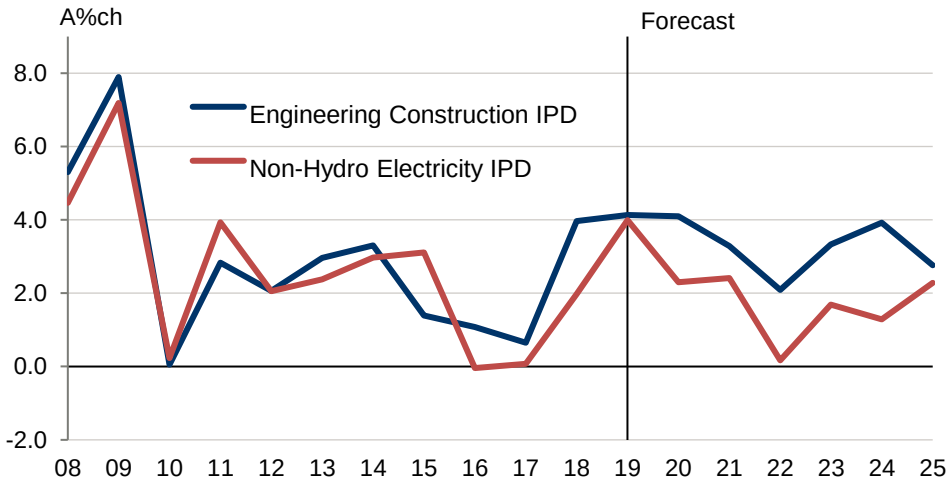
Engineering construction cost growth is expected to see similar growth over FY20 before receding over FY21 and FY22 to 3.3% and 2.1%, respectively. Wage growth is forecast to remain relatively weak in the short run, leading to low pressure from the wage component of engineering construction costs. Additionally, raw materials price inflation is expected to moderate, in line with the declining pace of commodity price rises over this period, and this will weigh on the overall sector IPD.

The engineering construction IPD growth will lift to 3.3% in FY23 and 3.9% in FY24 driven by rebuilding strength in construction wages, rising domestic oil prices, and a cyclical peak in construction activity. Following this, engineering cost growth is forecast to dip back to 3% in FY25 as activity and costs fall with wage growth levelling out, and other materials prices growth moving to long run levels.

5.1.1 Non-Hydro Electricity Costs in Australia

The Non-Hydro Electricity Construction IPD is a measure of construction costs in the electricity sector, which covers transmission, distributions and generation related construction.

Fig. 17. Engineering Construction and Non-Hydro Electricity Implicit Price Deflator Growth



Year Ended June

Source: BIS Oxford Economics, ABS data

The Non-Hydro Electricity Construction IPD has historically aligned broadly with construction costs, i.e., the national engineering construction IPD, with a growth rate correlation coefficient of 0.87 over the past three decades. However, Non-Hydro Electricity Construction IPD is considerably more volatile than the engineering construction IPD, with variance 3.9 times higher between 1987 and 2017. The higher level of volatility is predominantly explained by the influence of copper and steel prices, which are a key cost for the electricity sector. This can lead to considerable spikes in the non-hydro electricity IPD, such as a 25.3% y/y spike in FY07. Furthermore, non-hydro electricity costs have increased faster than general engineering construction costs, with growth averaging 4.2% y/y over the past three decades, compared to 3.3% y/y.

Non-hydro electricity IPD growth is estimated to have fallen behind engineering construction costs in FY18, but caught up to speed in FY19. Due to the influence of commodity prices on the index, we expect growth to moderate to 2.3% in FY20 and remain below engineering construction growth over the forecast period, averaging 1.7% per annum compared to 3.3% per annum.

5.2 NON-RESIDENTIAL BUILDING COSTS IN AUSTRALIA

Non-residential building activity is forecast to remain stable in FY20, before growing moderately to a historic record in FY22. As such, we expect costs to continue to grow moderately in the short run, peaking at 3% in FY23. Following the cyclical peak in non-residential work done, activity is forecast to decline over the remaining years, troughing in FY25. Accordingly, cost growth is forecast to decline overall to 2.4% in FY25.

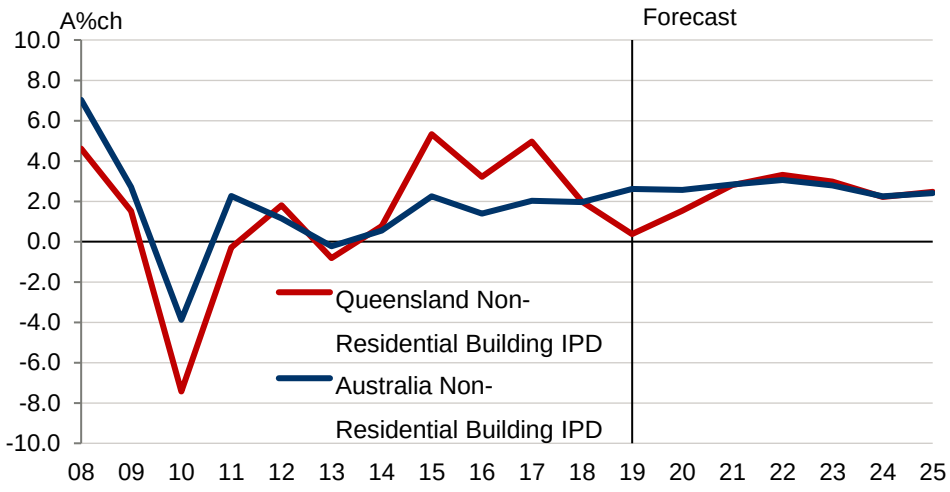
Growth in the non-residential building IPD has fallen in trend terms since 1975, from average annual growth of 10.5% in the ten years to FY85 to 1% in the ten years to FY17. The forecasted average growth rate of 2.7% per annum is below the long-term historical average of 5.1%.

5.3 NON-RESIDENTIAL BUILDING COSTS IN QUEENSLAND

Growth in the Queensland non-residential building IPD exceeded the national IPD in recent years due to relatively stronger growth in high density residential building, which competes with the non-residential sector for resources. However, in FY18 cost growth fell in line with national levels as the residential construction boom ended in Queensland, reducing competition pressures. FY19 is estimated to have seen costs flatten, unlike the Australia wide measure. This was primarily from a collapse in demand with residential, non-residential, and engineering construction work done falling over the year.

Growth in the Queensland non-residential building IPD is forecast to remain behind the national average in FY20, growing at 1.5% compared to the national average of 2.6%. While engineering construction and non-residential building are forecast to rebound, the persistent downturn in residential construction will continue to reduce pressure on resources. Following this, growth in Queensland costs will more closely align with the national level, growing at 2.8% y/y on average compared to 2.7% at the national level from FY21 to FY25 and following similar trends.

Fig. 18. Non-Residential Building Implicit Price Deflator



Year Ended June

Source: BIS Oxford Economics, ABS data

6. APPENDIX 1: STATEMENT OF COMPLIANCE WITH EXPERT WITNESS GUIDELINES

I have read the Guidelines for Expert Witnesses in Proceedings of the Federal Court of Australia and confirm that I have made all inquiries that I believe are desirable and appropriate and that no matters of significance that I regard as relevant have, to my knowledge, been withheld from the Court from this report.

7. APPENDIX 2: ESCALATION TABLES

Fig. 19. Labour Cost Escalation

Nominal Labour Price Changes	Forecast Provider	Actual		Forecasts					
		2018	2019	2020	2021	2022	2023	2024	2025
Australia Wage Inflation									
All Industries									
Average Weekly Earnings	BISOE	2.3	2.7	2.9	3.3	3.8	4.1	4.1	3.7
Average Weekly Ordinary Time Earnings	BISOE	2.4	2.7	3.3	3.5	4.0	4.2	4.2	3.8
Wage Price Index	BISOE	2.1	2.3	2.5	2.8	3.2	3.6	3.6	3.3
Electricity, Gas, Water and Waste Services Wages									
Wage Price Index	BISOE	2.0	2.8	3.0	3.2	3.5	3.9	4.0	3.7
Construction									
Wage Price Index	BISOE	1.9	1.9	2.2	2.5	3.0	3.8	3.8	3.2
Queensland Wage Inflation									
All Industries									
Wage Price Index	BISOE	2.1	2.3	2.3	2.8	3.2	3.6	3.6	3.3
Electricity, Gas, Water and Waste Services Wages									
Wage Price Index	BISOE	2.5	3.0	3.0	3.1	3.6	3.9	3.9	3.6
Construction									
Wage Price Index	BISOE	1.5	1.7	2.0	2.6	3.1	3.9	3.8	3.1
Australia Consumer Price Index (headline)	BISOE	1.9	1.6	1.9	1.9	2.2	2.5	2.5	2.3
	RBA	1.9	1.6	1.8	1.9	2.1	2.3	2.3	2.3
Queensland Consumer Price Index (headline)		1.7	1.6	1.9	2.0	2.3	2.5	2.5	2.3
Real Labour Price Changes									
Australia Wage Inflation									
All Industries									
Average Weekly Earnings	BISOE/RBA	0.4	1.0	1.1	1.4	1.6	1.6	1.5	1.3
Average Weekly Ordinary Time Earnings	BISOE/RBA	0.5	1.0	1.4	1.6	1.8	1.7	1.6	1.5
Wage Price Index	BISOE/RBA	0.1	0.7	0.7	0.9	1.1	1.3	1.3	0.9
Electricity, Gas, Water and Waste Services Wages									
Wage Price Index	BISOE (RBA)	0.0	1.1	1.2	1.3	1.4	1.5	1.6	1.4
Construciton									
Wage Price Index	BISOE (RBA)	-0.1	0.2	0.5	0.6	0.9	1.5	1.5	0.8
Queensland Wage Inflation									
All Industries									
Wage Price Index	BISOE (RBA)	0.2	0.7	0.6	0.9	1.1	1.3	1.3	0.9
Electricity, Gas, Water and Waste Services Wages									
Wage Price Index	BISOE (RBA)	0.6	1.4	1.3	1.2	1.5	1.5	1.6	1.3
Construction									
Wage Price Index	BISOE (RBA)	-0.4	0.1	0.2	0.7	1.0	1.6	1.5	0.7

Source: BIS Oxford Economics, RBA, ABS Data

Fig. 20. Materials Cost Escalation

Nominal Price	Forecast Provider	Unit	Actual		Forecasts					
			2018	2019	2020	2021	2022	2023	2024	2025
World Aluminium Price	BISOE	AUD/tonne	2751	2683	2668	2796	2934	2998	2977	2960
		A%ch	17.1	-2.5	-0.6	4.8	5.0	2.2	-0.7	-0.5
	Consensus	AUD/tonne	2751	2683	2759	2854	2895	3001	3213	3394
		A%ch	17.1	-2.5	2.8	3.5	1.4	3.7	7.0	5.6
World Copper Price	BISOE	AUD/tonne	8701	8598	8756	9414	9871	10010	9530	9611
		A%ch	21.8	-1.2	1.8	7.5	4.8	1.4	-4.8	0.9
	Consensus	AUD/tonne	8701	8598	9231	9586	9820	10072	10451	10820
		A%ch	21.8	-1.2	7.4	3.8	2.4	2.6	3.8	3.5
World Oil Price (Brent Crude Spot)	BISOE	AUD/barrel	82	96	94	90	89	91	89	91
		A%ch	23.9	16.9	-2.5	-3.9	-1.1	2.2	-2.3	2.0
	Consensus	AUD/tonne	82	96	95	93	93	94	97	99
		A%ch	23.9	16.9	-1.5	-1.5	-0.2	1.1	3.0	2.4
Steel Beams & Sections PPI	BISOE	Index	107	113	114	113	105	103	102	104
		A%ch	2.2	5.0	1.1	-0.7	-7.2	-1.9	-0.7	1.7
	Consensus	Index	107	113	114	113	108	106	107	107
		A%ch	2.2	5.0	1.0	-0.6	-4.9	-1.5	0.6	0.4

Source: BIS Oxford Economics, RBA, ABS Data

Fig. 21. Construction Cost Escalation

Implicit Price Deflator	Actual		Forecasts					
	2018	2019	2020	2021	2022	2023	2024	2025
Engineering Construction (National)	4.0	4.1	4.1	3.3	2.1	3.3	3.9	2.8
Non-Residential Building (Queensland)	2.0	0.4	1.5	2.8	3.3	3.0	2.2	2.5
Non-Hydro Electricity (National)	2.0	4.0	2.3	2.4	0.2	1.7	1.3	2.3

Source: BIS Oxford Economics, RBA, ABS Data

8. APPENDIX 3: METHODOLOGY

8.1 THE OXFORD ECONOMICS GLOBAL ECONOMIC MODEL

The Oxford Global Economic Model (GEM) is the most widely used commercial International Macro Model, with clients including international institutions, Ministries of Finance and central banks around the world, and a large number of blue-chip companies. In addition, the GEM is used internally within Oxford Economics, for both baseline forecasting and simulating alternative scenarios for the world economy and individual economies.

The GEM has constantly evolved over the past three decades, reflecting continuous interaction between the Global Economic Model and changing conditions in the policy sphere, private sector, and global institutions. It is intended for use both by Oxford Economics and by clients to produce forecasts for a wide range of international macroeconomic and related variables, and for "what-if" scenario analysis. Clients can produce forecasts using the model either with a detailed internal forecasting exercise or simply by taking the Oxford Economics baseline and adjusting a small number of key inputs/assumptions. Scenario analysis can focus on the expected impact of a particular event or policy change, or cover a wider range of alternative outcomes for stress testing.

It has long been one of Oxford Economics' guiding principles that many of the most important and interesting macroeconomic issues are inherently international. Globalization means that policy makers and analysts must form judgements about developments in their domestic economy and in the economies of countries with which they have trade and financial ties. For instance, a shift in US monetary policy has global repercussions; fossil fuel and commodity price shocks are significant source of terms of trade movements in Europe; governments increasingly collaborate over monetary, fiscal and environmental policies. These stylized facts imply that single country econometric models, which treat world trade, world prices and exchange rates as exogenous, are not best suited to analysing some of the most important issues of interest to financial and business economists.

The root cause of this integration is the massive increase in trade and capital flows between countries in the post-war period, and Oxford Economics' client base is testament to the growth in interest in international issues. With offices throughout the world, in the UK, elsewhere in Europe, the US and Asia, Oxford Economics aims to combine access to local information and expertise with a global outlook to provide a truly international service. The Oxford Global Economic Model reflects this priority, as coverage of the major trading countries has deepened and widened.

The current Oxford Model covers 80 individual countries, including Australia. The model is "well-behaved" in the sense that it has a coherent long-run equilibrium embedded which the model will tend to converge to in the long run for a wide range of sensibly calibrated shocks.

It maintains the tradition of allowing for significant cross-country differences in economic structure, but ensures that those differences truly reflect economic,

as opposed to economic model-builders', idiosyncrasies. Where possible, and it is possible in the majority of cases, the functional form for equations is left the same across countries. The exceptions chiefly reflect examples where countries are heavily dependent on particular sectors such as oil and emerging market countries where Foreign Direct Investment (FDI) plays a major role in the economy. Where the data allow, some countries have more detail on trade, distinguishing fuel and non-fuel and modelling profit and dividend receipts.

Parameters across countries differ, and this means that different countries exhibit different behaviour in response to shocks (although economy structure also accounts for variations). Now, however, tracing the root cause of these differences, and attributing them to underlying behaviour or structure, is much simpler. For instance, real wage rigidity is higher in some countries than others, and specific coefficients in wage and price equations reflect this. Unemployment will tend to rise further and faster in these countries in response to an adverse demand shock, even though the functional form of wage and price equations is identical across countries.

8.1.1 Structure of the GEM

Very broadly, the Oxford Global Economic Model is Keynesian in the short-run and monetarist in the long-run. This means that increased demand will lead to higher output and employment initially, but eventually this feeds through into higher wages and prices. Given an inflation target, interest rates have to rise, reducing demand again ('crowding out'). In the long run, output and employment are determined by 'supply side' factors. Interactions between countries through trade, exchange and interest rates, capital flows and oil/commodity prices are modelled in detail.

Within this theoretical framework, the structure of each country in the Oxford Global Economic Model can be generalized as follows:

- Consumption - function of real income, wealth and interest rates.
- Investment - 'q' formulation with accelerator terms.
- Exports - depend on world demand and relative unit labour costs.
- Imports - depend on total final expenditure and competitiveness.
- Real wages depend on productivity and unemployment relative to NAIRU.
- Prices are a mark-up on unit costs, with profits margins a function of the output gap.
- Monetary policy endogenised. Options include Taylor rule, fixed money and exchange rate targeting.
- Exchange rate determined by uncovered interest parity (UIP) in the short run and equilibrium exchange rates in the long run.
- Expectations are generally adaptive, with an option to use forward-looking expectations on a model-consistent basis for certain key financial variables.

Countries are linked in the Oxford Global Economic Model via:

- Trade (Exports driven by weighted matrix of trading partners' import demand).

- Competitiveness (IMF relative unit labour costs where available, relative prices elsewhere).
- Interest Rates and Exchange Rates.
- Commodity Prices (e.g. oil, gas and coal prices depend on supply/demand balance; metal prices depend on growth in industry output).
- World Price of Manufactured Goods.

8.1.2 Country model detail

The structure of each of the country models is based on the income-expenditure accounting framework. However, the models have a coherent treatment of supply. In the long run, each of the economies behaves like the classic one sector economy under Cobb-Douglas technology (production function). Countries have a natural growth rate, which is determined by capital stock, labour supply adjusted for human capital, and total factor productivity. Output cycles around a deterministic trend, so the level of potential output at any point in time can be defined, along with a corresponding natural rate of unemployment.

Firms are assumed to set prices given output and the capital stock, but the labour market is characterized by imperfect competition. Firms bargain with workers over wages but choose the optimal level of employment. Under this construct, countries with higher real wages demonstrate higher long-run unemployment, while countries with more rigid real wages demonstrate higher unemployment relative to the natural rate.

Inflation is a monetary phenomenon in the long run. All of the models assume a vertical Phillips curve, so expansionary demand policies place upward pressure on inflation. Unchecked, these pressures cause an unbounded acceleration of the price level. Given the negative economic consequences of this (as seen in the 1970s in developed economies and more recently in some emerging markets), most countries have adopted a monetary policy framework which keeps inflation in check. The model mirrors this, by incorporating endogenous monetary policy. For the main advanced economies, monetary policy is underpinned by the Taylor rule, captured using an inflation target, such that interest rates are assumed to rise when inflation is above the target rate, and/or output is above potential. The coefficients in the interest rate reaction function, as well as the inflation target itself, reflect assumptions about how hawkish different countries are about inflation. (A by-product of this system is that scenarios under fixed interest rates only make sense in the short-run. A scenario which imposes a fixed interest rate, and therefore assumes a lack of monetary policy, in conjunction with a vertical Phillips curve, would result in accelerating - or decelerating - inflation after several years.)

Demand is modelled as a function of real incomes, real financial wealth, real interest rates and inflation. Investment equations are underpinned by the Tobin's Q Ratio, such that the investment rate is determined by the return relative to the opportunity cost, adjusted for taxes and allowances. Countries are assumed to be "infinitely small", in the sense that exports are determined by aggregate demand and a country cannot ultimately determine its own terms of trade. Consequently, exports are a function of world demand and the real

exchange rate, and the world trade matrix ensures adding-up consistency across countries. Imports are determined by real domestic demand and competitiveness.

8.2 THE AUSTRALIAN STATES MODEL

To generate the forecasts for the Queensland economy, BIS Oxford Economics used the Australian States Model. In this model, forecasts for the states are generated relative to the national outlook based on state specific structural features, such as the prevalence of the mining industry in Queensland.

8.3 ELECTRICITY, GAS, WATER AND WASTE SERVICES WAGES

To generate forecasts for Electricity, Gas, Water and Waste Services, BIS Oxford Economics used an econometric model based on a comparison of all industries wage growth and EGWWS wage growth, as well as the influence of current wage agreements that will drive wage growth over the next three years.

8.4 NON-HYDRO ELECTRICITY IMPLICIT PRICE DEFLATOR

To generate Non-Hydro Electricity Implicit Price Deflator forecasts, BIS Oxford Economics used an econometric model based on a comparison of the total engineering construction IPD to the non-hydro electricity IPD, as well as copper and steel price forecasts, which drive spikes in non-hydro electricity costs.

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