

Economic

Roundup

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Measuring market inflation expectations

Will Devlin and Deepika Patwardhan¹

Of the available measures of inflation expectations, those available with highest frequency are taken from financial market pricing — so-called ‘break-even’ inflation rates from the bond market and the market for inflation swaps. Bond market derived measures — which can be subject to both positive and negative biases — suggest medium-term inflation expectations are currently anchored within the Reserve Bank of Australia’s target band. Inflation swap rates — which can be subject to their own biases — also suggest that medium-term expectations are well contained. Finally, forward inflation expectations derived from the inflation swaps curve suggest that the market concurs with Treasury estimates that the introduction of the carbon price will have a modest, one-off impact on headline CPI of around 0.7 per cent in 2012-13.

¹ The authors are from Macroeconomic Policy Division, the Australian Treasury. This article has benefited from comments and suggestions provided by David Gruen, David Drage, Michael Bath (AOFM), James Kelly and Shane Johnson. The views in this article are those of the authors and not necessarily those of the Australian Treasury.

Introduction

Given their ability to influence price and wage-setting behaviour in particular, inflation expectations play a key role in the determination of future inflation outcomes. As such, timely and reliable estimates of inflation expectations are an important input into the inflation forecasting process and, more generally, the determination of macroeconomic policy settings.

Measures of inflation expectations can be grouped into two broad categories: survey and market-based measures. Survey-based measures ask particular sub-sections of the community – such as market economists, consumers or trade union officials – what their expectations are for inflation over some defined period. While these measures can contain useful information, they are typically released with a lag and can be distorted by the systematic biases of the surveyed respondents.

This paper focusses on market-based measures, which directly infer market participants' expectations for inflation from financial prices. These measures are readily available, updated in real time and, perhaps most importantly, reflect the collective actions of actors who have to back their views by 'putting their money where their mouths are.' Nonetheless, market-based measures are subject to their own biases, and the economic forecaster or macroeconomic policymaker must be aware of these when forming their views.

The paper is structured as follows. First, we examine inflation expectations taken from the market for government bonds, which have historically been the most widely used measure. Second, we look at the market for inflation swaps, which has developed into a viable alternative to bond market-derived measures. Using the inflation swaps curve to derive forward inflation expectations, we then assess the expected price impacts of the Government's *Clean Energy Future* package. Finally, we discuss reasons for divergences in implied inflation expectations between the bond and inflation swaps markets.

Bond market ‘break-even’ inflation rates

The most widely used market-based measures of medium to long-term inflation expectations are those derived from the market for government bonds. Their use is based on the premise that (nominal) Treasury bond yields can be decomposed into three main components:²

1. the real yield, which bond investors demand as compensation for postponing consumption;
2. compensation for expected inflation over the term of the bond; and
3. compensation for any potential variation in either of the above two components (also referred to as term and inflation risk premia, respectively).

In contrast, yields on Treasury indexed bonds – which pay a fixed coupon on the inflation-adjusted capital value of the bond – represent a real yield and compensation for its potential variation. By deduction, the difference between yields on nominal and indexed bonds – the ‘break-even’ inflation rate – can be regarded as representing the compensation investors demand for being exposed to inflation and to uncertainty around future inflation.³

The incorporation of an inflation risk premium potentially distorts bond market break-evens as a measure of inflation expectations. While it is possible to decompose break-even rates to get a cleaner estimate of the expected inflation component, this is a complex modelling exercise and, particularly given data limitations in the Australian market, is subject to some degree of imprecision (see, for example, Finlay and Wende 2011).

The use of bond market break-evens is also made somewhat problematic by the limited size and liquidity of the indexed bond market in Australia. While the market for (nominal) Treasury bonds is quite liquid, the market for Treasury indexed bonds is significantly less liquid (see Box 1). As a consequence, yields on Treasury indexed bonds likely trade at some premium *relative* to nominal Treasury bond yields – since investors will demand compensation for holding this liquidity risk. This, in turn, biases down implied inflation expectations taken from calculated break-even rates.

2 Note, compensation for default risk on Australian government debt is assumed to be negligible. Australia is currently one of only seven sovereigns globally to hold a AAA rating with a stable outlook from all three of the major credit rating agencies.

3 It is termed the ‘break-even’ rate since if future inflation turned out to be equal to this rate then the realised real return from holding a nominal bond and an indexed bond would be exactly the same.

Box 1: The markets for nominal and indexed Treasury bonds

The Australian Government, via the Australian Office of Financial Management (AOFM), issues two types of medium to long-term debt securities to the public:⁴

- **Treasury nominal bonds**, which carry an annual (nominal) rate of interest fixed over the life of the security, payable six-monthly.
- **Treasury indexed bonds**, where the capital value of the security is adjusted for movements in the Consumer Price Index. Interest is paid quarterly, at a fixed rate, on the adjusted capital value. At maturity, investors receive the adjusted capital value of the security.

The bulk of the Commonwealth's debt raising task has typically been met by the issuance of Treasury bonds, and the Treasury bond market has historically been the largest Commonwealth Government Securities (CGS) market as a consequence. Since the 2002-03 Review of the CGS market successive governments have committed to retaining a liquid and efficient CGS market. As discussed in the 2011-12 Budget, a panel of financial market experts reported that the CGS market should be maintained at around 12 to 14 per cent of GDP over time (around \$200 billion at present), significantly higher than the previous target of \$50 billion. There are currently 18 Treasury bond lines on issue, with maturities ranging from late 2012 out to 2027.

The issuance of Treasury indexed bonds was halted in 2003, and maturing bond lines saw the market shrink to a low of around \$6 billion outstanding in 2008. In late 2009, however, the AOFM resumed its indexed bond issuance program and the market has since grown to just over \$16 billion outstanding. At the 2011-12 Budget the Government announced it would support liquidity in the indexed bond market by maintaining around 10 to 15 per cent of the total CGS market in indexed securities. There are currently five indexed bond lines on issue, with maturities ranging from 2015 to 2030.

Owing partly to its limited size, the market for Treasury indexed bonds has typically been regarded as a significantly less liquid market. Since they are highly prized by portfolio managers with longer term inflation-linked liabilities to hedge – such as life insurers – Treasury indexed bonds tend to be very tightly held. As a result, secondary market trading in indexed bonds can be quite limited, particularly relative to (nominal) Treasury bonds.

That said, the size of this relative liquidity difference appears to have narrowed over recent years, largely due to reduced turnover of nominal Treasury bonds (Chart 1). There are likely several reasons for this reduction in turnover. It may reflect an increased preference by investors and bond traders to use derivatives referencing Treasury bonds (such as futures and swaps) to adjust their portfolio and trading positions, rather than trades involving the physical securities.

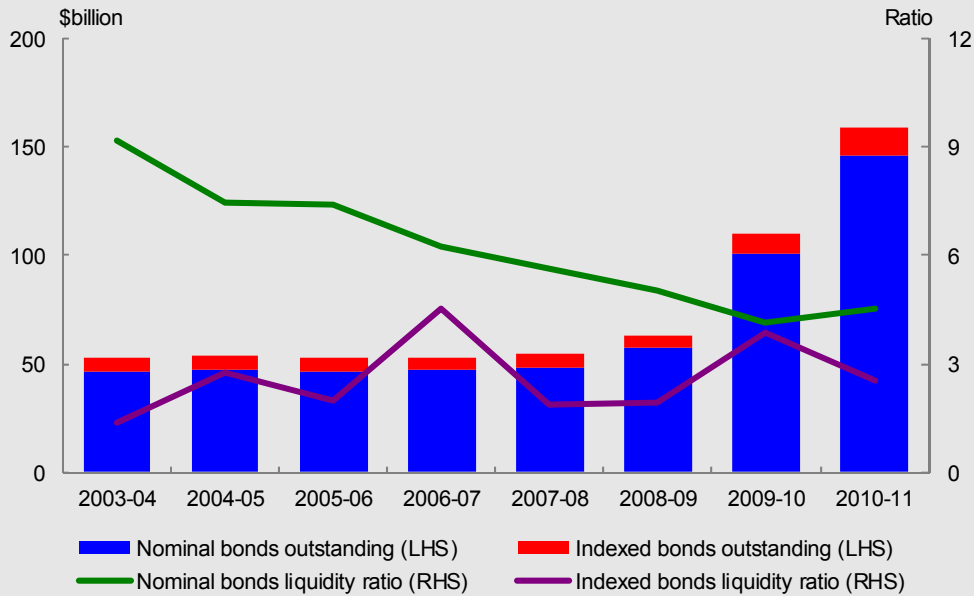
An increase in the proportion of Treasury bonds held by passive (or, 'buy and hold') investors, such as foreign reserve asset managers and institutional investors, may also

4 The Commonwealth also issues Treasury Notes, which are a short-term debt security issued to assist with the Australian Government's within-year financing task.

Box 1: The markets for nominal and indexed Treasury bonds (continued)

have contributed to the decline in secondary market turnover (AOFM 2007-08). Finally, an increasing proportion of Treasury bonds are being held by domestic banks as they seek to enhance the quality of their liquid asset holdings ahead of the new Basel III liquidity rules.

Chart 1: The markets for nominal and indexed Treasury bonds^(a)



(a) The liquidity ratio is the ratio of annual turnover to total outstandings, where outstandings are an average of monthly data on CGS published by the AOFM.

Source: AOFM, Australian Financial Markets Association and Treasury.

The limited number of indexed bond lines on issue also means that, since break-even rates must be calculated using bonds on a comparable tenor basis, interpolation is usually necessary to fill in points on the real yield curve.⁵ Moreover, since Treasury

5 We use the linear interpolation method, where the real yield at any given point in time, $r_{0,T}$, is given by a weighted average of the yields on the two indexed bonds with maturity dates closest to the target maturity date:

$$r_{0,T} = (1 - \lambda) * r_M + \lambda * r_N$$

$$M < T < N$$

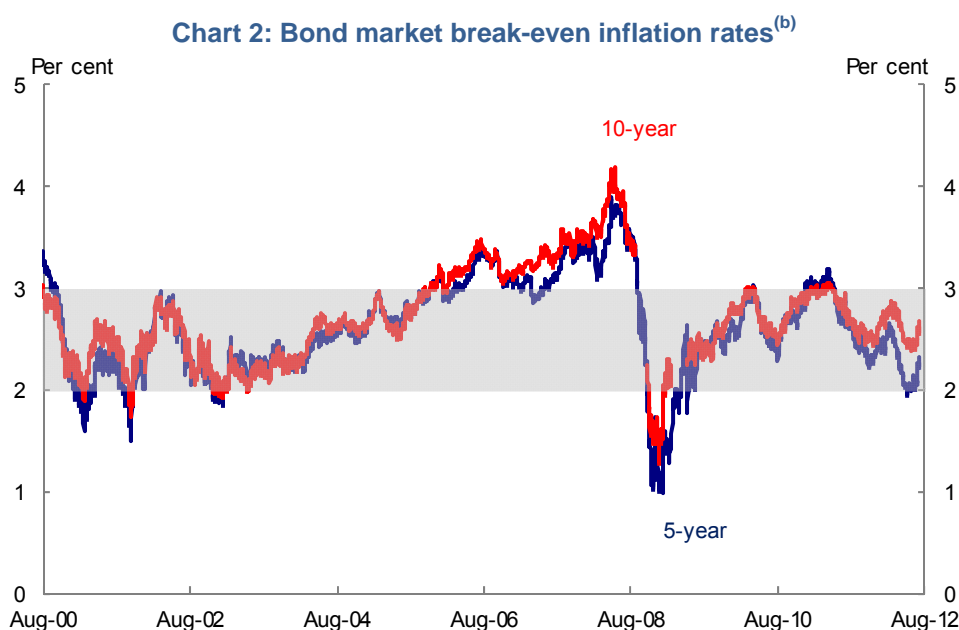
where M is the number of days until maturity of the indexed bond that matures before the target maturity date, T , and N is the number of days until maturity of the indexed bond that matures after the target maturity date. The weights are calculated based on the relative proximity (in days) to the target maturity date:

$$\lambda = \frac{days_{0,T} - days_M}{days_N - days_M}$$

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indexed bond lines have typically been issued with maturities spaced every five years, a reliable time series of break-even rates can only be calculated at tenors of five years or more.

These caveats notwithstanding, the five-year bond break-even rate — which shows expectations for average annual inflation over the next five years, abstracting from the influence of any risk premia — is currently in the lower half of the Reserve Bank of Australia's (RBA) target band (Chart 2).⁶ At the longer 10-year horizon, expectations are currently around the mid-point of the target band.



(b) There are two breaks in the 10-year break-even series — between September and November 2008, and February and June 2009 — owing to a lack of reliable pricing data for the 10-year indexed bond during those periods.

Source: Bloomberg and Treasury.

It is difficult to be precise about the relative magnitudes of the competing biases on bond break-even rates — there are likely to be periods when the positive inflation risk bias dominates and other periods when the negative liquidity risk bias dominates.⁷ Nevertheless, over relatively short periods, an assumption of constant inflation risk and liquidity premia is likely to be a reasonable one such that, while the relative

⁶ Bond market break-evens should technically be adjusted to account for different compounding frequencies between (nominal) Treasury bonds (which pay semi-annual coupons) and indexed bonds (which pay quarterly coupons). In practice, however, this does not materially affect estimates of expected inflation taken from bond market break-evens.

⁷ Finlay and Wende (2011), for example, estimate extended periods of both positive and negative inflation risk premia, where they attribute episodes of negative inflation risk premia to the influence of liquidity premia (the two are not modelled separately).

magnitude of these competing biases at any one time may distort the implied *level* of expected inflation, short-term changes in break-even rates should represent changes in actual market inflation expectations reasonably well.

Over longer periods of time, however, both of these biases are likely to exhibit some variability. While relative liquidity conditions between the indexed and nominal bond markets may be reasonably stable during normal times, the relative liquidity premium incorporated in real bond yields can become more elevated during periods of heightened risk aversion (when investors show a strong preference for more liquid assets). Inflation risk premia, on the other hand, are likely to rise and fall with, for instance, unexpected volatility in realised inflation outcomes, announced government policy changes, volatility in world oil prices and a range of other influences.

Inflation swap rates

Inflation swap rates provide an alternative to bond market-derived measures of market expectations for inflation. An inflation swap is a bilateral agreement that requires one party (the 'inflation payer') to pay realised cumulative inflation over the period of the swap in return for receiving a fixed interest rate (the inflation swap rate) from a second party (the 'inflation receiver') (see Box 2).

As a measure of market inflation expectations, inflation swap rates (also called inflation swap 'break-evens') offer some advantages over bond market break-evens. They are available over a much wider range of tenors – quoted rates are available from one-year out to 30 years – and, thus, are able to provide a read on both short and long-horizon inflation expectations. As a primary (or, dealers) market, where contracts can be created as required, inflation swap rates are not subject to the kind of liquidity premia that can affect bond market break-evens. While inflation swap rates may incorporate some premium for counterparty risk, this is likely to be negligible since contracts are negotiated with reference to notional amounts (that is, there is no exchange of principal) and make use of standard agreements that provide some legal protection in the event of counterparty default (Hurd and Relleen 2006).

However, despite their advantages, inflation swaps are also unlikely to give a perfectly clean measure of market inflation expectations. As with bond market break-evens, inflation swap rates likely incorporate some premia for inflation risk – compensation demanded by the inflation payer for potential volatility in realised inflation over the term of the swap. Moreover, while inflation swaps are more liquid than Treasury indexed bonds in the sense that they can be created as required, the tailoring of contracts and their bilateral nature makes inflation swaps less liquid 'on the way out' – since the holder of an inflation swap who wished to exit the contract early would have to renegotiate terms with the original issuer, who may or may not be

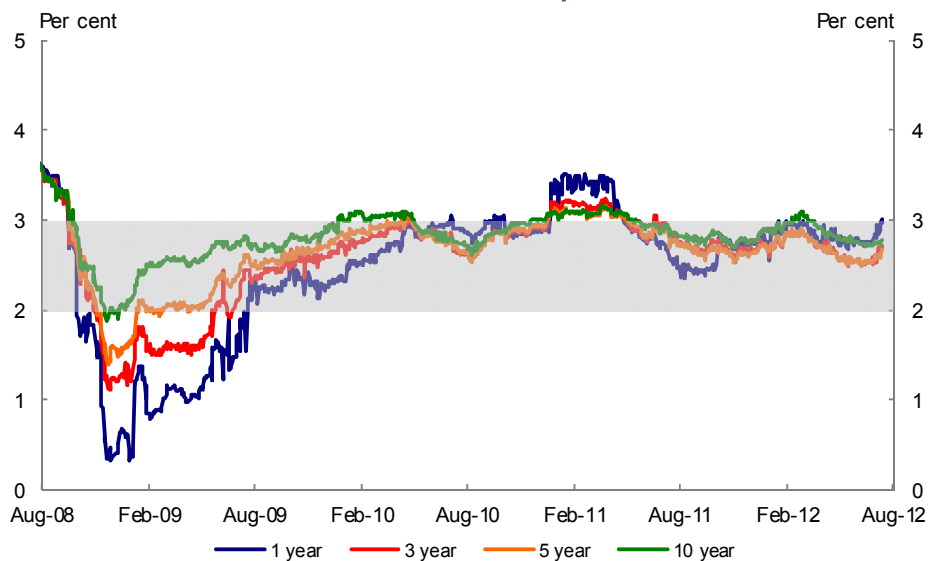
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willing to do so. Compensation for this risk may bias inflation swap rates away from the market's true expected inflation rate.

Further, regulatory changes enacted in recent years have meant that banks dealing in the inflation swaps market are required to set aside significantly more capital against any derivatives exposures. Compensation demanded by banks for these higher capital charges may also have introduced a systematic bias into inflation swap rates.

Chart 3 below shows the three, five and ten-year swap rates are currently in the top half of the target band.

Chart 3: Inflation swap rates



Source: Bloomberg.

Since quoted rates are available at yearly intervals from 1 year out to 10 years, we can decompose inflation swap rates into a series of shorter spot and implied forward rates.⁸ A useful application of forward rates is to isolate the expected price impacts of announced policy changes that are due to take effect at some point in the future. In July 2011, the Government announced the introduction of a \$23 a tonne carbon price beginning on 1 July 2012. At the time of the announcement the Government released the results of Treasury modelling which estimated the policy would result in a one-off rise in headline CPI of 0.7 per cent in the September quarter 2012.⁹

8 The implied one-year forward swap rate, and any subsequent forwards, are calculated as:

$$f_{l-s} = \frac{s_l l - s_s s}{l - s}$$

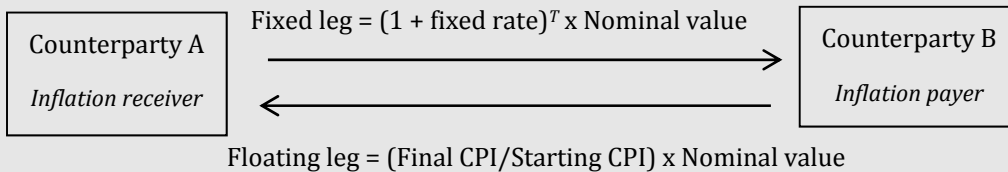
Where f_{l-s} is the forward rate over the period $l - s$ and s_l is the swap rate for a particular maturity, l , and s_s is the swap rate for a shorter maturity, s (Pepper and Cassino 2011).

9 A smaller step up in headline CPI, of 0.2 per cent, was expected to occur in 2015-16, when the scheme moves to the international carbon price (Commonwealth of Australia 2011).

Box 2: The inflation swaps market

While a variety of inflation swaps are transacted in Australia, the most common is the zero-coupon inflation swap. This has the most basic structure, with payments exchanged only on maturity (Figure 1). Zero-coupon swaps have become the standard for which rates are quoted by brokers of these products (generally the major Australian banks and international banks dealing in the Australian swaps market).

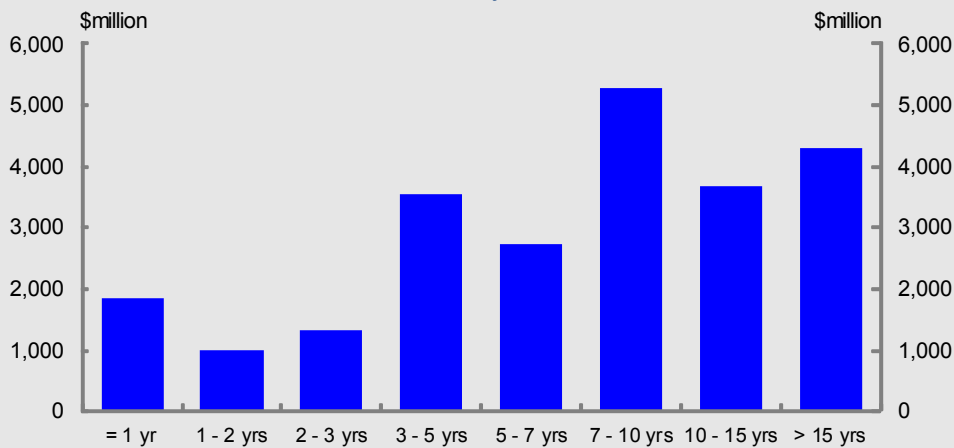
Figure 1: Indicative cash flows of a zero-coupon inflation swap contract



Where the fixed rate is quoted as an effective percentage rate per annum and T is the number of years between the start and end dates.

The inflation swap market is transacted over-the-counter, rather than via an organised exchange, so comprehensive data on market activity are not readily available. However, according to a survey by the Australian Financial Markets Association (AFMA) there were \$23.7 billion of inflation swaps outstanding as at May 2011 – the majority of which were for terms of three years or more – with annual turnover (to end-June 2011) of \$12.2 billion (Chart 4) (AFMA 2011).

Chart 4: Inflation swaps outstanding by tenor
As at May 2011



Source: AFMA.

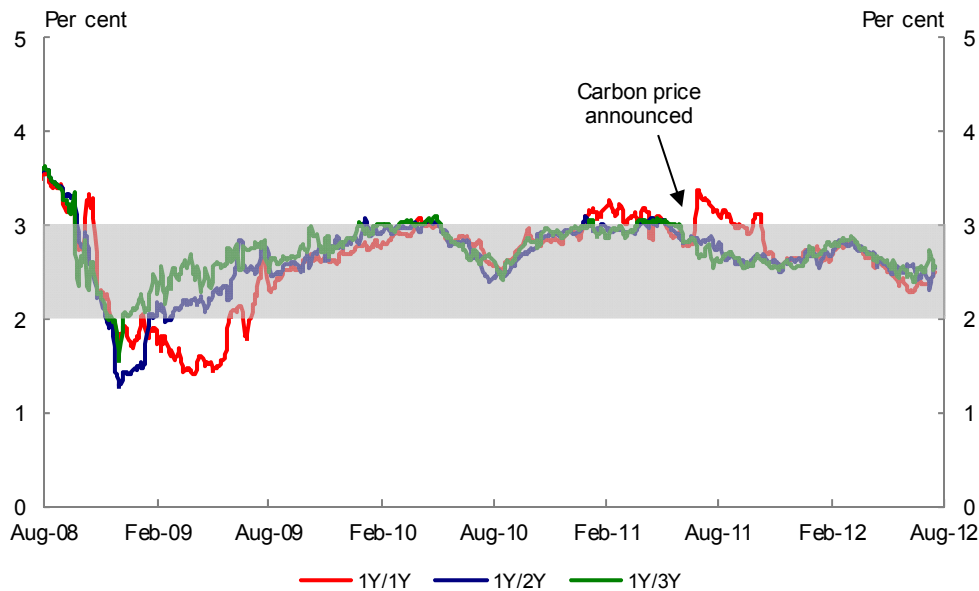
AFMA only began collecting survey data on the inflation swaps market in 2010-11, but by all indications the market has expanded quite rapidly over the past decade. For instance, in August 2001 the Reserve Bank of Australia (RBA) estimated there were only around \$500 million in inflation swaps outstanding (RBA 2001).

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Activity in the inflation swaps market surrounding the announcement suggests these estimates were viewed as credible, with the implied one-year ahead forward rate rising by between 0.6 and 0.7 per cent upon the announcement (Chart 5). This level jump was maintained until end-October 2011 (since, following the release of the September quarter 2012 CPI in late October 2012, the impact of the introduction of the carbon price on the CPI is expected to have largely passed).

Currently, the one, two, and three-year ahead forward rates – which reflect expectations over time windows in which the introduction of the carbon price is not expected to have a material price impact – are currently around the mid-point of the target band (Chart 5).

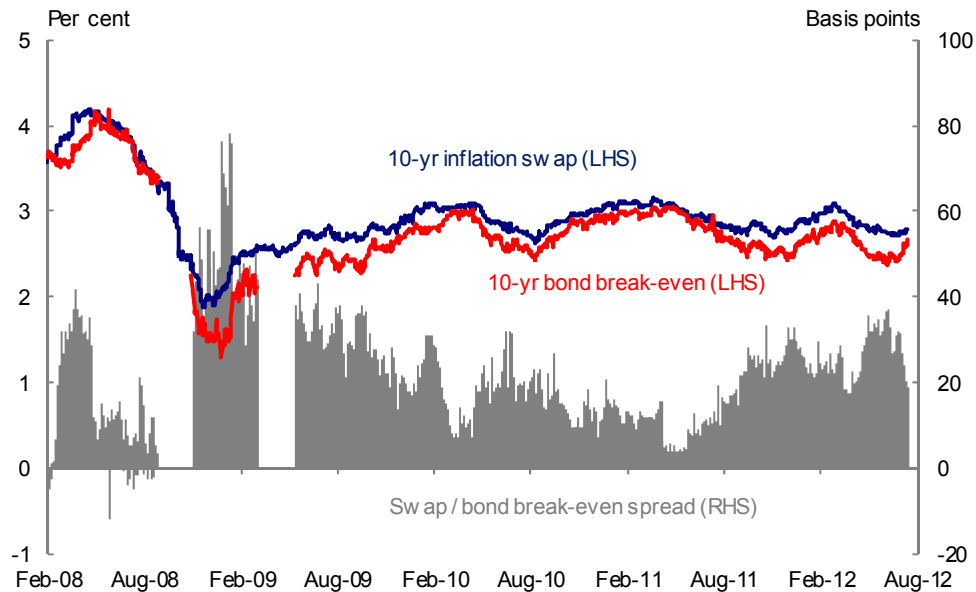
Chart 5: Implied forward swap rates
5-day moving averages



Source: Bloomberg and Treasury.

In summary, measures of inflation expectations taken from both the Treasury bond and inflation swaps markets are subject to a range of potential biases, the relative magnitudes of which will vary over time. As a consequence, inflation expectations implied by these two measures can diverge. While inflation swap rates generally move closely in line with bond market break-evens, they have typically been around 20 basis points higher at the 10-year tenor (Chart 6).

Chart 6: Bond market break-evens vs inflation swaps



Source: Bloomberg and Treasury.

Of course, in a world of perfect markets, arbitrage should ensure that the inflation compensation implied by the difference between nominal and indexed bond yields be equal to that implied by inflation swap rates.¹⁰ At a broad level, the reason for the observed divergence is that there may be specific factors that inhibit participants from fully arbitraging away any differences between the two markets.

On the one hand, the limited range of maturities available in the indexed bond market means it is difficult to fully replicate the inflation exposure in a given swaps position with simultaneous trades in the indexed and nominal bond markets. Further, one of the counterparties to an inflation swap will usually be a swaps dealer, who may seek to hedge their inflation exposure with parallel trades in the indexed bond market. Because a cash position in the indexed bond market necessarily entails a capital cost, and because indexed bonds are relatively illiquid, the swaps dealer may demand additional compensation for the cost and potential difficulties involved in hedging this risk. This, in turn, may drive a wedge between inflation swap rates and bond break-evens.

¹⁰ Since the payoffs involved in entering an inflation swap can be replicated using nominal and inflation-indexed bonds, and two portfolios with identical future payoffs should, under the assumption of perfect markets, have the same price via arbitrage (Hurd and Relleen 2006).

Conclusion

This article has examined two market-based measures of inflation expectations. The inflation compensation implied by the difference between the yields on nominal and indexed Treasury bonds – which can also incorporate time-varying premia for inflation and liquidity risk – suggest medium to long-term expectations are currently well contained within the RBA's target band. Inflation swap rates, which can be subject to their own biases, point to expectations being within the top half of the target band.

Given the limited number of indexed bonds on issue in Australia, one clear advantage of inflation swap rates as a measure of inflation expectations is their ability to be easily decomposed into implied forward rates. A useful application of forward rates is to gauge the expected price impact of impending policy changes. For instance, forward inflation swap rates suggest the market concurs with Treasury estimates that the introduction of the carbon price will result in a modest, one-off increase in headline CPI of around 0.7 per cent in 2012-13.

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Sovereign wealth funds and the exchange rate: comparing resource booms in Australia, Chile and Norway

Phil Garton¹

The idea of Australia establishing a sovereign wealth as a response to the challenges posed by the resource boom has attracted considerable interest. Some argue that a fund investing in foreign assets, as is done in Chile and Norway, could ease pressures on trade-exposed industries resulting from the high Australian dollar. This article examines how effective this might be, drawing on comparative experience in recent resource booms in the three economies.

1 The author is from the Macroeconomic Policy Division, the Australian Treasury. This article has benefited from comments and suggestions provided by James Kelly and David Gruen. The views in this article are those of the author and not necessarily those of the Australian Treasury.

Introduction

A number of commentators have argued that Australia should consider establishing a sovereign wealth fund as a way to better manage the current resource boom by saving a greater share of the tax revenues arising from the boom. Proponents have in mind various objectives, with the main ones being to:

- ensure a larger share of unusually high incomes is saved for longer-term benefit rather than being used for current consumption;
- avoid pro-cyclical fiscal policy by stopping revenues being recycled back into the economy through tax reductions and increased government spending;
- protect the fiscal position against exposure to commodity price risks by accumulating financial assets that can be drawn on if commodity prices plunge; and
- dampen appreciation of the exchange rate resulting from the boom by investing in foreign assets, thereby relieving pressure on other trade-exposed sectors.

This article is concerned with the last of these objectives, extending analysis published in a recent speech (Garton and Gruen 2012). It does not attempt to take a position on the overall merits of establishing a sovereign wealth fund, but is concerned more narrowly with the question of whether accumulation of foreign assets through such a fund could have a significant effect on the exchange rate.

The article begins by outlining the elements that may be involved in a regime of this kind. It then outlines what economic theory suggests about likely impacts on the exchange rate. The final part of the paper presents a comparative analysis of recent resource boom experiences in Australia, Norway and Chile. This provides something of a natural experiment, as the three countries have had similar rises in their terms of trade, and Norway and Chile have had in place sovereign wealth fund regimes linked to resource revenues.

What is meant by a sovereign wealth fund in this context?

While the idea of a sovereign wealth fund has attracted a good deal of support, it is not always clear what its proponents have in mind. In considering exchange rate impacts it is important to be clear on what elements would be involved in such a mechanism.

A sovereign wealth fund can be defined broadly as a government-owned fund that invests in domestic and/or foreign financial assets. However, in the context of a resource boom, proponents of a sovereign wealth fund usually have in mind that fund accumulation would be linked in some way to government revenues derived from the

boom. This could be done by hypothecating a specific stream of revenues derived from the resources sector, or through some other mechanism to ensure above-normal revenues are saved in the fund.

Another key element not always identified explicitly in discussions on this issue is that a sovereign wealth fund would need to be combined with fiscal rules to ensure that it results in a genuine increase in government saving, and is not offset by increased borrowing in the rest of the budget. Such rules can be viewed as the central element of both the Norwegian and Chilean regimes.

Norway's Government Pension Fund Global is often cited as a model for managing resource booms. This arrangement has three key features:

- all government revenues from oil and gas are hypothecated to the fund;
- the fund is invested solely in foreign equities and fixed income assets; and
- the medium-term objective for the structural budget deficit, excluding oil and gas revenues, is set at 4 per cent of accumulated funds (the assumed long-term real rate of return on fund assets).²

The third element is designed to preserve the real value of the fund over time, with only the fund earnings available to finance current spending, while retaining flexibility for fiscal policy to respond to economic conditions in the short-term.

An alternative model is Chile's Economic and Social Stabilisation Fund, which also invests solely in foreign assets. This fund is linked to a structural budget balance objective that is based (in addition to the normal output gap) on estimates of equilibrium prices for copper and molybdenum over a 10-year period. This arrangement is designed to ensure that revenues arising from above-normal minerals prices are saved in the fund, which can be drawn down when prices fall below normal.

The difference between the Chilean and Norwegian regimes reflects their differing objectives. Norway's is a long-term savings fund, designed to ensure revenues from finite oil and gas reserves are saved for the benefit of future generations. Chile's is a stabilisation fund, designed to smooth the fiscal and macroeconomic effects of fluctuations in minerals prices. It is not intended to deliver a structural increase in saving in response to a rise in prices that is judged to be structural.

2 The structural balance adjusts the budget balance to remove the effects of the economic cycle, normally by estimating what the budget balance would be if the economy was always operating at non-inflationary full capacity.

Notwithstanding these differences, the Norwegian and Chilean regimes have in common two elements relevant to considering exchange rate impacts:

- a fiscal rule that ensures higher budget surpluses when relevant commodity prices are higher; and
- investing surpluses in foreign financial assets, rather than domestically.³

The terms of trade and the exchange rate

In considering how arrangements of this kind might affect the exchange rate, it is important to first understand why a rise in the terms of trade normally results in currency appreciation.

While the nominal exchange rate is most directly thought of as matching demand and supply in the foreign exchange market, it also plays a broader role in equilibrating goods and services and financial markets.

Goods and services market equilibrium

In an open economy, goods and services market equilibrium relates primarily to matching demand and supply for non-tradables. These are goods and (particularly) services for which international trade is limited by transport costs, regulatory barriers or practical requirements for proximity between buyer and seller. For tradables, prices are generally determined on world markets and differences between demand and supply can normally be accommodated through trade deficits or surpluses.

This means that the effect of any policy on the real exchange rate can be considered in terms of how it affects the demand for non-tradables relative to their supply.⁴ Other things equal, a policy (other than monetary policy) that reduces the level of domestic demand could be expected to depreciate the real exchange rate.

A rise in prices for commodity exports raises the equilibrium real exchange rate primarily because it leads to an increase in demand for non-tradables. This occurs for two reasons:

- the increase in aggregate incomes resulting from higher export prices leads to an increase in spending on non-tradables (the spending effect); and

3 A budget surplus, as conventionally defined, must be reflected in the accumulation of financial assets or the reduction in financial liabilities. Direct government investment in new physical assets is counted as government spending and reduces the measured surplus.

4 Prices of some domestic tradables may diverge from world prices due to factors such as product differentiation, imperfect competition and home bias in consumption. In this case, part of the real exchange rate movement will occur through a change in prices of domestic tradables relative to foreign tradables.

- higher profitability in the resources sector induces increased investment to expand productive capacity, raising demand for associated non-tradable inputs (the factor movement effect).

Unless the economy has substantial spare capacity, this increase in demand requires a rise in the price of domestic non-tradables relative to tradables, causing a real appreciation.⁵ Under a monetary policy regime that targets low inflation while allowing the exchange rate to float, this will occur primarily through nominal appreciation reducing domestic prices of tradables.⁶

It follows that this real appreciation could be prevented only through an offsetting reduction in demand for non-tradables or an offsetting increase in their supply. If the nominal exchange rate is prevented from appreciating, real appreciation will occur instead through higher domestic price inflation, relative to other countries.

Financial market equilibrium

Equilibrium in financial markets requires that expected returns on different financial assets be equalised, adjusted for risk. Other things equal, a rise in domestic interest rates relative to foreign interest rates can be expected to appreciate the nominal exchange rate. The exchange rate must rise, relative to its long-run equilibrium, in order to deliver a future depreciation that offsets the impact on expected returns of the higher domestic interest rate. The exchange rate can also be expected to appreciate if the relative risk premium on domestic assets falls, reducing the rate of return investors require to hold such assets.

From this perspective, a rise in resource prices (other things equal) leads to a rise in the equilibrium exchange rate for two reasons:

- the rate of return on capital invested in the resources sector rises; and
- the stimulus to domestic demand from higher incomes normally requires tighter monetary policy than otherwise, resulting in higher interest rates.

Foreign exchange market equilibrium

Equilibrium in the foreign exchange market requires that the demand for Australian dollars from foreigners match the demand for foreign currency from Australians.

5 The real exchange rate could also be affected through tradables prices if the relevant commodity prices affect a larger share of the domestic price index than of foreign price indices. This effect is likely to be relatively minor for the commonly-used real exchange rate measure based on relative consumer prices.

6 For example, if the relative price of non-tradables is to rise by 10 per cent without affecting domestic inflation, non-tradables prices must rise by 3 per cent and tradables prices fall by 7 per cent (assuming non-tradables are around 70 per cent of the economy).

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Demand for Australian dollars arises from export receipts, income payments from abroad and gross capital inflows, while demand for foreign currency arises from import payments, income payments to foreigners and gross capital outflows.

From this perspective, a rise in prices of resource exports raises the equilibrium nominal exchange rate because it increases demand for Australian dollars through both increased export receipts and increased capital inflows in response to higher returns on Australian assets.

Exchange rate impact of higher budget surpluses

If the fiscal rules associated with a sovereign wealth fund result in higher budget surpluses than would otherwise be achieved, this will mean the level of domestic demand is lower than otherwise. As demand for non-tradables will therefore be lower, the real exchange rate required for goods market equilibrium will also be lower.

From a financial market perspective, the lower level of domestic demand due to tighter fiscal policy means that monetary policy settings over time will be easier than otherwise.⁷ Lower domestic interest rates mean that a lower exchange rate is required to equalise risk-adjusted returns on domestic and foreign assets. This in turn reduces the demand for Australian dollars to acquire Australian assets.

Exchange rate impact of investing surpluses in foreign assets

The impact on the exchange rate of investing budget surpluses in foreign financial assets, rather than domestically, is less clear. At first sight it might appear obvious that acquisition of foreign assets must increase demand for foreign currency, and thereby depreciate the domestic currency. However, this is a partial equilibrium perspective and we need to consider general equilibrium effects.

In order to understand these effects it is useful to consider first the case where domestic and foreign assets are perfect substitutes. For an economy too small to affect global interest rates, this case implies that the supply of funds from abroad is perfectly elastic.

If budget surpluses are invested in foreign assets, other investors will need to absorb more Australian securities (and less foreign securities) than would have been the case had surpluses been used to acquire domestic financial assets or repay existing debt. If the supply of foreign funds is perfectly elastic, acquisition of these additional securities

⁷ The extent to which tighter fiscal policy reduces domestic demand depends on, amongst other things, the size of the relevant multiplier, which is a function of a number of factors including the degree of spare capacity, and the composition and timing of fiscal consolidation.

by foreign investors will add to demand for Australian dollars, offsetting the rise in demand for foreign currency from offshore investment of surpluses.

In the more realistic case where Australian and foreign securities are somewhat imperfect substitutes, the effect of investing surpluses offshore rather than domestically will depend on the size of these investments relative to total stocks of Australian and foreign securities. This determines the impact on portfolio balance: that is, on the share of domestic securities in global investor portfolios.

The basic idea behind this is that investors prefer to hold a balanced portfolio to diversify country-specific risks, and will demand a higher return (risk premium) to increase the portfolio share of a country's securities.⁸ The higher return occurs through both an increase in yields and a depreciation of the currency. Higher yields also reduce domestic demand, so that a lower real exchange rate is needed for goods market equilibrium.

The stock of domestic and foreign securities provides an indication of the potential size of portfolio balance effects. According to the IMF's Global Financial Stability Report, the global stock of debt and equity securities at the end of 2010 was worth around US\$150 trillion. The ABS Financial Accounts indicate that the stock of debt and equity securities issued by Australian entities was worth around A\$4 trillion, implying that Australian securities comprised about 2.7 per cent of the global portfolio.

These numbers imply that increasing this portfolio share by even 0.1 of a percentage point (from 2.7 to 2.8 per cent of the global portfolio) would require an offshore investment of \$150 billion, more than 10 per cent of current GDP (and twice the size of the accumulation to date in the Future Fund). Even this would be a relatively modest portfolio shift –less than 4 per cent in proportional terms –so its impact on the exchange rate would likely also be modest.

Australia, Norway and Chile: comparing resource boom experiences

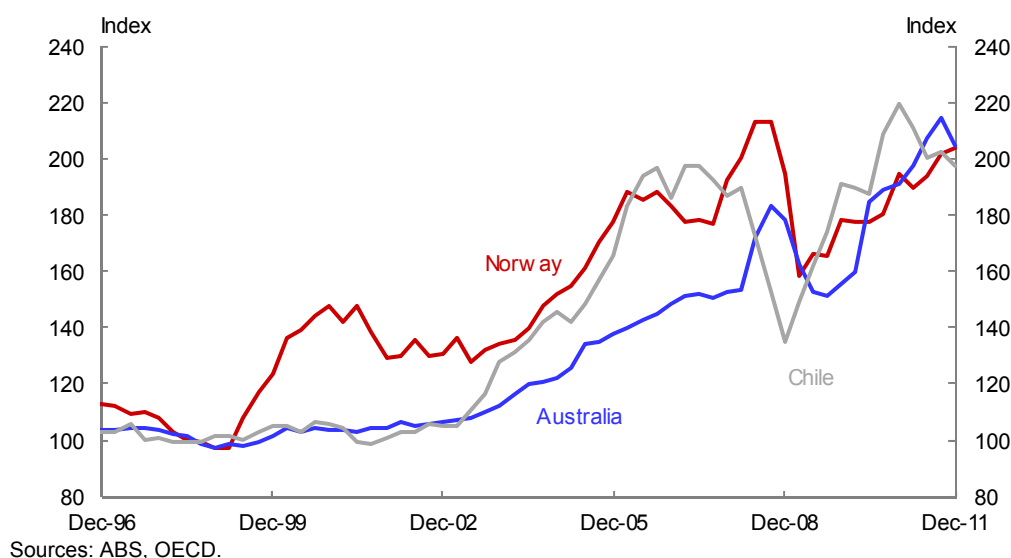
This section presents a comparative analysis of the experiences of Australia, Norway and Chile through their resource booms over the past decade, with a view to assessing how the Norwegian and Chilean regimes may have influenced the behaviour of their exchange rates compared to that of Australia.

⁸ Imperfect substitutability may also arise from factors that contribute to 'home bias' in investment of saving, including information imperfections and differences in legal and regulatory frameworks.

Dimensions of the resource booms

While Australia's current experience of a once-in-a-lifetime terms of trade boom has attracted much comment, Norway and Chile have also experienced similar rises in their terms of trade (Chart 1). In all three countries, the quantity of imports that each unit of exports will buy has doubled since the late 1990s.

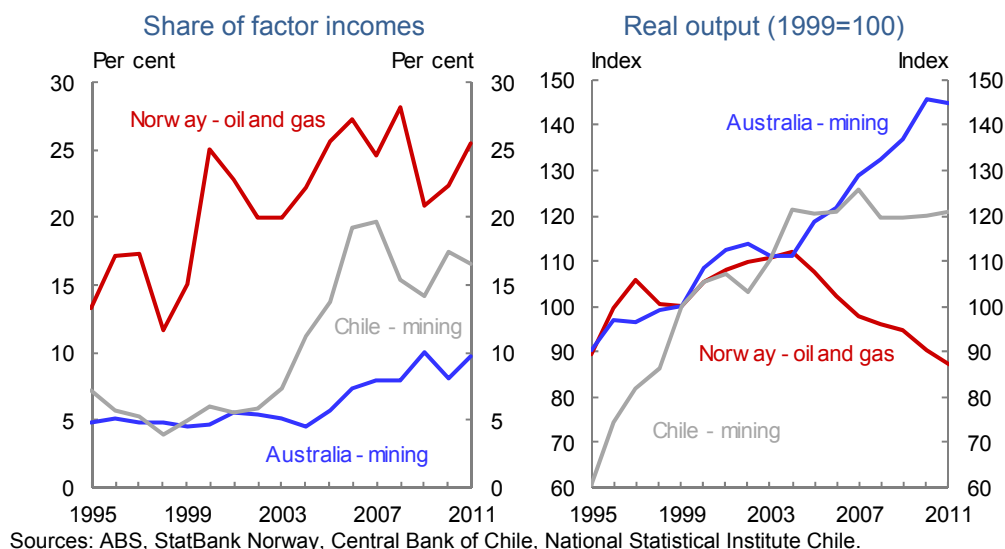
Chart 1: Terms of trade (1998=100)



In Norway's case, the rise in the terms of trade commenced much earlier, from 1999. While the terms of trade in Australia and Chile started to rise around the same time in 2003, the rise in Chile's terms of trade was much steeper initially. The difference in terms of trade paths reflects primarily differences in key resources, which are oil and gas for Norway, iron ore and coal for Australia and copper for Chile.

The resources sector also comprises a much larger share of the Norwegian and Chilean economies than that of Australia (left-hand panel of Chart 2). Norway's oil and gas sector has grown from around 14 per cent of total factor incomes in the 1990s to around 25 per cent now. Mining in Chile has grown from around 6 per cent of factor incomes in the early 2000s to around 17 per cent now. In contrast, Australia's mining sector still accounts for only 10 per cent of factor incomes, even though this share has doubled since the early 2000s.

Chart 2: Resource sector output



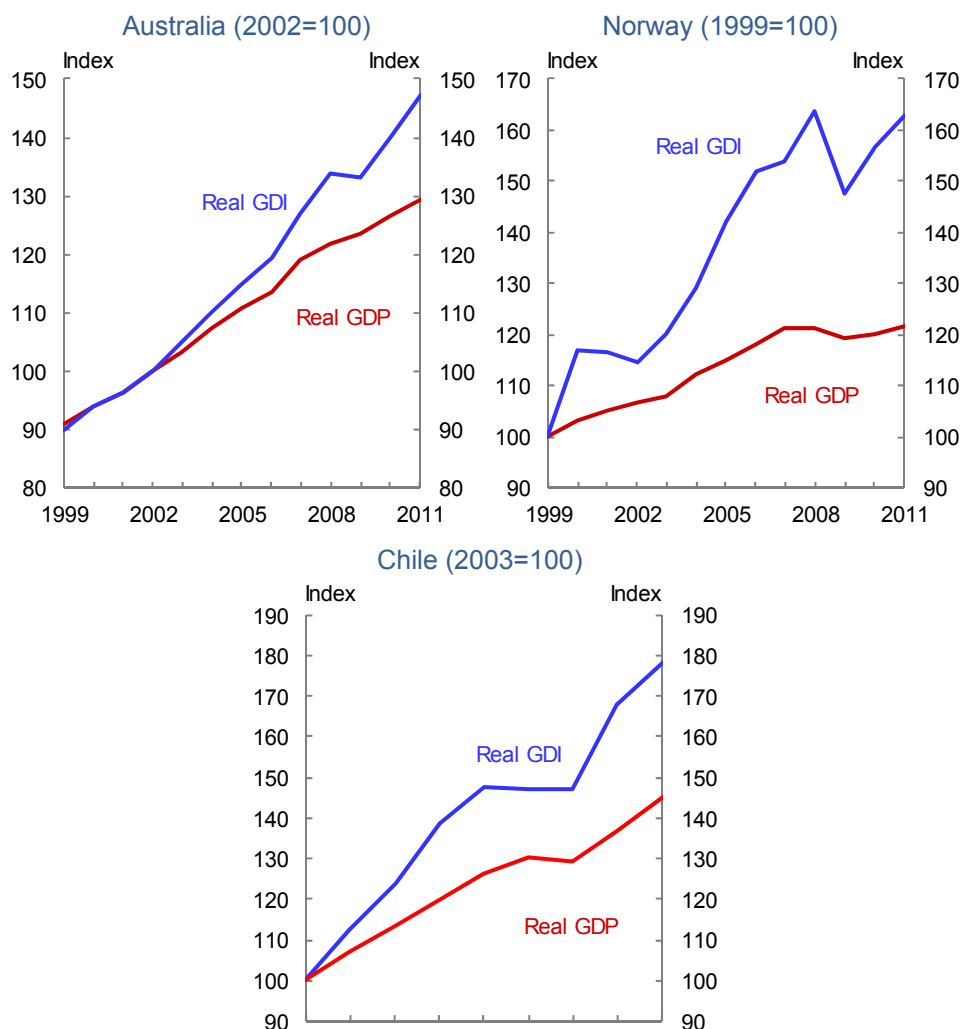
Changes in these shares capture both output and price effects of the resources boom. It is useful to consider these two elements separately, as they link to the two key channels noted earlier through which higher commodity prices affect the economy: namely, the factor movement effect and the spending effect.

The right panel of Chart 2 highlights one key difference between the three booms. Output volumes in Norway's oil and gas sector have been declining since 2003-04, reflecting limited remaining reserves of oil and gas, with production levels having already passed their peak. Mining output in Chile is no higher than its level six years ago. In contrast, mining output volumes in Australia have continued to grow, and the extent of mining investment still in the pipeline means that much of the expansion in mining output as a result of the current boom is still to come. This is significant because it means the pressures on the non-resource economy arising from the boom are significantly greater when the resource sector is expanding.

The extent of income gains from higher resource prices can be gauged by comparing growth in real gross national disposable income (income received by domestic residents) to growth in real GDP (Chart 3). This comparison suggests Norway's terms of trade boom has boosted Norwegians' real income growth by 41 per cent, while real income growth has been boosted by 33 per cent for Chileans and 18 per cent for Australians. The differences reflect the larger share of the resources sector in the Norwegian and Chilean economies.

Sovereign wealth funds and the exchange rate: comparing resource booms in Australia, Chile and Norway

Chart 3: Income effect of terms of trade booms

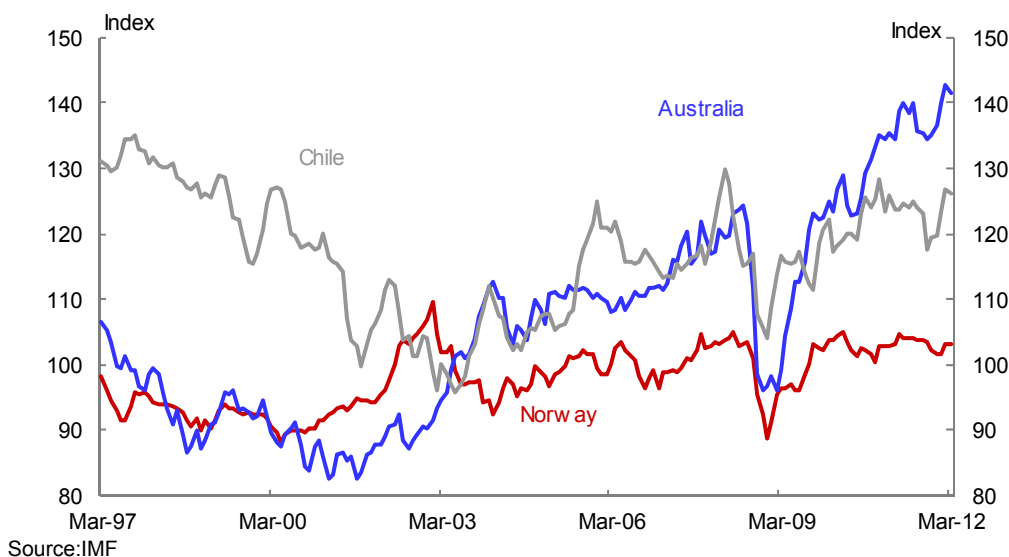


Note: GDI is deflated by the implicit price deflator for gross national expenditure.
Sources: ABS, OECD, Central Bank of Chile.

Exchange rate behaviour during resource booms

Chart 4 shows that the terms of trade boom in Australia has been associated with a substantial rise in the real exchange rate, which has appreciated by around 40 per cent using the CPI-based measure.

Chart 4: Real trade-weighted exchange rates (2003=100)



In contrast, exchange rate appreciation has been much more limited in Norway, with the real exchange rate appreciating only about 10 per cent since its boom commenced in the late 1990s.

Chile has experienced an intermediate real appreciation of around 25 per cent over the same period, although its exchange rate is not high by historical standards, having depreciated significantly in the years leading up to the boom. Notably, Australian and Chilean real exchange rates appreciated at a similar rate between 2003 and 2010, with a significant gap emerging only over the past year.

What explains differences in exchange rate behaviour?

To what extent can the much smaller exchange rate appreciations in Norway and Chile be attributed to their sovereign wealth fund regimes? The earlier discussion concluded that impacts on the size of exchange rate appreciation are likely to come primarily from associated fiscal rules that ensure budget surpluses rise in line with increased resource-related revenues. Impacts from investing surpluses offshore are unlikely to be significant unless accumulated investments become very large.

Impact of fiscal regimes

Since its terms of trade boom commenced in 1999, Norway has been running massive budget surpluses, rising from 3 per cent of GDP prior to the boom to a peak of 19 per cent of GDP in 2008 (Chart 5). Even after a large fall following the global financial crisis, surpluses have averaged 13 per cent of GDP since 2000. In Australia, by contrast, the terms of trade boom since 2004 has not been associated with any marked

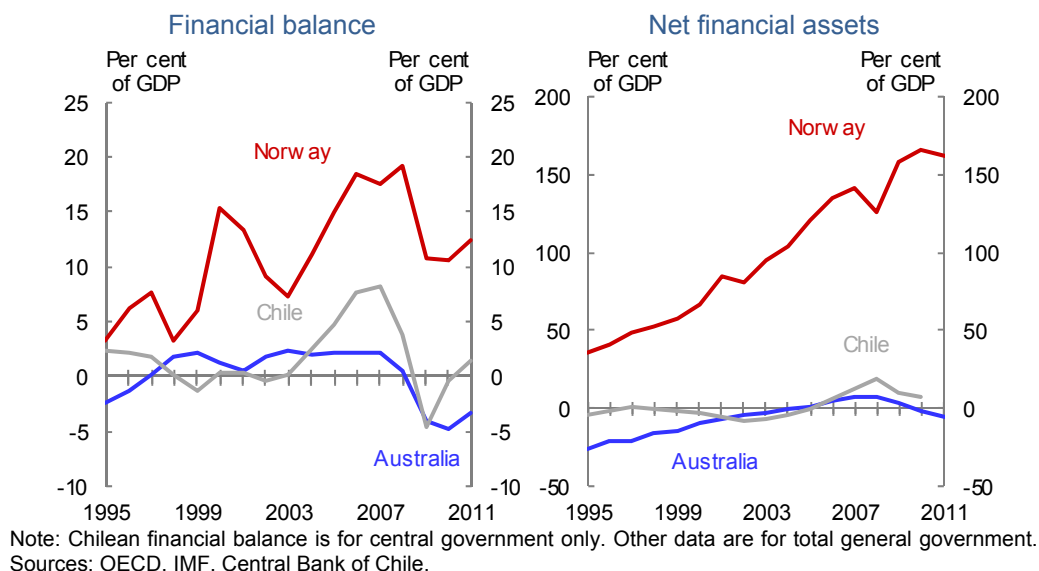
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shift in the general government budget balance. The size of surpluses achieved in Norway reflects two factors (see Garton and Gruen 2012 for more detail):

- the Norwegian government captures a large proportion of the returns from oil and gas production; and
- the fiscal rule underpinning its regime ensures these revenues are saved, with the budget excluding oil and gas revenues averaging near balance over this period.

Accumulation of these budget surpluses has resulted in a massive build-up of financial assets held by the Norwegian government. The value of Norway's sovereign wealth fund has reached nearly 130 per cent of GDP, which is reflected in the increase in general government net financial assets since the early 1990s (Chart 5).

Chart 5: General government financial position

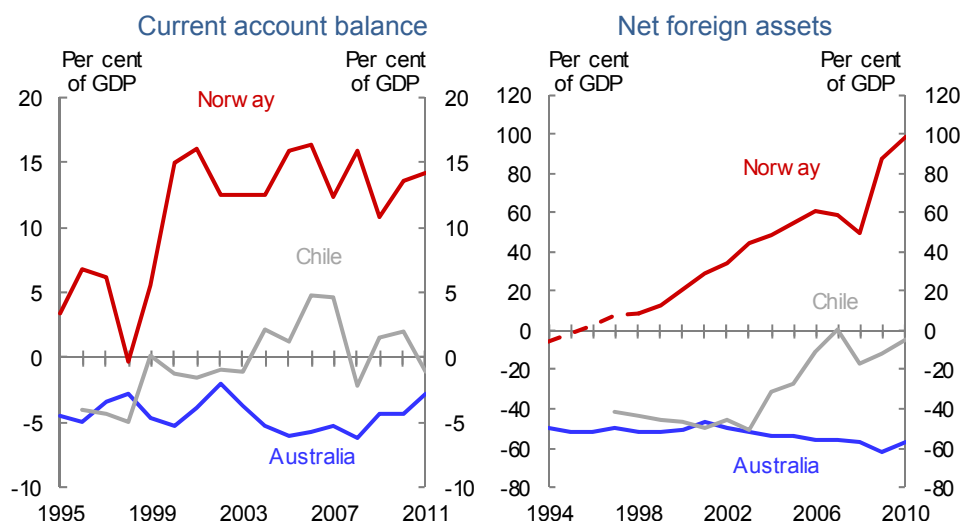


Chile's fiscal rule also saw its fiscal position improve sharply from around balance in 2003 to a surplus of 8 per cent of GDP by 2007, before falling back into deficit following the global financial crisis. This is consistent with the intention of Chile's fiscal regime, which is to play a macroeconomic stabilisation role rather being a means to increase long-term government saving.

As a result of the past accumulation of surpluses, the value of Chile's sovereign wealth fund has grown to around 8 per cent of GDP, resulting in a similar improvement in government net financial assets.

Chart 6 shows that these movements in government financial positions in Norway and Chile have been reflected substantially in changes in current account balances and net foreign assets. This is important as it suggests that the impacts of the fiscal regimes in these countries have not been offset substantially by private sector behaviour.

Chart 6: External accounts



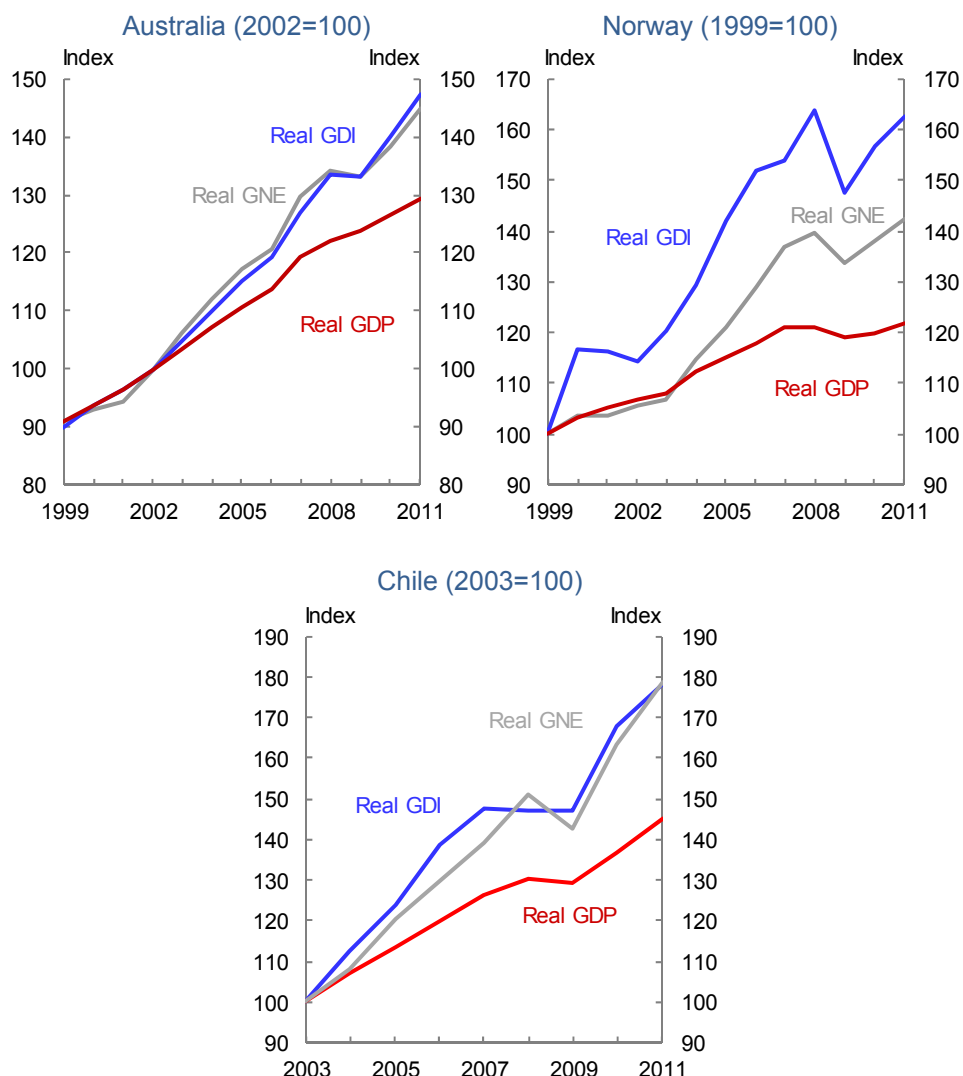
Note: Norwegian net foreign assets are interpolated between 1993 and 1998 as data are unavailable for these years.
Sources: ABS, OECD, Central Bank of Chile.

Chart 7 presents an alternative perspective which examines the extent to which income gains from terms of trade booms have resulted in increased gross national expenditure (GNE); that is, consumption and investment by government and private sectors.⁹ For Australia, the increase in national incomes, relative to GDP, has been matched by a similar increase in aggregate spending. This is consistent with the explanation outlined above; that a rise in the terms of trade can normally be expected to lead to an increase in domestic demand, which in turn requires a real exchange rate appreciation.

This is also true for Chile, although expenditure did grow more slowly than income over the initial period to 2007. In contrast, cumulative growth in national expenditure in Norway over the period of the boom has remained well below growth in national income. Indeed, up until 2004 real GNE had increased no faster than real GDP.

⁹ The current account balance is equivalent by definition to the difference between national disposable income and national expenditure. Hence, the gap between changes in GDI and GNE corresponds to the change in the current account over the same period.

Chart 7: Expenditure out of income gains



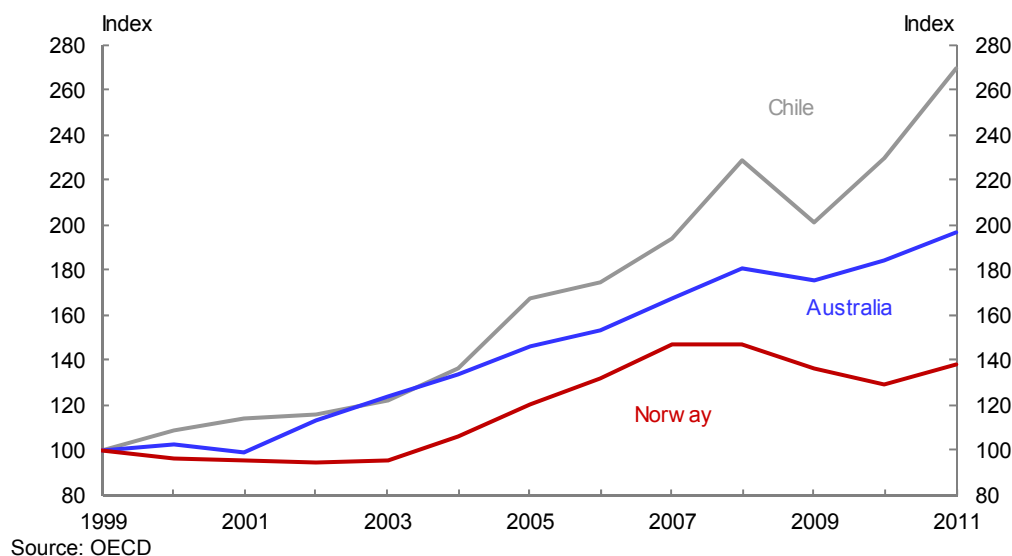
Sources: ABS, OECD.

The difference between Norway and Chile reflects partly the difference in fiscal policy stances shown in Chart 5. While Norway has had a lasting increase in budget surpluses, which have continued to limit the impact of higher national incomes on demand, Chile ran larger surpluses only in the pre-GFC boom period, but not more recently. This is consistent with the different objectives of the two country's regimes noted earlier: long-term saving for Norway and stabilisation for Chile.

Another key factor has been the difference in investment responses to high commodity prices (Chart 8). While real investment in Chile and Australia has grown substantially faster than real incomes, real investment in Norway has not even matched growth in

real GDP. Norway has experienced a much lesser increase in resource sector investment, which may be linked to the fact that the remaining life of its oil and gas reserves is limited (Garton and Gruen 2012). This has made it much easier for the fiscal regime in Norway to limit the impact of the boom on aggregate spending and, thereby, on the real exchange rate.

Chart 8: Real national gross fixed capital formation (1999=100)

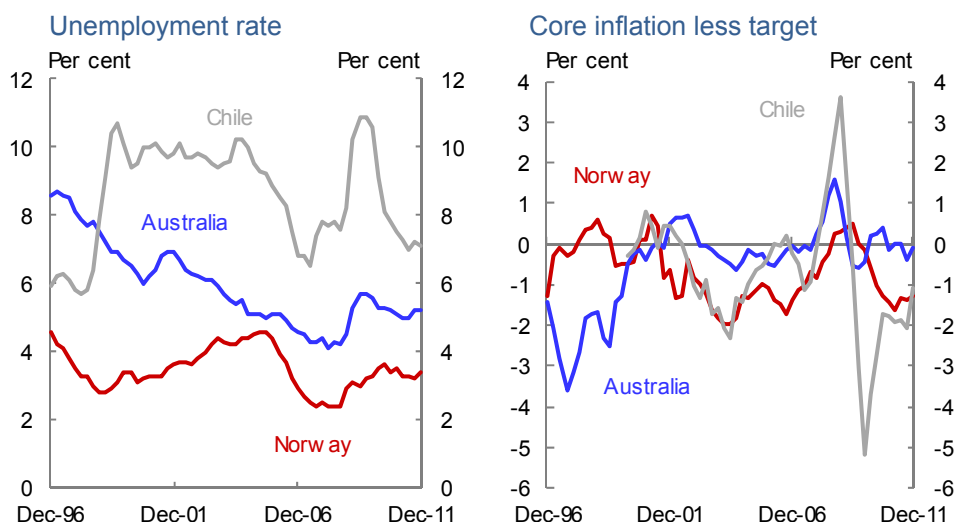


Differences in cyclical conditions

The combined impact of Norway's fiscal regime and the absence of a resource sector investment boom is likely to explain much of Norway's more limited real appreciation compared to Australia and Chile. Another factor likely to have influenced exchange rate behaviour is differences in cyclical conditions in the three economies, manifested in differences in the degree of spare capacity.

If an economy has more spare capacity this should reduce the need for its real exchange rate to appreciate in response to an increase in demand. This is difficult to assess by comparing unemployment rates, as natural rates of unemployment can vary considerably across countries and over time. The direction of the unemployment rate, however, provides an indication of whether spare capacity is tightening or easing. While unemployment rates have fallen in Australia and Chile over the course of their resource booms, this has not been the case in Norway, where the unemployment rate rose over the initial period of its boom (left-hand panel of Chart 9).

Chart 9: Indicators of spare capacity

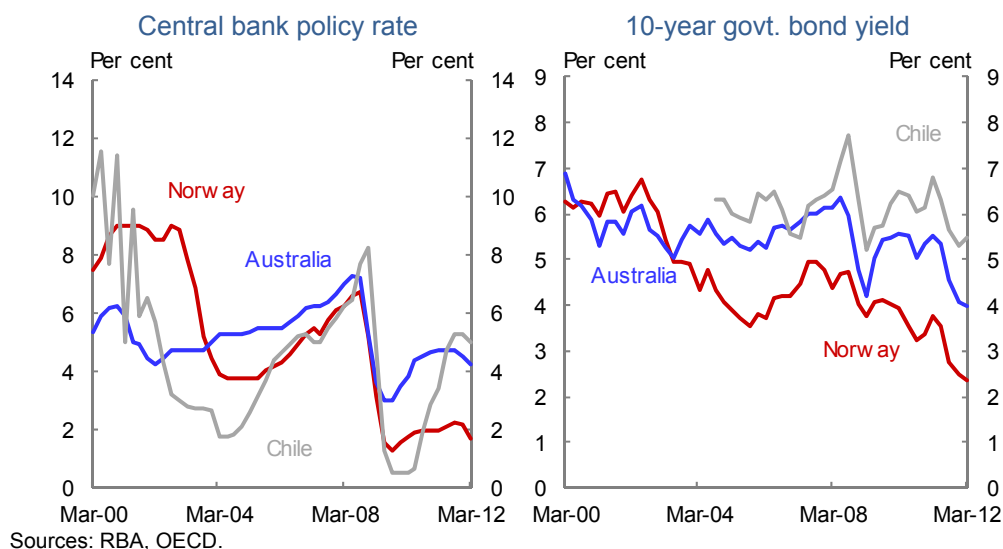


Note: Core inflation excludes food and energy for Australia and Chile and energy for Norway. Australian data are adjusted to remove the impact of the GST's introduction in 2000.
Sources: OECD, StatBank Norway.

One way to assess the degree of spare capacity is from the direction of core inflation, which tends to decline when the economy falls below full capacity. The right-hand panel of Chart 9 shows the divergence of core inflation from the central bank's inflation target or mid-point of its target band. Core inflation in Norway and Chile fell significantly below target in the early 2000s and again in the period since the GFC. This implies that both economies had significant spare capacity during these periods. In contrast, core inflation in Australia has not been significantly below target over the past decade, implying an absence of significant spare capacity.

The difference in cyclical conditions between Australia and the other two economies is also seen in differences in the stance of monetary policy. Norway and Chile began the 2000s with higher policy interest rates than Australia, but after considerable easing in the early 2000s have since been generally lower than Australian rates (Chart 10).

Chart 10: Interest rates



Similarly, Norwegian long-term bond yields were similar to Australian yields in the early 2000s, but have generally been around 1½ percentage points lower since 2004. With Australia and Norway both being AAA-rated countries, this means that a higher Australia dollar is needed to make risk-adjusted returns equally attractive to global investors.¹⁰

A key factor likely to have contributed to continued easy monetary policy in Norway and put downward pressure on the exchange rate in recent years is the continued economic weakness in Europe and concerns over a possible crisis in the euro area. Norway is highly exposed to Europe, which accounts for more than 80 per cent of its exports, representing around one-third of GDP.

This leaves the question of what explains the recent divergence in Australian and Chilean real exchange rates, given that cyclical conditions in Chile have recently improved and monetary policy has been tightened. The Central Bank of Chile made substantial purchases of foreign exchange during 2011, although it is unclear how much impact these might have had, given the economic literature has generally been sceptical about the effectiveness of sterilised intervention.¹¹ For the purpose of this article, however, the relevant point is that recent exchange rate behaviour appears to

10 Sovereign ratings for Australia and Norway are AAA for all three major credit rating agencies. Chile is rated Aa3 by Moody's and A+ by Standard & Poors and Fitch.
 11 The stated purpose of these purchases was to increase international reserves to a level comparable to other similar economies. While reiterating its commitment to inflation targeting and a floating exchange rate, the Central Bank of Chile also noted that 'intervention should smooth the effects of the exchange rate adjustment'.

be unrelated to the operation of Chile's sovereign wealth fund regime, given that the fiscal position has only just returned to surplus (Chart 5).

Conclusion

Some commentators have argued that establishing a sovereign wealth fund, as has been done in other resource-exporting economies like Norway and Chile, would help to relieve the pressures on trade-exposed sectors of the economy arising from the high Australian dollar.

Norway has experienced comparatively little real exchange rate appreciation over the course of its recent resources boom, despite a similar rise in its terms of trade to Australia and Chile. This appears to be due primarily to the impact of the fiscal objective associated with Norway's regime, which has resulted in massive budget surpluses since the early 2000s. By capturing and saving the bulk of increased national incomes arising from the boom, Norway has limited the impact of the boom on domestic demand, which is the underlying driver of the real appreciation that is normally associated with terms of trade booms. The absence of a sizeable boom in resource sector investment has also been important in this regard.

In contrast, Chile's real exchange rate had appreciated at a similar rate to Australia's until quite recently. This probably reflects the size of Chile's investment boom, which has meant that its fiscal regime was unable to prevent a rise in aggregate spending despite delivering large surpluses prior to the GFC. Further, these surpluses have been unwound since the GFC, consistent with the regime's intended role as a stabilisation mechanism rather than a means to boost long-term saving. While it is unclear what explains the recent divergence between Chilean and Australian real exchange rates, it is unlikely to be related to the operation of the fiscal regime.

If Australia were to seek to emulate the Norwegian example, governments would need to target much higher budget surpluses than have been contemplated to date. For example, in order to save the same proportion of the increase in national income from the terms of trade as was achieved in Norway, Australian governments would have had to achieve budget surpluses averaging over 4 per cent of GDP over the past 8 years.

However, the economic structures of Australia and Norway are considerably different – Australia, for one, captures a much smaller share of the increased national income associated with resource booms (Garton and Gruen 2012). Furthermore, it is likely that the requirement would be even greater than this because of the larger surge in investment to expand resource sector capacity that has been occurring in Australia. This suggests, taking into account the favourable saving and macroeconomic stability outcomes already achieved during the current boom, that it would be inherently

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and Norway

difficult, and not necessarily sensible to replicate the Norwegian experience,
particularly within the current global economic environment.

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Understanding the appreciation of the Australian dollar and its policy implications

Phil Garton, Danial Gaudry, and Rhett Wilcox¹

The Australian dollar has appreciated strongly over the past decade, leading to increased concerns over the impacts of the high exchange rate on trade-exposed sectors of the economy. This paper examines the underlying drivers of this rise, the exchange rate's role as a macroeconomic shock absorber and the implications of various policy options that might be directed at reducing the exchange rate.

¹ The authors are from Macroeconomic Policy Division, the Australian Treasury. This article has benefited from comments and suggestions provided by James Kelly, Shane Johnson and David Gruen. The views in this article are those of the authors and not necessarily those of the Australian Treasury.

Introduction

Over the past decade, the Australian dollar (AUD) has appreciated strongly against the US dollar (USD), rising from less than US \$0.50 in 2001 to a peak of over US \$1.10 in 2011. While the rise can be attributed to a number of factors, the mining boom has been the key driver of the appreciation over this period.

The AUD has remained well above its post-float average for a number of years, and has generally been around or above parity against the USD since October 2010, when it reached parity for the first time since it was floated in December 1983. The prolonged high level of the currency has led to significant debate regarding its effects on the Australian economy. Indeed, there have been calls for Australia to reconsider the long-standing policy of allowing the AUD to float relatively freely.

Against this backdrop, this paper examines the factors determining the value of the AUD and its role in the macroeconomy more broadly. It also discusses the implications of various policy options that might be directed at reducing the exchange rate.

Measuring the exchange rate

The value of the AUD is generally reported as a nominal bilateral rate, which is the rate at which one unit of currency can be exchanged for another. Given that the USD is a global major currency, the AUD/USD cross rate receives the most attention.

An alternative measure is an effective exchange rate, which is a trade-weighted average of bilateral exchange rates. Generally this provides a more informative measure of the value of the AUD, particularly when bilateral exchange rates exhibit diverging trends (RBA 2002). A commonly-cited measure is the trade-weighted index (TWI) published by the Reserve Bank of Australia (RBA), which weights the currencies of Australia's largest trading partners by their shares of Australia's trade.

Both the TWI and the USD exchange rates are important measures. The TWI provides a more accurate reflection of overall trade competitiveness as it includes the exchange rates of all our major trading partners. The USD exchange rate is also important as a significant proportion of Australia's trade is denominated in USDs, even if the United States is not a direct participant in the transaction.

Another measure of the exchange rate is the real effective exchange rate, which is the trade-weighted nominal exchange rate multiplied by the ratio of Australian prices to our trading partners' price levels. Since trade competitiveness is ultimately determined by changes in the relative price of Australian goods and services in terms of foreign goods and services, the real exchange rate is conceptually a better measure of trade competitiveness.

A commonly used measure of the real effective exchange rate is the RBA's real TWI, which uses the core consumer price index (CPI) measure of price levels (which excludes food and energy).

There are also alternative weighting schemes. Movements in trade-weighted measures such as the real TWI provide only a rough measure of changes in Australia's trade competitiveness, since weights based on trade shares do not capture changes in prices relative to countries that are competing suppliers to our exports in third countries (Ellis 2001).

The economic role of the exchange rate

In an open economy, the exchange rate is a key economy-wide relative price that helps to maintain equilibrium across both the financial and real sides of the economy. The exchange rate – along with other variables such as interest rates, output and prices – adjusts to simultaneously equate demand and supply in the foreign exchange market, other financial markets, and goods and services markets.

Most importantly, movements in the nominal exchange rate play a critical role in allowing the real economy to adjust to shocks while limiting the impacts on macroeconomic stability. As the currency normally appreciates (depreciates) in response to shocks that have a stimulatory (contractionary) impact on the economy, the exchange rate functions as an automatic stabiliser that helps keep the economy growing at a rate consistent with its non-inflationary level of capacity utilisation (full employment).

For instance, a shock that boosts demand for Australian goods requires domestic prices to rise relative to foreign prices (that is, a real exchange rate appreciation) unless there is substantial spare capacity in the economy.² This brings demand and supply into line by shifting spending from domestic to foreign goods and by promoting increased supply of domestic goods. Similarly, a shock that reduces demand for Australian goods will require a real depreciation.

Under a flexible exchange rate regime, where monetary policy targets low inflation, these relative price movements occur mainly through the nominal exchange rate. This is closely linked to the operation of monetary policy, as the exchange rate tends to appreciate (depreciate) when domestic interest rates rise (fall) relative to foreign interest rates. When the economy is strong (weak), monetary policy will be tighter

2 Unless otherwise stated, impacts on the exchange rate are discussed on the assumption that other things are unchanged, including in the rest of the world. A shock with identical effects on Australia and our trading partners would not affect the exchange rate. Hence, the exchange rate only helps adjustment to shocks that are 'asymmetric'.

(easier) than normal and the exchange rate will generally rise above (fall below) its medium-term level.

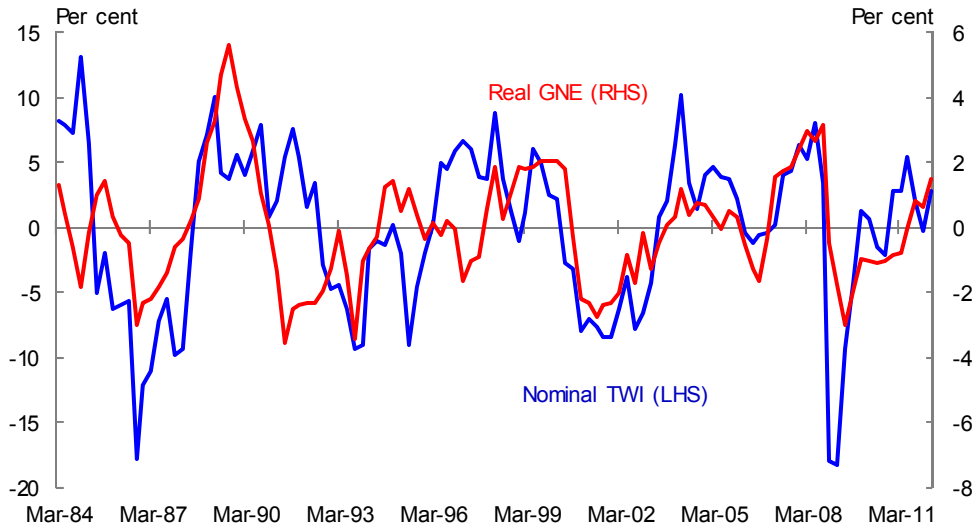
If the nominal exchange rate is prevented from moving, the required real appreciation (depreciation) will instead occur through domestic prices and wages rising (falling) relative to foreign prices and wages. While exchange rate volatility can be costly, it is less costly for relative price adjustments to occur through the nominal exchange rate, for two main reasons.

- First, higher inflation has economic costs. Greater uncertainty about future prices hampers longer-term decision-making and leads to higher real interest rates as lenders demand a premium for inflation risk. As interest income is taxed on a nominal basis, higher inflation also discourages saving by considerably reducing the real after-tax rate of return.
- Second, real depreciation through price and wage deflation can normally be achieved only through an extended period of economic weakness and high unemployment. This problem is illustrated by the severe recessions currently being experienced in the peripheral economies within the euro area, which cannot achieve the real depreciation they need through the nominal exchange rate.

Chart 1 confirms that the floating exchange rate has served as an automatic stabiliser for the Australian economy. The AUD has generally been high (low) relative to trend when domestic demand (gross national expenditure) has been relatively strong (weak). These cyclical variations suggest that it may be desirable for the exchange rate to be above or below its medium-term equilibrium at any time.³

³ The role of the exchange rate in equilibrium is discussed at greater length in Garton (2012).

Chart 1: Real gross national expenditure and exchange rate divergences from trend



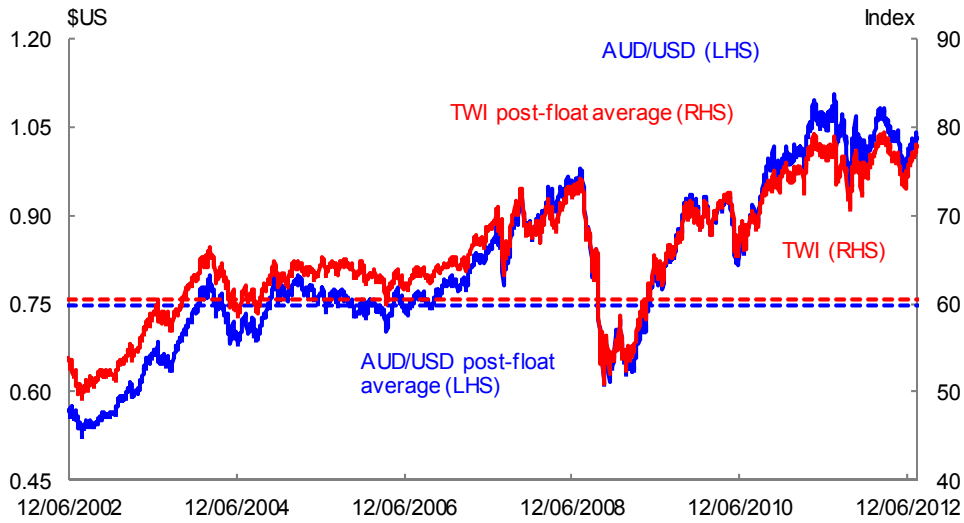
Note: Trend is based on a Hodrick-Prescott filter.
Source: ABS cat. no. 5206.0, RBA and Treasury.

Recent trends in the AUD

Over the past decade the AUD has been on an upward trend against both the USD and the TWI (Chart 2), with the notable exception of the global financial crisis (GFC) period when it fell sharply from June 2008 to November 2008. Since its recent trough in June 2010, the AUD has appreciated by around 21 per cent against the USD and by around 14 per cent against the TWI. To put these figures into perspective, the AUD is now around 33 per cent above its post-float average of 75 US cents and around 24 per cent above its post-float average of 60 against the TWI (as at 24 July).

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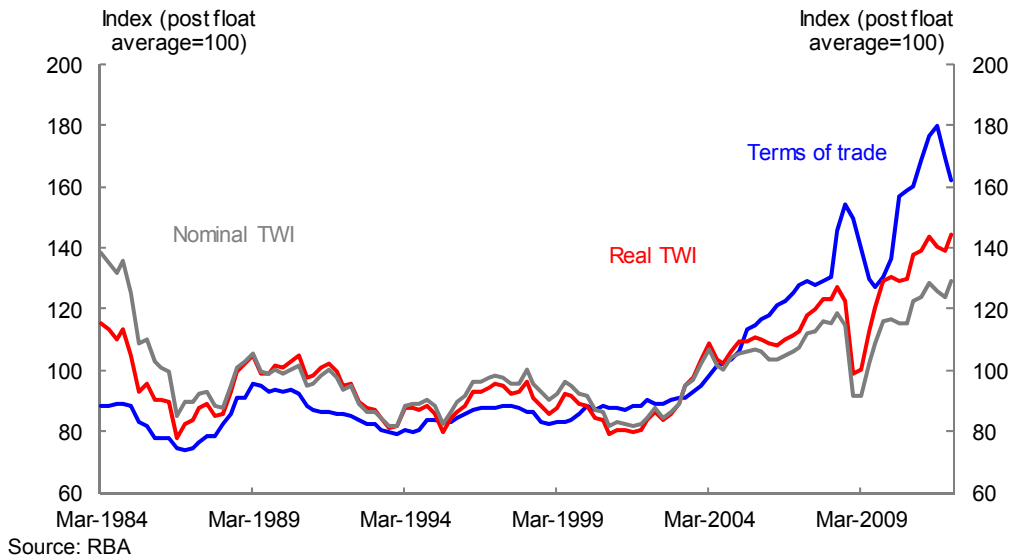
Chart 2: AUD against the USD and the TWI



Source: RBA and Treasury

Since the current terms of trade boom began around 2004, the increase in the real TWI has been even more pronounced than the increase in the nominal TWI (Chart 3). This reflects higher average core inflation in Australia over the past decade than in our major trading partners, largely as a result of unusually low inflation in the rest of the world.

Chart 3: Real and nominal TWIs and the terms of trade



Source: RBA

Why is the Australian dollar so high at present?

High terms of trade

The primary reason why the AUD has appreciated so much since the early 2000s is that Australia's terms of trade have doubled over this period, mainly due to rises in world prices for our commodity exports.

From a real economy perspective, a rise in commodity export prices raises the equilibrium real exchange rate because it leads to increased demand for Australian goods, requiring their price to rise relative to foreign goods.⁴ This normally occurs for two reasons:

- higher commodity prices lead to increased investment to expand capacity in the resources sector; and
- higher aggregate incomes resulting from the rise in the terms of trade lead to an increase in consumption spending, much of which is on domestic goods.

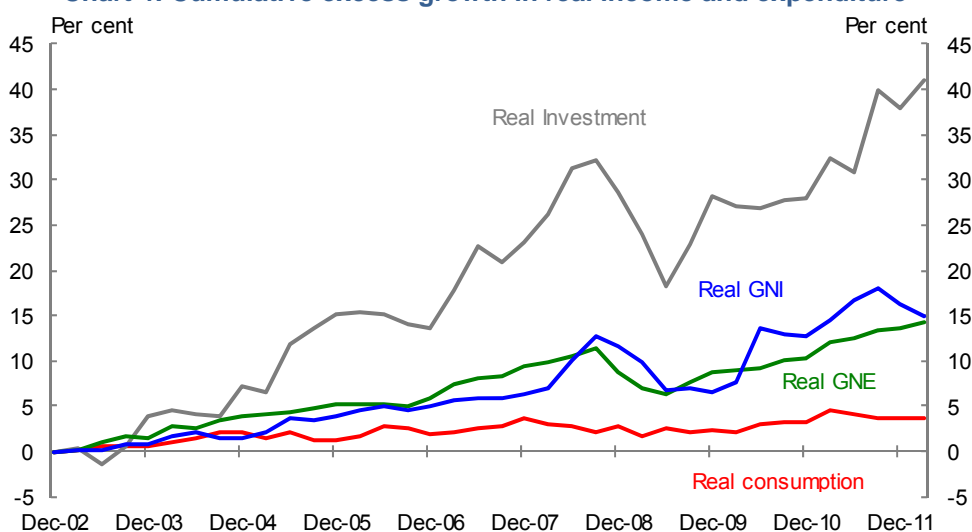
The higher exchange rate is promoting the reallocation of labour and capital to meet these demands by reducing returns in other tradable sectors. If this adjustment did not occur through a higher nominal exchange rate, it would instead occur through higher domestic prices. This is what occurred during the terms of trade boom of the early 1970s, when Australia had a fixed exchange rate and governments were reluctant to revalue the currency (Gruen 2011). This means that the rise in the real exchange rate would still occur over time through higher inflation, even if the nominal exchange rate was held down.

It is true that growth in domestic demand has been more subdued since the GFC than in the initial phase of the terms of trade boom, reflecting in part a more cautious approach to spending by households. Nonetheless, the level of demand remains considerably higher than it would have been had the rise in the terms of trade not occurred. This means that the level of the real exchange rate also needs to be higher.

This can be seen in Chart 5, which shows the cumulative gap between growth in real gross national income and expenditure and cumulative growth in real GDP since the end of 2002. These gaps provide measures of the income gain from the terms of trade and the extent to which it has fed into increased spending (with a constant terms of trade, real national income would have grown in line with real GDP).

4 The rise in commodity prices could itself contribute to real appreciation if the relevant prices affect a larger share of domestic expenditures than foreign expenditures. This effect is unlikely to be significant for a CPI-based real exchange rate.

Chart 4: Cumulative excess growth in real income and expenditure



Note: Real GNE is the sum of private and public consumption and investment. The chart shows the cumulative growth of the described variables in excess of the growth in real GDP.

Source: ABS cat. no. 5206.0 and Treasury.

Real national income has grown by 15 percentage points more than real GDP over this period, while real national expenditure has grown 14 percentage points more. This is due largely to very strong growth in investment, though consumption has also grown about 4 percentage points faster than real GDP.

The appreciation in the AUD is also in line with what one would expect from the point of view of the other markets in which the exchange rate plays an important role. From a financial market perspective, a rise in resource prices raises the equilibrium exchange rate for two reasons:

- the rate of return on capital invested in the resources sector rises; and
- the stimulus to domestic demand from higher incomes may require tighter monetary policy than otherwise, resulting in higher interest rates.

From a foreign exchange market perspective, a rise in the prices of commodity exports increases demand for AUDs through both increased export receipts and increased capital inflows in response to higher returns on Australian assets.

Economic weakness and increased risk in other advanced economies

While the terms of trade have been the main driver of the rise in the AUD since the early 2000s, circumstances in other advanced economies have also contributed to the strong AUD since the GFC.

Firstly, a prolonged period of economic weakness has seen interest rates in the major advanced economies remain at abnormally low levels. As a result, the differential between Australian interest rates and those in other advanced economies has been unusually high, even though Australian interest rates have not themselves been unusually high. In addition to holding policy interest rates at or near the zero lower bound, some central banks have also undertaken monetary expansion through quantitative easing, which also puts downward pressure on their currencies, thereby contributing to the high AUD.

Secondly, a number of other advanced economies are now judged to be more risky on account of high levels of government debt, weak economic growth and fragile banking systems. In contrast, Australia is now one of only seven countries whose national government debt is still rated AAA with a stable outlook by all three major credit rating agencies.

The combination of these factors has increased risk-adjusted returns on Australian assets in relative terms, boosting global investors' demand for AUD assets.

Estimates of equilibrium exchange rates

The competitive pressures placed on certain sectors by the high real exchange rate are reflected in concerns that the AUD might be overvalued. This would imply not only that the exchange rate is elevated, but also that it is above a level warranted by its fundamental determinants; that is, the equilibrium exchange rate.

Determining this equilibrium exchange rate, however, has long been a contentious issue in applied economics, reflecting the difficulties of modelling all the relevant economic linkages that determine the exchange rate. Notwithstanding this, substantial efforts have been made to analyse the issue. The IMF, for example, does so through the Consultative Group on Exchange Rate issues (CGER), which provides exchange rate assessments for use in its Article IV staff reports (IMF 2006).

While there are many methods for deriving medium-to-long-run equilibrium exchange rates, the simplest is to calculate the nominal exchange rate that would equalise prices in Australia and its trading partners, expressed in a common currency. Indeed, a number of analysts use this condition, which is based on the theory of purchasing power parity (PPP), as a rule of thumb guide to whether a nominal exchange rate is too strong or weak. For example, Bloomberg and the OECD publish formal PPP exchange rates, while The Economist publishes its Big Mac Index.

There are, however, many reasons to question the validity of PPP-based estimates (Box 1). More sophisticated analyses generally take a macroeconomic approach to estimating a medium or long-run equilibrium exchange rate, taking into account the factors discussed earlier in this paper (Wren-Lewis 2003). The more commonly used

approaches attempt to estimate the fundamental equilibrium exchange rates – the exchange rate consistent with macroeconomic equilibrium – or reduced form equations. For example, in the former vein the IMF uses the ‘macroeconomic balance’ and the ‘external sustainability’ approaches, and for the latter, the ‘equilibrium real exchange rate’ approach (IMF 2006).

Both the macroeconomic balance and external sustainability approaches involve making an assessment of current account ‘norms’ – albeit using different methods – and the real exchange rate adjustment required to close the gap between this and the projected underlying current account with economies operating at full capacity. The third approach derives the equilibrium exchange rate by estimating a long-run relationship between the exchange rate and a set of relevant fundamentals.

Notwithstanding the differences in these approaches, including the measure of the exchange rate and the date at which the estimations were performed, comparing the equilibrium values they produce with the prevailing exchange rate suggests, unsurprisingly, that the AUD is overvalued compared to its medium-to-long run equilibrium value (Table 1).

These estimates are, however, subject to considerable uncertainty. For example, while the IMF estimates that Australia’s real exchange rate is overvalued, the 90 per cent confidence intervals around the estimates are large – so much so that the estimated overvaluation is not statistically significant using the macroeconomic balance approach.⁵ Aside from estimation uncertainty, it is important to note that the IMF’s estimates are based on medium-to-long term concepts of equilibrium, which do take into account cyclical divergences in economic activity and relative interest rates.

Table 1: Estimates of the AUD exchange rate relative to equilibrium

Institution	Date	Measure	Method	Overvaluation (%)
Bloomberg	Jun-12	AUD/USD	PPP (consumer prices)	30.12
	Jun-12	AUD/USD	PPP (producer prices)	27.87
OECD	Jun-12	AUD/USD	PPP	35.41
IMF — Article IV	Oct-11	REER	Macroeconomic Balance	11
			External Sustainability	19.4
			Equilibrium real exchange rate	16.4

Note: Bloomberg and OECD estimates use exchange rates as of 14 June 2012.
Source: Bloomberg and IMF.

5 This stems from uncertainties over the assumptions on potential output and current account ‘norms’, exchange rate elasticities and projections of future fundamentals, as well as uncertainties affecting reduced form econometric estimation.

Nominal exchange rates frequently diverge from estimates of fair value in the short run. This reflects the fact that short-run movements in the exchange rate may be driven by changes in the desire of foreign investors to hold Australian assets, in response to factors such as prevailing interest rate differentials and perceptions of risk. Cyclical variations in monetary policy also influence these movements. As noted above, these short-term movements in the exchange rate help to equilibrate financial markets and are also a key channel through which monetary policy operates.

Estimates of equilibrium exchange rates over the medium-to-longer term abstract from these cyclical influences, on the basis that they do not affect its level over the longer term, which is determined by factors such as Australia's foreign asset position and the terms of trade. This point is widely misunderstood, with a common assertion being that if the real exchange rate is above its medium-term equilibrium, this must imply that it is currently inappropriately high.

Thus, while estimates suggesting that the real exchange rate is above its medium-to-long term equilibrium may provide information about the likely direction of the exchange rate over an extended period of time, they need not imply that its current level is undesirably high, nor that intervention is warranted.

Box 1: Purchasing power parity

One of the best-known and tested theories for determining the long-run equilibrium exchange rate is purchasing power parity (PPP). PPP suggests that prices should be equal across countries when measured in a common currency.⁶ If so, the real exchange rate should be a 'stationary' time series.

While a number of analysts use PPP as a rule of thumb guide to whether a nominal exchange rate is too strong or weak, there are various reasons to question its validity as a benchmark. For instance, traded goods (particularly complex manufactures) are often imperfect substitutes and many goods and services are not traded. This implies that there is little reason to expect price levels to converge across countries. Indeed, numerous studies find that the real exchange rate does not appear to be stationary but is 'non-stationary'.⁷

The finding that the real exchange rate is non-stationary is important, since it implies that its high level alone need not suggest that it is overvalued and will fall back to

6 Absolute PPP assumes that price levels converge over time. A less restrictive variant, known as relative PPP, assumes that rates of price growth converge over time, recognising that transport costs and other factors may create permanent price differences. In both cases, the real exchange rate is assumed to revert to a constant.

7 See, for example, Gruen and Wilkinson (1994) and Henry and Olekalns (2002).

Box 1: Purchasing power parity (continued)

some 'normal' value in the future. Instead, future movements in the exchange rate depend on the factors that explain its current level and the extent to which these influences will be sustained over time.

Even if prices of tradable goods were equalised – and the empirical evidence on this is ambiguous – persistent deviations in the real exchange rate from PPP would still occur due to differences in prices of non tradables between countries. Key factors that may cause prices of non tradables to diverge include variations in the terms of trade and differences in productivity levels and growth rates.

For example, the Balassa Samuelson effect suggests that, under certain conditions, productivity growth that is faster in the tradable sector than the non tradable sector should, by boosting wages across the economy, lead to an increase in the price of non tradables in terms of tradables. If this productivity bias is stronger domestically than abroad then the real exchange rate should appreciate.

Why can't something be done to lower the exchange rate?

Concerns about the negative impacts of a high exchange rate have led some commentators to argue that Australia should stop allowing the exchange rate to float freely and take action to depreciate it or, alternatively, that the monetary policy framework should be changed to focus less on inflation-targeting. In particular, calls have been made for the RBA to follow the example of the Swiss National Bank, which set a cap on the Swiss franc in September 2011 (Box 2).

In considering these arguments, there are two key points to bear in mind:

- First, the exchange rate should be considered from the perspective of overall macroeconomic balance, not from the perspective of particular sectors. Hence, the exchange rate could be considered too high only if it was having an excessive dampening impact on economic activity, causing economic activity to fall below the non-inflationary sustainable level.
- Second, as the exchange rate is closely linked to monetary policy, the two cannot be considered separately. Any attempt to influence the exchange rate must have implications for monetary policy.

Monetary policy

As noted, the exchange rate will tend to appreciate (depreciate) if domestic interest rates rise (fall) relative to foreign interest rates. This makes the exchange rate one of the key channels through which monetary policy operates. Currency appreciation

reinforces the impact of a rise in interest rates on economic activity, while also directly reducing import prices.

This linkage between monetary policy and the exchange rate gives rise to the so-called 'impossible trinity'. In a country open to capital flows, it is impossible to target the exchange rate while also maintaining an independent monetary policy that targets domestic inflation (and macroeconomic stability more broadly).

For example, if policymakers wished to target a lower exchange rate, the most direct and effective way to do so would be for the RBA to ease monetary policy. If the policy interest rate was initially set at a level consistent with the inflation target, a sustained easing would result in future inflation exceeding the target. But responding to higher inflation would be incompatible with holding down the exchange rate. Hence, the only way to sustain a lower nominal exchange rate would be to shift monetary policy away from targeting inflation to targeting the exchange rate.

If fundamentals such as the terms of trade were driving the nominal appreciation, this would result in the real appreciation occurring instead through higher inflation relative to our trading partners. Real appreciation through higher inflation would occur more slowly, as prices and wages tend to be sticky, but would also be more costly for the economy, especially in the process of again reducing the inflation rate.

While it is possible for the currency to appreciate further than is desirable from a macroeconomic perspective, this has not in large part been the case over the period since 2003-04. Apart from the period following the GFC in 2008-09, when the Australian dollar depreciated sharply, Australia has had a low and/or falling unemployment rate over this period. In the year or two before the GFC the economy was clearly operating above full capacity, as underlying inflation rose to well above the RBA's 2 to 3 per cent target band.

Should the exchange rate become too high for macroeconomic purposes, this will be reflected in rising spare capacity and, ultimately, declining inflation. In these circumstances we could expect that monetary policy would be eased, putting downward pressure on the exchange rate. Hence, the appropriate remedy for an excessively high exchange rate is already available within the existing inflation-targeting framework.

Intervention in the foreign exchange market

In principle, a lower exchange rate might also be targeted through 'sterilised' intervention, where the central bank purchases foreign securities and prevents any

impact on monetary policy through an offsetting sale of domestic securities.⁸ The economic literature is generally sceptical about the effectiveness of sterilised intervention, as central bank purchases are invariably small relative to the stock of outstanding securities (Appendix A).

Even if sterilised intervention was effective in lowering the exchange rate, the same problem of incompatible policy objectives would still arise. If the central bank continued to target inflation, it would need to offset the stimulatory effect of the lower exchange rate by raising interest rates, which would in turn tend to push the exchange rate back up. This is why decisions on intervention are appropriately a matter for the RBA.⁹

Fiscal policy

One way in which a lower exchange rate might be achieved without sacrificing macroeconomic stability is through tighter fiscal policy. Cutting government spending or increasing taxation has a dampening effect on economic activity and, thereby, inflation.¹⁰ A sufficiently large fiscal tightening would therefore allow monetary policy to be eased, and the exchange rate to depreciate, without causing inflationary pressures to increase.

The substantial fiscal consolidation currently under way, totalling 4½ per cent of GDP between 2009-10 and 2012-13, is already helping to moderate upward pressure on the AUD. Achieving a substantially lower exchange rate through this avenue would therefore require a much larger fiscal contraction than is appropriate given the global economic environment currently facing Australia.

A sovereign wealth fund

Some commentators have argued that a lower exchange rate could be achieved by putting some portion of government revenues arising from high commodity prices into a sovereign wealth fund that would invest in foreign assets, as is done in some other commodity-exporting countries (notably Norway and Chile).

Importantly, the Norwegian and Chilean sovereign wealth funds are linked to fiscal rules that ensure that budget surpluses rise in line with commodity prices. In terms of

8 The official cash rate set by the RBA depends on the balance between demand and supply for exchange settlement balances held by banks with the RBA. Purchases of foreign exchange by the RBA would increase the supply of these balances and, thereby, depress the cash rate unless offset by matching sales of domestic securities that reduces supply.

9 While the RBA does not take a completely 'hands off' approach to the exchange rate, it nowadays intervenes only during periods of market dysfunction (RBA 2011). The last such interventions occurred during the global financial crisis in October-November 2008.

10 The extent to which economic activity is dampened depends on the size of the relevant fiscal multiplier, which is a function of a number of factors, including the degree of spare capacity, and the composition and timing of fiscal consolidation.

influencing the exchange rate, the effect of these fiscal rules is likely to be much more important than foreign asset acquisition as such.

Without a change in fiscal settings, acquisition of foreign assets by governments is analogous to sterilised foreign exchange intervention by the central bank (Appendix A). This is unlikely to have a material effect on the exchange rate unless done on a massive scale. Norway's sovereign wealth fund, for example, has built up to almost 130 per cent of Norway's GDP (in comparison, the Future Fund is worth around 5 per cent of Australia's GDP).

The fact that Norway has experienced relatively limited exchange rate appreciation, despite a comparable rise in its terms of trade to Australia, can be attributed primarily to its fiscal policy regime (Garton and Gruen 2012). Norway's budget surpluses have averaged around 13 per cent of GDP since 2000, compared to an average of less than 3 per cent of GDP over the 1990s. These surpluses appear to have been large enough to offset the spending effect of higher commodity prices, which normally drives exchange rate appreciation.

In contrast, there was no sustained rise in budget surpluses in Australia after commodity prices began to grow strongly from 2003-04. In order to save the same proportion of increased national incomes as in Norway, Australian governments would have had to run budget surpluses averaging over 4 per cent of GDP since 2003-04 (4½ per cent of GDP above the actual outcome). Taking into account the fiscal implications of the global financial crisis, this would have required much higher budget surpluses during the first phase of the mining boom.

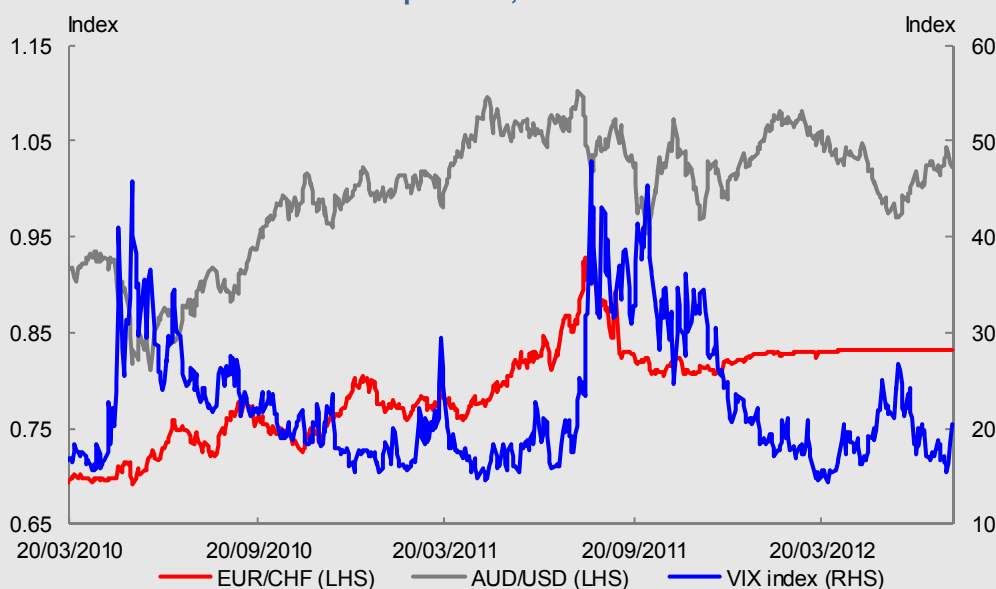
As noted in Garton (2012), given the current global economic environment, combined with considerably different economic structures facing Australia and Norway, it would be difficult, and not necessarily sensible to attempt to achieve such targets.

Box 2: Case study: Switzerland

The Swiss National Bank (SNB) set a cap on the Swiss franc/euro cross rate in September 2011 to prevent the franc from appreciating further. However, the SNB's actions reflect important differences between Australia's and Switzerland's economic circumstances.

Unlike the AUD, which tends to depreciate during periods of heightened uncertainty, the Swiss franc is a safe-haven currency that tends to be purchased at times of financial market stress. During periods of financial turbulence, the value of a safe-haven asset will tend to increase as investors unwind their riskier positions and increase their holdings of safe-haven assets. As such, the Swiss franc tends to be procyclical, appreciating during periods of turbulence, thus dampening the Swiss economy further during downturns, and depreciating and adding additional inflationary pressure during booms.

Chart 5: Swiss francs per euro, AUD/USD and the VIX index



Source: Bloomberg.

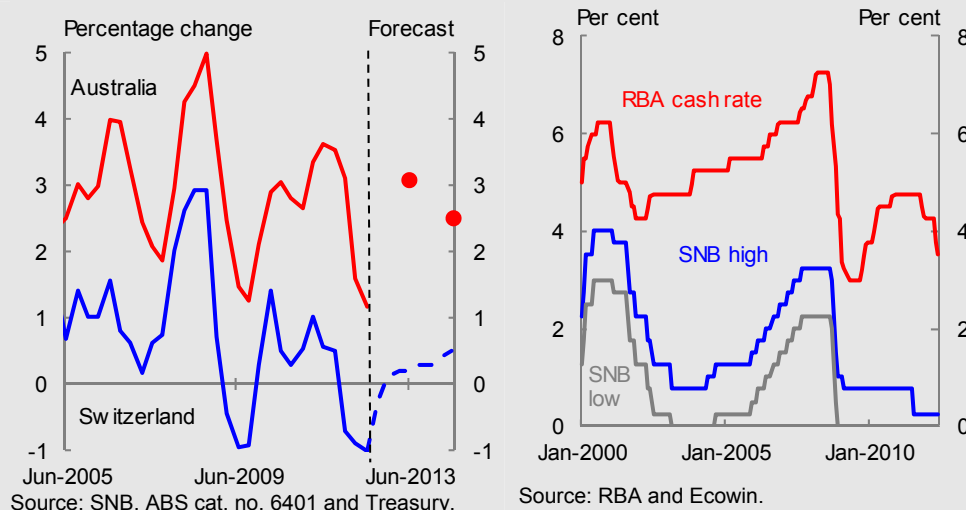
One way to demonstrate this property is to look at the relationship between the franc and measures of perceived financial market risk aversion (Chart 6). The VIX volatility index, which reflects the markets expectations of volatility in the S&P 500 index over the next 30 days, is one popular measure of risk aversion. The negative correlation between the VIX volatility index and the franc shows that when risk aversion rises, the franc tends to appreciate.

Empirical studies also support the view that the Swiss franc is a safe-haven currency. Ranaldo and Söderlind (2010) used a factor model to capture linear and non-linear linkages between currencies, stock and bond markets and proxies for market volatility and liquidity.

Box 2: Case study: Switzerland (continued)

They found that the Swiss franc tends to appreciate against the USD when US stock prices decrease and US bond prices and foreign exchange market volatility increase.

Chart 6: Inflation and central bank policy rates



The structures of the Australian and Swiss economies are also quite different. The Swiss economy is more trade exposed, with trade (exports plus imports) as a share of GDP equal to around 90 per cent, compared to 40 per cent in Australia. Manufacturing, which is highly trade exposed, is also a much larger proportion of the Swiss economy, around 20 per cent, compared to Australia, around 8 per cent. The structure of the Swiss economy tends to exacerbate the procyclical impact of the franc on the Swiss economy.

In addition, the Swiss economy conducts around 70 per cent of its trade with the struggling economies of the European Union (EU), whereas Australia's main trading partners in Asia have generally continued to perform strongly recently.

The recent performance of the Swiss economy has also been quite different to that of Australia. In particular, Switzerland is currently going through a period of deflation, which began in late 2011 and is expected to continue through 2012 (Chart 7).¹¹

At the same time, the Swiss policy interest rate has recently hit the zero lower bound, the point at which traditional monetary policy has reached its limit in terms of stimulating the economy.

Despite these deflationary pressures, safe haven flows have continued to put upward pressure on the franc. To counter this, the SNB intervened and set a minimum exchange rate of 1.20 Swiss francs per euro on 6 September 2011.¹²

11 All Swiss forecasts are taken from the SNB's March 2012 Bulletin.

12 See SNB 2011.

Box 2: Case study: Switzerland (continued)

The SNB has committed to purchasing unlimited quantities of foreign currency in order to hold the franc below the cap. Importantly, the SNB is now engaging in unsterilized foreign currency intervention, as it is not offsetting the effects of its foreign currency purchases on the monetary base (Chart 8). Unsterilized interventions are much more effective in influencing the exchange rate than sterilised interventions (Appendix A).

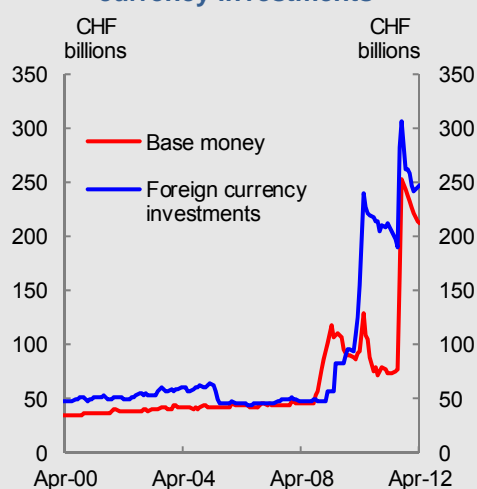
Given that the policy rate is already at the zero lower bound, the increases in the monetary base that have occurred as a result of the intervention are having no effect on the SNB's target interest rate (as it cannot fall below zero). The SNB is effectively engaging in a form of unconventional monetary policy in pursuit of its price stability mandate. Under the circumstances faced by the Swiss economy, many commentators, including the IMF, have endorsed the SNB's action.¹³

In spite of the stark differences between Australia and Switzerland, some commentators have recently called for the RBA to follow the path of the SNB and lower the value of the AUD. However, the Australian economy:

- does not have a highly procyclical currency;
- does not have Switzerland's problem of dependence on economically weak trading partners;
- does not have a problem with deflation; and
- does not have interest rates at the zero lower bound (and therefore cannot undertake unsterilized intervention without pushing down the cash rate, which would be inconsistent with the RBA's inflation targeting mandate).

As the current challenges faced by the Australian economy are quite different to those faced by the Swiss, there is no coherent reason for the RBA to follow the lead of the SNB and lower the value of the AUD. While the SNB's approach is consistent with its mandate given its circumstances, adopting the same approach here would raise fundamental conflicts with the RBA's inflation target.

Chart 7: Swiss base money and foreign currency investments



Source: SNB and IMF.

¹³ See IMF 2012.

Conclusion

Over the past decade the AUD has appreciated substantially, primarily as a result of a dramatic rise in the terms of trade. An additional factor boosting the AUD since the GFC has been Australia's relatively strong economic performance, which has resulted in interest rates in Australia close to normal levels, while those in most advanced economies are close to zero. The currency is also being supported by Australia's standing as a low risk country in a world where the number of such countries is dwindling.

However, while the AUD is now well above its post-float average, it appears to be at a level consistent with what might be expected, given the changes in its fundamental determinants.

Ultimately, the value of the AUD must be judged according to whether it is consistent with macroeconomic stability. If the high exchange rate is judged to be inconsistent with keeping the economy close to non-inflationary full employment, we could expect that monetary policy would be eased in response, putting downward pressure on the AUD. Hence, the remedy for such a problem is available within the existing policy framework.

As such, calls for Australia to shift away from its long-standing policy approach and take action directed at lowering the value of the AUD are misplaced. Rather than helping the economy, the available options are likely to be either ineffective or result in greater macroeconomic instability. The combination of flexible inflation-targeting monetary policy and a floating exchange rate has served Australia well in delivering macroeconomic stability through a range of shocks over the past two decades. There is no coherent reason to believe that it is inappropriate for current economic circumstances.

Appendix A: Foreign exchange market intervention

The economic literature suggests that sterilised intervention may affect the exchange rate through two channels: a signalling channel and a portfolio balance channel (for example, see Sarno and Taylor 2001 and Dominguez and Frankel 1993).

The signalling channel operates through intervention being interpreted as a signal of the central bank's view on the appropriate level of the exchange rate, and hence of the likelihood that it may take monetary policy action in support of this view. As such, the signalling channel is ultimately not independent of monetary policy.

The portfolio balance channel operates through the effect of intervention on the composition of investors' portfolios, assuming domestic and foreign securities are not viewed as perfect substitutes. When the central bank purchases foreign assets and sterilises by selling domestic securities, other investors must hold more domestic securities (and fewer foreign securities). If domestic and foreign assets were perfect substitutes this would have no effect: the additional domestic securities would be absorbed without any change in asset prices. Demand for Australian dollars from foreign investors' acquisition of these securities would exactly offset demand for foreign currency from the central bank's purchase of foreign securities.

Investors are more likely to view domestic and foreign assets as somewhat imperfect substitutes because they prefer to hold a balanced portfolio to diversify country-specific risks. This means they will demand a higher risk premium to increase the portfolio share of a country's securities, requiring the domestic currency to fall in order to lower the price of these securities relative to foreign securities.

The effects of sterilised intervention through this channel depend on the degree of substitutability between domestic and foreign securities, and the size of central bank purchases relative to outstanding stocks of these securities. Results from empirical studies on the effectiveness of sterilised intervention are mixed. To the extent that intervention is effective, this is generally attributed to the signalling channel, as interventions are invariably too small to have significant effects on portfolio balance.

This point is illustrated by the following figures. According to the IMF's Global Financial Stability Report, the global stock of debt and equity securities at the end of 2010 was worth around US \$150 trillion. The ABS Financial Accounts indicate that the stock of securities issued by Australian entities was worth around \$4 trillion: hence, Australian securities comprised about 2.7 per cent of the global portfolio. Increasing this portfolio share by a tiny 0.1 of a percentage point would therefore require a very large foreign asset acquisition of \$150 billion (more than 10 per cent of current Australian GDP).

Foreign asset acquisition by governments affects the exchange rate through portfolio balance effects in the same way as sterilised intervention by the central bank. It cannot, however, work through a signalling channel as monetary policy is set independently by the RBA.

If budget surpluses are used to acquire foreign securities, rather than repaying existing government debt or acquiring domestic securities, this means that other investors must hold more domestic securities than otherwise. As with sterilised intervention, impacts on the exchange rate depend on the asset acquisition being large enough to have a significant effect on investors' portfolio balance and, thereby, the risk premium on domestic securities.

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Unemployment disparity across regions

David Gruen, Bonnie Li and Tim Wong¹

The resources boom, globalisation and other global economic forces have raised questions about whether employment and unemployment outcomes in regional Australia have become more unequal. This paper examines how the dispersion of unemployment across regions has changed over time. Our results show that unemployment dispersion has narrowed as the aggregate level of unemployment has declined. This relationship has not changed over the course of the current resources boom and is consistent with similar outcomes in the United States and the United Kingdom.

¹ We are indebted to: Shane Johnson for his leadership in this project; James Kelly and Ben Dolman for comments and suggestions; and Will Devlin, Stephanie Gorecki and Yong Jortzik-Yan for their assistance. The views in this article are ours and not necessarily those of the Australian Treasury.

Introduction

Over the past decade, Australia's increasing integration with emerging Asian economies has led to a sustained surge in demand for our resource commodity exports on a scale never seen before. This has led to rapid growth in the mining and mining-related sectors and relevant regions while placing pressure on other parts of the Australian economy (Gruen 2011). Added to this, there have been increasing concerns around the employment outlook in some industries competing with Asian producers, whose emergence as major players in the global trading system has accelerated.

This paper seeks to inform this debate by examining whether strong aggregate employment outcomes have masked increasingly disparate outcomes between Australian regions. In particular, building on the work of Thirlwall (1966), we examine how unemployment has been distributed and how its dispersion has changed since the 1990s.

Our results show that unemployment disparity across Australian regions has fallen as the aggregate rate of unemployment has declined. This strong relationship has not changed over the course of the current resources boom. We find a similar strong, positive relationship between the dispersion of regional unemployment rates and the aggregate unemployment rate in both the United Kingdom (UK) and the United States (US).

The paper is structured as follows: first we present a brief review of unemployment outcomes in Australia, with a particular focus on differences between mining and non-mining states. We then explore unemployment distribution and dispersion at the regional level for Australia. This analysis is then extended to examine unemployment distribution in the UK and the US.

Setting the scene — trends in unemployment

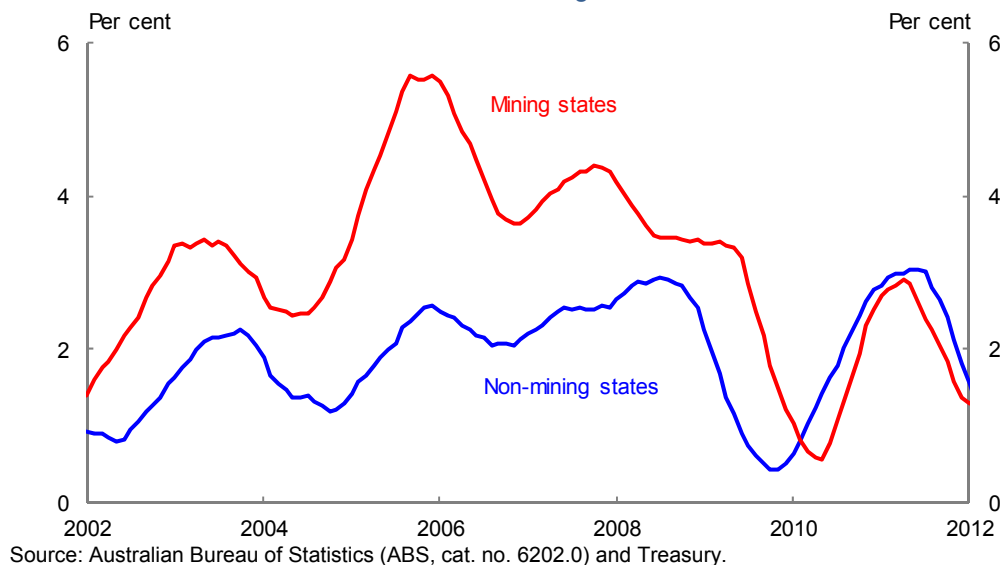
Since the onset of the resources boom in the early 2000s, Australia's terms of trade — that is, the ratio of export to import prices — has surged to historically high levels. The combination of surging export prices for Australian commodities and the constrained growth in import prices faced by Australians has boosted real national income and purchasing power (Parkinson 2011).

The strong boom has prompted discussion of a two-speed economy. In particular, the resources boom is benefiting mining and mining-related sectors as well as the states and territories where these are concentrated, while restraint has been placed on other parts of the economy.

While a two-speed economy is evident in looking at output growth by sector, this need not translate to a widening in employment outcomes between regions. The rise in the terms of trade affects the economy in two main ways: through a resource movement effect and a spending effect (see, for example, Corden 1984, Corden and Neary 1982 and Gregory 1976). In particular, as the mining sector demands more labour and capital, it utilises any spare capacity in the economy and draws resources away from lagging sectors. In addition, the extra income and government revenues from the higher terms of trade increases demand for goods and services. This in turn raises demand for labour in the sectors not exposed to international competition. It remains an empirical question whether the combined effect of these two forces has a favourable or adverse effect on unemployment disparity across regions.

Not surprisingly, the resources boom has provided a greater stimulus to activity in the mining states than elsewhere (Garton 2008).² Since 2003-04, gross state production (GSP) has on average grown around 1.7 times as fast in the mining states as in the non-mining states. Over the same period, for each 1 per cent increase in employment in the non-mining states, employment has also increased by around 1.7 per cent in the mining states (Chart 1).

Chart 1: Employment growth in Australia
Year average



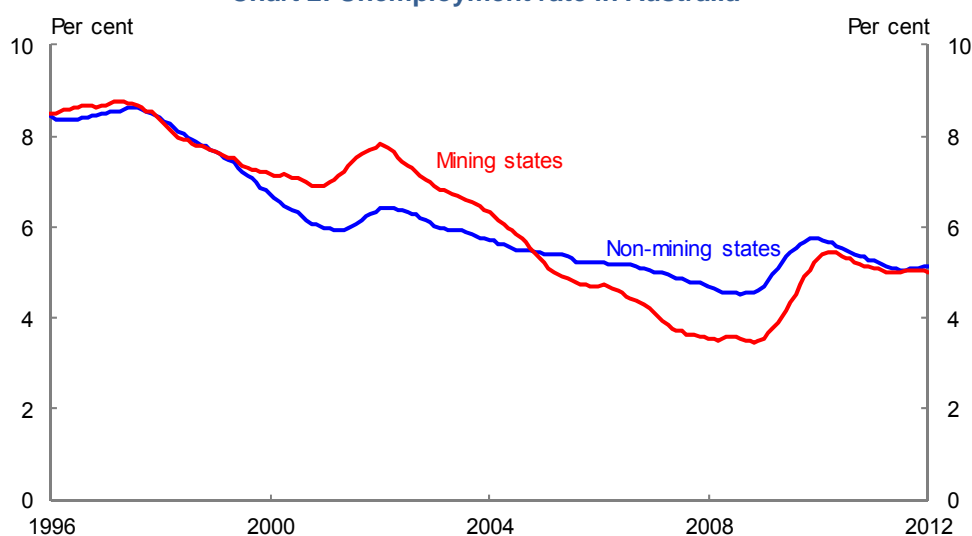
² 'States' is a shorthand for states and territories. 'Mining states' include Western Australia, Queensland, and Northern Territory. The remaining states (New South Wales, Victoria, South Australia, Tasmania and the Australian Capital Territory) are then 'non-mining states'.

Unemployment disparity across regions

The stronger growth in the mining states has also led to a more rapid decline in the unemployment rate in those states. As highlighted by Garton (2008), this has reversed previous experiences – where mining states had higher unemployment rates. The unemployment rate in the mining states was 1 percentage point lower than in the non-mining states' prior to the onset of the global financial crisis (Chart 2).

Although the unemployment rate in the mining states fell below that in the non-mining states in the mid 2000s, unemployment across both groups has fallen since the late 1990s and has stabilised at similar levels following the global financial crisis.

Chart 2: Unemployment rate in Australia



Source: ABS cat. no. 6202.0 and Treasury.

Unemployment disparity across regions

The distribution of regional unemployment in Australia

While unemployment disparity has fallen at the state level, it is also of interest to examine unemployment disparity at a more disaggregated level.

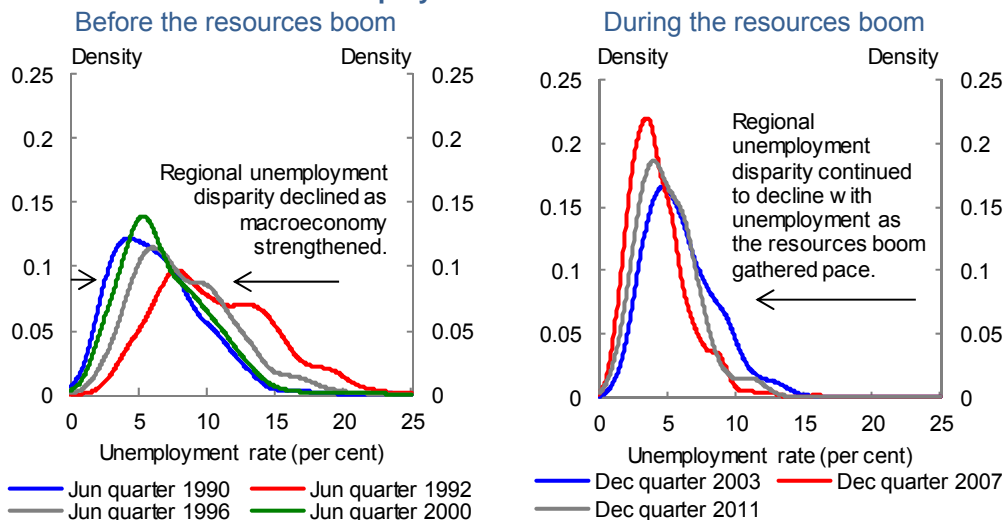
For Australia, we can examine unemployment outcomes across Statistical Local Areas (SLAs) using quarterly Small Area Labour Market data from the Department of Education, Employment and Workplace Relations (DEEWR) for the period 1990 to 2011.³

We find that unemployment disparity across Australian (SLA) regions has narrowed as aggregate outcomes have improved over the 1990s (Chart 3). As Australia emerged

³ The number of SLAs has varied over time from around 1,300 in the 1990s to over 1,400 in 2006.

from the early 1990s recession, the variation in regional unemployment rates narrowed as the national rate declined. In the June quarter 1992, around 10 per cent of Australia's (SLA) regions recorded an unemployment rate of 5 per cent, and only around 15 per cent of the regions had unemployment rates within a band of 1 percentage point either side of the national average. By the June quarter 1996, the proportion of regions with unemployment rates below 5 per cent had risen to around 21 per cent, while the proportion of regions with unemployment rates within the 1 percentage point band had risen to 20 per cent. By the June quarter 2000, the corresponding figures were 34 per cent and 21 per cent respectively.

Chart 3: Unemployment distribution in Australia



Note: Regional distributions are smoothed using Gaussian kernel density estimation (see, for example, Wand and Jones 1995). For presentational clarity, distributions were deliberately over-smoothed with windows of 1 for the selected quarters before the resources boom, and windows of $\frac{3}{4}$, $\frac{1}{2}$ and $\frac{3}{4}$ for the December quarters 2003, 2007 and 2011 respectively.
Source: DEEWR and Treasury.

Since the beginning of the resources boom in the early 2000s, these trends have remained intact. Demand for labour has increased in the mining and related sectors (for example, the construction and business services sector). These sectors have drawn labour from other parts of the economy which are not directly exposed to the resources boom. Across both mining and non-mining communities, unemployment has declined.

Overall, the distribution has narrowed and shifted to the left since the early 2000s. However, as the effects of the global financial crisis hit the labour market, the distribution widened and became less even. The subsequent general economic recovery and re-emergence of the resources boom have resulted in a further narrowing of the density more recently.

As of the December quarter 2011, the national unemployment rate was 5.1 per cent and around 57 per cent of the (SLA) areas had an unemployment rate of 5 per cent or less.

Unemployment disparity across regions

While current labour market conditions are not as strong as those that prevailed just before the global financial crisis, they are considerably stronger than those before the resources boom, with lower average unemployment and a more even distribution. For instance, as of the December quarter 2002, there were only around 24 per cent of the areas with unemployment rates within 1 percentage point of the national average. This is considerably lower than the proportion as of the December quarter 2011 of just below 30 per cent and around 32 per cent prior to the global financial crisis. Hence, the distribution of unemployment distribution across regions has become more even.

Measuring dispersion in these distributions

One of the ways of quantifying the 'evenness' of the distribution of unemployment is to measure its dispersion.

There are different approaches to measuring dispersion. The most commonly used measures are the standard deviation and the coefficient of variation of the regional unemployment rates weighted by the corresponding labour force sizes. They are referred to as the absolute dispersion and relative dispersion of unemployment rates.

The absolute dispersion measures the variation of regional unemployment rates *around* the national unemployment rate, whereas the relative dispersion measures the variation of regional unemployment rates *relative* to the national unemployment rate (see Appendix A for the computation of the two measures).

The two dispersion measures may diverge and do not necessarily yield similar trends (see Box 1). The absolute measure is more resistant to movements in the aggregate unemployment rate, which makes it more comparable over time (see, for example, Thirlwall 1966). For the purpose of examining dispersion in unemployment outcomes, this paper uses the absolute measure.⁴

4 For the remainder of the paper, unless otherwise stated, 'dispersion' refers to absolute dispersion.

Box 1: The difference between absolute and relative dispersion measures

Suppose there are three regions (A, B, and C) of equal labour force size in the economy, and that the unemployment rates in these regions are 2, 3 and 8 per cent respectively (Table 1).

If all the regions see an increase in unemployment rates of 1 percentage point (Scenario 1), then the absolute dispersion would remain unchanged, but the relative dispersion would fall. However, if the unemployment rate were to double for all regions (Scenario 2), the absolute dispersion would also double, while the relative dispersion would stay constant and, as a result, would not capture the amplified gaps between regions.

Most distinctly, if the unemployment rate in Region B rises from 3 per cent to 8 per cent, making unemployment outcomes more polarised, the relative measure is lower compared to the original situation rather than being higher (Scenario 3).

Table 1: Hypothetical illustration of the difference between absolute dispersion and relative dispersion

		Original	Scenario 1	Scenario 2	Scenario 3
Unemployment rate (per cent)	Region A	2	3	4	2
	Region B	3	4	6	8
	Region C	8	9	16	8
Aggregate unemployment rate (per cent)		4.3	5.3	8.7	6.0
Absolute dispersion (percentage points)		3.2	3.2	6.4	3.5
Relative dispersion (per cent)		74.2	60.3	74.2	57.7

Note: Appendix A outlines the computation of dispersion.

Thus, the absolute and relative dispersion measures do not necessarily move in line with each other. The divergence is due to the scale insensitivity and location sensitivity of the coefficient of variation. Owing to these characteristics, to avoid unnecessary complication and potential misinterpretation, researchers caution against using relative dispersion (see, for example, Livers 1942, Bedeian and Mossholder 2000, and Sørensen 2002).

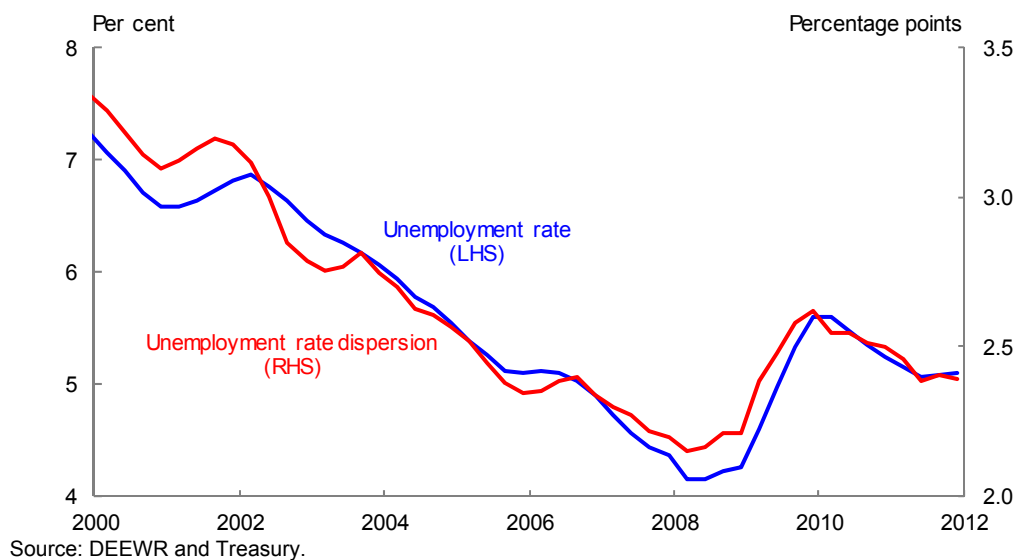
In spite of this, there has been some confusion in the literature around these two measures. Some studies have interpreted a negative relationship between the relative unemployment dispersion and the unemployment rate as a negative relationship between the absolute unemployment rate dispersion and the aggregate unemployment rate. As such, they have been led to incorrectly claim that lower unemployment has been achieved at the cost of increased (absolute) dispersion in unemployment rates across regions.

Regional unemployment dispersion and aggregate unemployment

An increase in demand for labour in a region will see unemployment in that region fall, which will encourage higher workforce participation. If this demand cannot be met, employers will adjust wages to attract new workers including those from other regions. This effectively reduces available labour and leads to a fall in unemployment in these other regions. Hence, we would expect a lower degree of dispersion; albeit with a lag (see, for example, Debelle and Vickery 1998). As such, we would expect a positive relationship between aggregate unemployment and unemployment dispersion.

Unemployment dispersion in Australia has narrowed over the past decade (Chart 4). While the dispersion picked up moderately during the global financial crisis, it remained low and has declined since. This suggests that the gains from the resources boom, in terms of unemployment outcomes, have been broadly distributed throughout the country.

Chart 4: Labour market trends in Australia

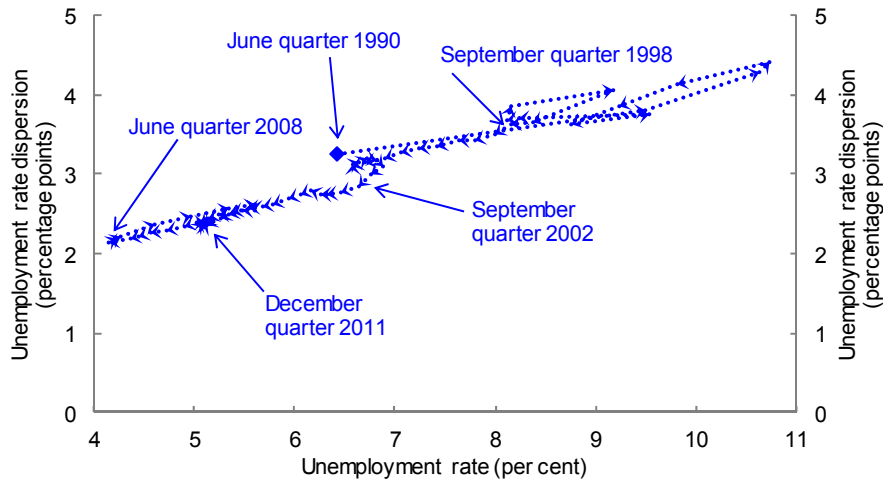


We noted above that there are reasons to expect the dispersion of regional unemployment rates to be positively related to the national unemployment rate. Indeed, when we compare the unemployment rate dispersion with the unemployment rate, they move very closely over time (Chart 4). This is also consistent with earlier studies in Australia (see, for example, Andrews and Karmel 1993).

To examine the relationship between unemployment dispersion and unemployment more clearly, we plot the unemployment rate dispersion against the national (aggregate) unemployment rate (Chart 5). As expected, there is a clear positive

relationship, with lower unemployment rates associated with lower levels of dispersion in unemployment rates.⁵

Chart 5: Unemployment rate dispersion and unemployment rate in Australia



Note: Each small arrow points to the following observation. There are several missing observations between the June quarter 1990 and the June quarter 1998. The diamonds represent the June quarter 1990 and the December quarter 2011.

Source: DEEWR and Treasury.

International comparison: the UK and the US

In the previous section, we presented our findings that highlighted the tendency for the unemployment rate dispersion to move in the same direction as the unemployment rate in Australia. This section investigates whether this relationship also exists in the UK and the US.

For the UK, we examine the distribution of unemployment across around 200 counties and equivalents with Annual Population Survey data from the Office for National Statistics (ONS) since 1995. For the US, we use data from the Bureau of Labor Statistics (BLS) for around 3,200 counties and equivalents since 1990, in addition to state data from the mid-1970s.

The distribution of regional unemployment in the UK and the US

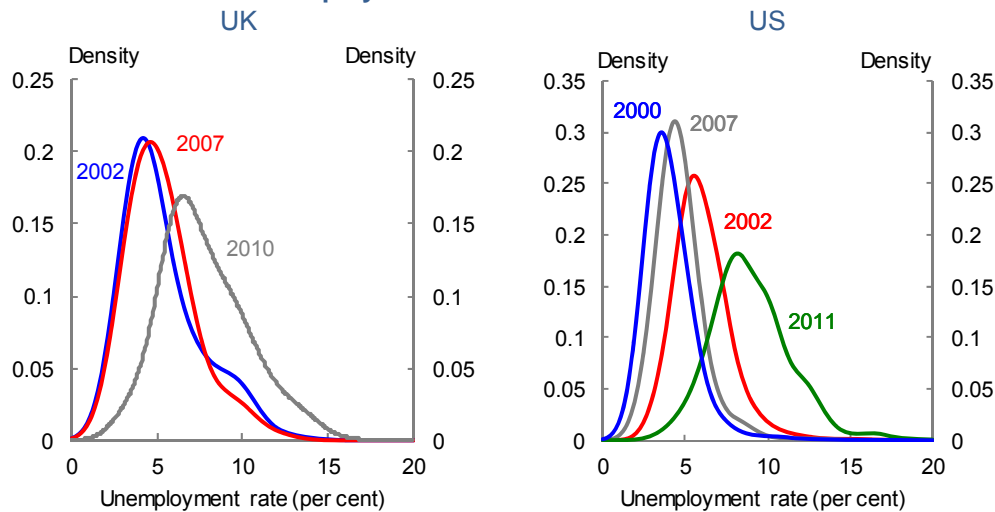
In both the UK and the US, unemployment and unemployment dispersion were at similar levels in 2007 as they were in the early 2000s (Chart 6). The US had seen some improvement in employment outcomes in 2007 relative to 2002, mainly due to the recovery from the bursting of the dot-com bubble.

⁵ While the zero-lower bound in unemployment rates could lead to this result, we find that this is not the case (see Appendix B).

Unemployment disparity across regions

Since the crisis, the distribution of unemployment has been more uneven for both the UK and the US (Chart 6). In particular, around half of the US counties had an unemployment rate within 1 percentage point of the national average in 2007. This compares to only around a quarter of the counties in 2011. Similarly for the UK, around 40 per cent of the counties had an unemployment rate within the 1 percentage point range in 2007. This proportion has fallen markedly since the global financial crisis to only around 25 per cent in 2010.

Chart 6: Unemployment distribution in the UK and the US



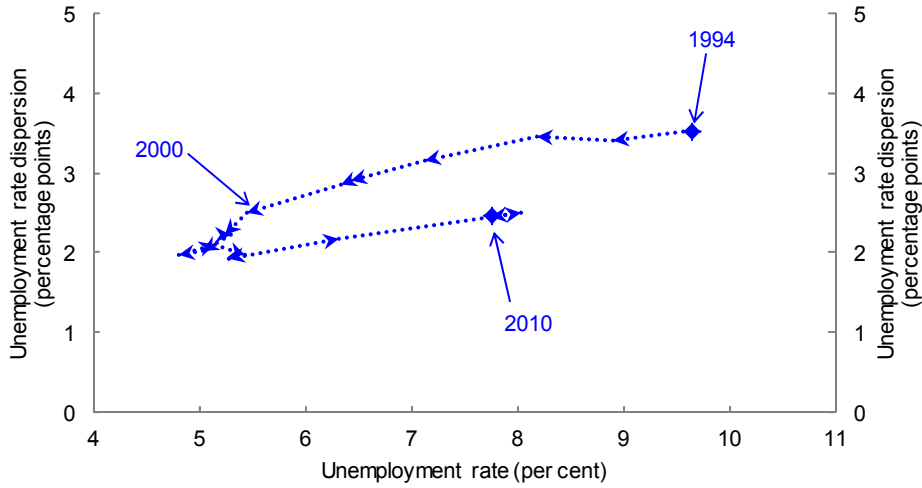
Note: County or equivalent data used for both the UK and the US. The UK chart represents averages over the years beginning in March 2002, April 2007 and April 2010, whereas the US chart represents averages over calendar years. Similar to Chart 3, regional distributions are smoothed using Gaussian kernel estimation (see, for example, Wand and Jones, 1995). For presentational clarity, distributions were deliberately over-smoothed with windows of 1 for the UK and $\frac{3}{4}$ for the US. Source: ONS, BLS and Treasury.

Unemployment dispersion

As for Australia, a positive relationship between the unemployment rate and the dispersion of regional unemployment rates is also found in the UK and the US (Charts 7 and 8). This is consistent with the findings of many other researchers (see, for example, Martin 1997, and Valletta and Kuang 2010).

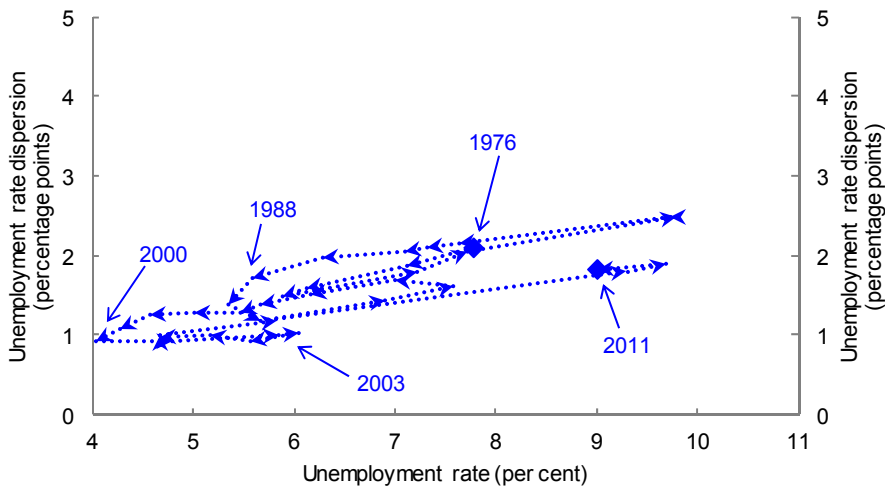
However, there appears to be one exception – the dot-com bubble in the early 2000s. While the US unemployment rate increased by around two percentage points after the bursting of the bubble, unemployment rate dispersion increased only marginally. Unemployment dispersion has otherwise been considerably more sensitive to economic slowdowns.

Chart 7: Unemployment rate dispersion and unemployment rate in the UK



Note: Each small arrow points to the following year which begins in March for 1995 to 2003 and April for 2004 to 2010. The diamonds represent the years beginning March 1994 and April 2010.
Source: ONS and Treasury.

Chart 8: Unemployment rate dispersion and unemployment rate in the US



Note: Each small arrow points to the following calendar year. The diamonds represent calendar years 1976 and 2010. State data used for the chart.
Source: BLS and Treasury.

There have been a number of periods during which the relationship between the dispersion of regional unemployment rates and the unemployment rate in the UK and the US appears to have changed. For example, the UK saw a fall in the unemployment rate dispersion relative to the unemployment rate in the early 2000s. This followed the New Deal welfare reform launched in 1998 which changed the labour market landscape (see, for example, Beaudry 2002, and Riley and Young 2001). For the US,

Unemployment disparity across regions

there were two shifts in the late 1980s and the late 1990s to lower dispersion, but an unfavourable shift towards higher dispersion in the early 1990s. These changes reflect the influence of factors other than changes in the unemployment rate, such as impacts of public policy and technological change.

Conclusion

Unemployment disparity tends to move in line with unemployment in Australia, the UK and the US.

For Australia, this relationship has held up over the past 20 years amid significant structural changes in the economy and the variation in the growth rates across industries. During the resources boom, the deviation in regional unemployment rates has narrowed as the national unemployment rate has fallen.

Appendix A: The computation of absolute and relative unemployment rate dispersion measures

The absolute dispersion of unemployment rates (AD) is often measured by the standard deviation of the regional unemployment rates from the national average weighted by the corresponding region's labour force size, that is:

$$AD^2 = \sum_i \frac{L_i}{L} (u_i - \bar{u})^2$$

where u_i and L_i are the unemployment rate and labour force size of the i -th region, \bar{u} denotes the aggregate unemployment rate and L is the aggregate labour force.⁶

The relative dispersion of unemployment rates (RD) is measured by the coefficient of variation in the regional unemployment rates with respect to the national unemployment rate. It can be calculated as:

$$RD^2 = \sum_i \frac{L_i}{L} \left(\frac{u_i - \bar{u}}{\bar{u}} \right)^2$$
$$RD = \frac{AD}{\bar{u}}$$

This paper uses the absolute dispersion to measure unemployment dispersion across regions.

6 The absolute dispersion can also be measured by the average deviation of regional unemployment rates from the aggregate unemployment rate weighted by the corresponding labour force size, which has the form:

$$AD_{abs} = \sum_i \frac{L_i}{L} |u_i - \bar{u}|$$

The difference between the average deviation and the standard is in their treatment of the outliers. The quadratic function in the standard deviation focuses more on larger deviations and less on smaller deviations. We find very similar results using this measure.

Appendix B: Focusing on regions with unemployment rates above national average

In theory, the truncation of the distribution of unemployment rates at zero could be responsible for our observed correlation between the aggregate unemployment rate and its dispersion.

To see whether this is a genuine issue, we restrict the sample to those regions with unemployment greater than the national average and measure the spread from the national average – that is:

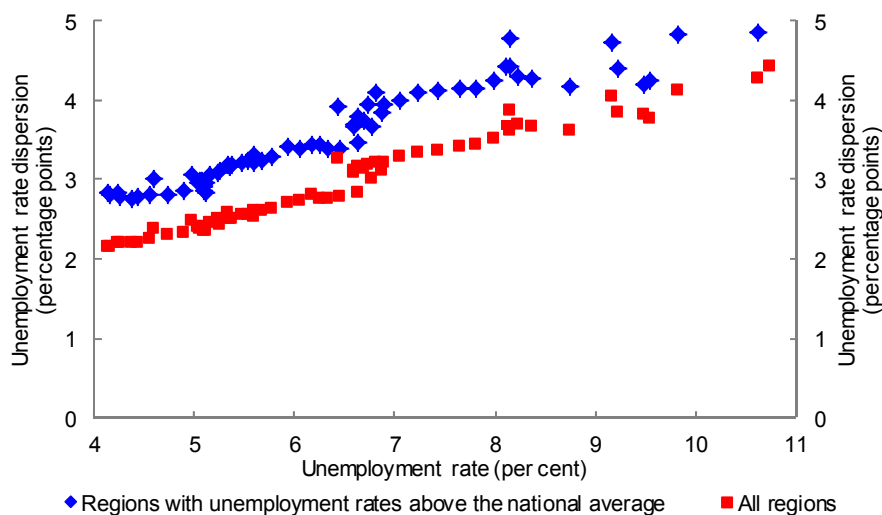
$$AD_{u_i > \bar{u}}^2 = \frac{\sum_{u_i > \bar{u}} L_i (u_i - \bar{u})^2}{\sum_{u_i > \bar{u}} L_i}$$

where the symbols have the same definition as in Appendix A.

For these regions, we find again a positive relationship between dispersion of unemployment rates from the national average and the national unemployment rate (Chart 9). We find similar results for the UK and the US.

This result provides strong evidence that unemployment outcomes are distributed more evenly across regions when the national unemployment rate is lower, and that this outcome is not a statistical artefact.

Chart 9: Unemployment rate dispersion and unemployment rate in Australia
Selected regions



Note: There are several missing observations between the June quarter 1990 and the June quarter 1998.
Source: DEEWR and Treasury.

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Key themes from Treasury's Business Liaison program

Overview

As part of its quarterly Business Liaison Program, Treasury met and held teleconferences with businesses and organisations during May 2012. Treasury greatly appreciates the commitment of time and effort by the organisations that participate in this program.

Consistent with findings in previous rounds, businesses pointed to the global outlook as a key source of concern with uncertainty around the euro zone continuing to weigh on both sentiment and confidence.

Activity

Strong demand was again evident in the resources sector with firms reporting solid progress on investment projects. Firms linked to the resources sector also continued to report strength in related business such as transport, manufacturing and firms providing services to mining regions.

Outside the resources sector, the story continued to be mixed with some parts of the manufacturing, retail and services sectors reporting slightly improved or steady activity while others reported continued softness. With demand across the some parts of the non-mining economy muted, some firms reported that they were focussed on supporting existing demand rather than organic growth.

In the retail sector, some contacts reported continued softness and that customers were increasingly using online options to purchase goods such as clothing and accessories.

Employment and wages

Firms in the mining sector reported some challenges in recruiting and contracting, in particular for highly specialised technical professions. With a significant pipeline of construction, these shortages were expected to continue in the near-term. In some cases, there were reports that this could lead to either sourcing less experienced staff or breaking up contract work into smaller parts.

In the non-mining economy, some reports suggested that there could be upwards pressure on wages in the construction sector with mining firms increasingly looking to hire workers with complementary skills. However, contacts generally noted that, with demand in other parts of the construction sector relatively weaker, this was unlikely to be a pressure in the near-term.

Financing and investment

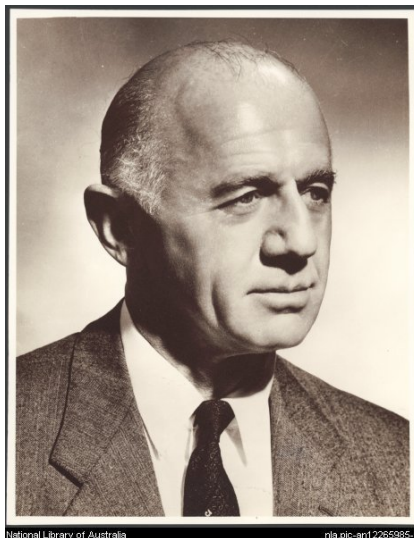
Mining sector contacts reported that competition for capital amongst projects within firms was strong.

In the non-mining sector, reports suggest that, post-GFC, banks had tightened their lending requirements with small business owners increasingly using residential property as collateral to secure finance.

William McMahon: the first Treasurer with an economics degree

John Hawkins¹

William McMahon was Australia's first treasurer formally trained in economics. He brought extraordinary energy to the role. The economy performed strongly during McMahon's tenure, although there are no major reforms to his name, and arguably pressures were allowed to build which led to the subsequent inflation of the 1970s. Never popular with his cabinet colleagues, McMahon's public reputation was tarnished by his subsequent unsuccessful period as prime minister.



Source: National Library of Australia.²

1 The author formerly worked in the Domestic Economy Division, the Australian Treasury. This article has benefited from comments provided by Selwyn Cornish and Ian Hancock but responsibility lies with the author and the views are not necessarily those of Treasury.

Introduction

Sir William McMahon is now recalled by the public, if at all, for accompanying his glamorous wife to the White House in a daringly revealing outfit (hers not his). Comparisons invariably place him as one of the weakest of the Australian prime ministers.³ Indeed, McMahon himself recalled it as 'a time of total unpleasantness'.⁴ His reputation as treasurer is much better, being called 'by common consent a remarkably good one'.⁵ The economy performed well during his tenure, but with the global economy strong and no major shocks, this was probably more good luck than good management.⁶ His 21 years and four months as a government minister, across a range of portfolios, was the third longest (and longest continuously serving) in Australian history.⁷

In his younger days he was something of a renaissance man; 'a champion ballroom dancer, an amateur boxer and a good squash player – all of which require, like politics, being fast on his feet'.⁸ He suffered deafness until it was partly cured by some

2 'Portrait of William McMahon, Prime Minister of Australia from 1971-1972/Australian Information Service', Bib ID: 2547524.

3 MacCallum (2012, p 145) quips he was not so much 'first among equals' as 'worst among sequels'. Among critical commentators are Errington and van Onselen (2007, p 275) who call him 'the prime minister the Liberal Party is most ashamed of'; Megalogenis (2011, p 31) who refers to him as 'the shorthand for national failure' and Mackerras (2008) who believes he had 'no achievements beyond actually getting the top job' and Hancock (2001, p 196) who describes him as 'generally inept' as prime minister.

4 Interview cited in *Canberra Times*, 10 April 1988, p 4.

5 Williams (1968, p 2). Bob Hawke referred to his tenure as 'widely recognised as a successful one'; *Hansard*, 12 April 1988, p 1403. Veteran journalist Alan Reid (1971, p 70) reports 'he was regarded, even by his enemies within the Liberal Party, as doing a highly competent and technically accomplished job' as treasurer.

6 Hancock (2001, p 211) says McMahon 'was fortunate to hold the office in fair economic times and to be assisted by a strong department'. Similar views were held by McMahon's ministerial colleagues Don Chipp, who opined that 'he inherited that [favourable] set of conditions from Harold Holt and there were few outside influences placed on the economy during his tenure as treasurer to disturb it'; Chipp and Larkin (1978, p 125), and Billy Snedden (1976) who described McMahon as treasurer 'during a fortunate era and it was not his doing but 'if the cricket team wins then the captain is a good captain'.

7 John McEwen and George Pearce served for longer but with breaks. McMahon's portfolios were navy; air; social services; primary industry; labour and national service; treasury; external (renamed foreign) affairs; and prime minister.

8 Aitchison (1971, p 278). Even as treasurer, he kept fit through playing golf and squash. Weller, Scott and Stevens (2011, p 72) remark 'in a couple of cases, recruitment to PM&C was said to be determined by the Prime Minister's need for a squash partner, someone who would not mind being hit with a swirling racket and who knew how to lose'.

operations in the 1960s. Possibly as a result, he had a quavering voice that was a gift to mimics and his public speaking style was described as 'dreadfully boring'.⁹

McMahon was the first treasurer with a degree in economics. He was 'fascinated' by economics.¹⁰ He commented while treasurer: 'I had always felt I was cut out for the life. I was born in a financial and economic mould. I trained myself for it ... I know it backwards ... I speak the lingo'.¹¹ According to his wife, 'he only ever wanted to be treasurer'.¹² But he once mused 'life was never intended to be pleasant for a treasurer'.¹³

McMahon claimed to be an intellectual who also read extensively on theology and communism.¹⁴ In a more reflective piece, McMahon defined politics as the 'study of human nature in society with emphasis on the parliamentary and economic aspects of man's activities'.¹⁵ He styled himself as a 'genuine liberal in the sense of feeling that the less interference there was with people...the better kind of society developed'.¹⁶ But most commentators believed there had 'never been any evidence that he is an initiator or an original thinker'.¹⁷ As he progressed in politics he became more cynical. Asked what politics is about at one question time, McMahon replied 'trying to get into office'.¹⁸ Asked what had gone wrong for Gorton he replied 'he tried to do things'.¹⁹

He was regarded as ungrateful²⁰ and a demanding boss.²¹ An example of his attitude, and the responses it could provoke, was that he once rang treasury secretary Wheeler

9 Chipp and Larkin (1978, p 125). Press gallery veteran Rob Chalmers (2011, p 120) referred to McMahon's 'total lack of eloquence'.

10 Rodan (1977, p 223) and Reid (1969, p 31). His wife recalled 'he loved the world of economics; Mitchell (2007, p 46). Reid (1969, p 126) described him as 'engrossed in his portfolio'.

11 Interview cited in Williams (1968, p 2).

12 Sonia McMahon, cited by Leeser (2010).

13 *The Sun*, 19 August 1977.

14 McMahon (1974, p 43) and in an interview with Peter Coleman (1963, pp 17-18).

15 McMahon (1954, p 29).

16 Interview by John Edwards (1972, p 3). In McMahon (1954) he discusses conclusions reached from this study and shows he had read widely.

17 Whittington (1972, p 119). Similarly, Hastings (1965, p 9) opined that he was 'not...either a very original man or a very imaginative one'. *Time* called him 'a man of limited vision'; when asked during an interview for his thoughts on Australia's future, 'McMahon shuffled rapidly through his papers. He found no brief on the future, no position paper filed under F...he said 'I'll have to send you a note on that'. But he never did'; 24 May 1971, p 36.

18 *Hansard*, 23 February 1972, p 6.

19 Cited in Oakes and Solomon (1973, p 64).

20 Heather Henderson, then an ambassador's wife in Geneva, recalls McMahon arriving an hour and a half late for a dinner without apology or thanks; Menzies and Henderson (2011, p 36).

after midnight requesting information. Wheeler rang McMahon back at 2.30 am and when McMahon asked why he was being called at such an hour, Wheeler replied that McMahon had said he needed the information as soon as possible.²²

The paradox of his career is how he reached the summit of Australian politics despite being poorly regarded by his peers and lacking in charisma. Menzies apparently 'did not trust him and doubted whether McMahon had that high standard of incorruptibility that Menzies himself would set for the Treasury'.²³ There is a long list of Cabinet colleagues on the record as highly critical of him.²⁴ He was particularly notorious for leaking to the press.²⁵ Contemporary journalists were also not favourably impressed.²⁶ There was considerable mirth when, interviewed by David Frost, McMahon said 'I have never, ever told a lie'.²⁷

21 Whittington (1972, p 149). Weller, Scott and Stevens (2011, p 70) say 'McMahon was impossible to work for: paranoid, inconsistent, demanding and unreasonable'. His private secretary reported being sacked and reinstated several times; Mitchell (2007, p 40).

22 Brown (2002, p 107).

23 Hasluck (1997, p 128); Howson (1984, p 589). In his early retirement, Menzies wrote of him as 'that untrustworthy little scamp'; Menzies and Henderson (2011, p 224).

24 Holt's biographer says it was a problem for Holt that 'very few members of cabinet trusted his treasurer's integrity'; Frame (2005, p 237). Leslie Bury (1975) said 'I have an intense antipathy...I don't like anything about him'. Snedden recalled him as 'conspiratorial, devious, untrustworthy'; Snedden and Schedvin (1990, pp 126-7). John Gorton called him 'utterly untrustworthy'; *Sydney Morning Herald*, 2 October 1987, p 11. Hasluck is particularly scathing: 'the longer one is associated with him the deeper the contempt for him grows...disloyal, devious, dishonest, untrustworthy, petty cowardly...I find him a contemptible creature'; Hasluck (1997, p 185). (These comments from 1968 were not made public by Hasluck, but published after his death, which may account for their candour.) In general 'in the Country Party he was detested'; Golding (1996, p 182). Even speaking in a condolence motion Ian Sinclair said McMahon was 'not the easiest of men with whom to be associated'; *Hansard*, 12 April 1988, p 1405.

25 In the press gallery he was known as 'Billy the Leak'; Chalmers (2011, p 155), Davey (2011, p 91); Hancock (2002, p 101). Malcolm Fraser recalls Menzies saying he kept in his desk a signed confession from McMahon about leaking which Menzies would release if too provoked; Fraser and Simons (2010, p 162). Another story has it that once when McMahon left a cabinet meeting early, Menzies looked at the clock, sighed and said 'oh dear, just in time for the final edition!' Golding (1996, p 350).

26 Mitchell (2007, p 38) remarks that leading journalists recalled him as a 'pathological liar' and 'fantasist'. Whittington (1972, p 153) points out that as prime minister he foolishly put out a press release describing himself as 'soldier, barrister, economist and parliamentarian' when he had never fought in a battle, been admitted as a barrister or worked as an economist. There were claims that while treasurer he would punt on the stockmarket using inside information; Buckley (1991, pp 211-2).

27 Jim Killen referred to it as 'the end of Diogenes' search'; Chalmers (2011, p 93). (Diogenes was a legendary figure in ancient Greece who roamed the countryside in search of an honest man.)

The answer to this paradox seems to be that McMahon was at least grudgingly admired for his energy and diligence. In a much-cited quotation upon becoming prime minister, McMahon described himself as a 'tremendous worker'.²⁸ Even a harsh critic said McMahon was 'able and hard working'.²⁹ He also benefited from being a member from New South Wales at a time when there was growing resentment of the dominance of Victorians in the Liberal Party.³⁰ Furthermore, McMahon was driven.³¹ He stood for the deputy leadership on Menzies' retirement in part so that he could claim the treasurer's job.³² In many ways he was a political professional in a party still with many amateurs.³³

McMahon's life before politics

William McMahon was born on 23 February 1908 into a wealthy family. He recalls being shunted between relatives by his father after his mother died when he was four, and his father died while Billy was in his teens. McMahon attended Sydney Grammar (shining neither academically nor at sports) and subsequently took a law degree at the University of Sydney. Shy as a boy, at university he was described as 'a cheerful, rowdy extravert individual of thalamic mentality'.³⁴ He had an early interest in politics, stimulated by his uncle, a lord mayor of Sydney.³⁵

He practised as a solicitor with the prestigious establishment firm of Allen, Allen and Hemsley. He specialised in commercial law and acted for the banks on the bank nationalisation cases, rising to junior partner. He enlisted in the army, rising to major although his hearing problems and a knee injury precluded overseas service.

28 Press conference, 10 March 1971.

29 McEwen and Jackson (1983, p 75). Downer (1982, p 24) and Hancock (2002, p 101) describe him as indefatigable. McMahon (1974, p 44) claimed to need only four hours sleep a night.

30 Successive leaders Menzies, Holt and Gorton all represented Melbourne electorates as did rising stars Snedden and Peacock. Once deputy leader Eric Harrison retired in 1956 and Garfield Barwick went to the High Court in 1964, McMahon was the senior NSW Liberal.

31 Golding (1996, p 181) writes his 'ambition to succeed knew no bounds...he would use any device to advance his own interests, even if this meant undermining a colleague'. Whittington (1972, p 145) and Oakes & Solomon (1973, p 77) both refer to his 'tremendous determination'. McMahon himself reflected 'it is a strange thing but everyone seems to think I am a person of tremendous ambition' at a press conference on 10 March 1971.

32 Golding (1996, p 228).

33 Reid (1971, p 74). Don Chipp described him as a 'consummate politician'; Chipp and Larkin (1978, p 124). Jones (1971, p 6) called him 'totally obsessive about politics'.

34 Cited in Oakes & Solomon (1973, p 67). McMahon (1974, pp 34 and 42) described himself as 'wild' gambler with a 'libertine sort of life' at this period.

35 Sir Samuel Walder was also vice president of the United Australia Party 1933-1939 and a member of the NSW Legislative Council from 1932 to 1943; Edwards (1972, p 2).

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After the war he travelled for over a year in Europe and the Americas and then took an economics degree at the University of Sydney.³⁶ At this time he was regarded as 'small, dapper....garrulous, a...gadabout from a wealthy family' and known as a heavy gambler at the racetrack.³⁷

Parliament

McMahon was elected member for Lowe in 1949.³⁸ As a candidate he advocated splitting the Commonwealth Bank into separate trading, saving and central banks and believed tariffs should only be provided to infant industries³⁹.

In his first speech McMahon, starting as was to go on, made almost no personal reflections but quoted masses of statistics. He cited approvingly two liberal economists, Keynes and Beveridge, but no conservative ones.⁴⁰ Much less liberal was his attitude towards academic freedom: in parliament he attacked Heinz Arndt's appointment as a professor of economics on the grounds that he was a Fabian and a supporter of bank nationalisation.⁴¹

McMahon was promoted to the ministry in 1951, a very rapid rise. In an unexpected move, he was appointed minister for primary industries in 1956 despite his city background.⁴² When Holt was promoted to treasurer, McMahon moved up to the labour and national service portfolio, but (unrealistically) thought he should have been given treasury.⁴³ He had a parliamentary reputation as an 'attack dog' in debates. He defeated Hasluck for the deputy leadership when Holt succeeded Menzies as leader.

36 He completed the four-year course in two years, including three politics subjects, and winning the Frank Albert Prize.

37 Golding (1996, p 180), See also Waterford (1982, pp 2 and 148) and Whittington (1968, p 7).

38 His preselection was almost by accident. He attended to speak on behalf of another candidate but made such a good impression he was asked to stand despite not being a party member; excerpt from unpublished autobiography; NLA MS 8725, box 97, folder 130/20.

39 Excerpt from unpublished autobiography.

40 *Hansard*, March 1950.

41 *Hansard*, 11 October 1950, p 591. At this time, support for bank nationalisation was not even an extreme position. It was a key issue at the election the year before when Labor had won 49 per cent of the two-party preferred vote advocating it.

42 McMahon commented at the time 'I have two pot plants on my front balcony and I know a little bit about it', cited by Ian Robinson, *Hansard*, 12 April 1988, p 1410.

43 Rodan (1977, p 52), based on interviews with Liberal MPs. McMahon was a member of cabinet's economic committee.

In 1965 he married socialite Sonia Hopkins and they were to have a son and two daughters.⁴⁴

Treasurer

Holt appointed McMahon as treasurer, the first with a university degree in economics. It was 'the role for which he had so assiduously prepared himself'⁴⁵. Being deputy leader strengthened his claim on the job⁴⁶ and few on the front bench of the Liberal Party were interested in economic policy.⁴⁷

He was not blind to the challenges of the post; commenting that the treasurer's 'role traditionally is supposed to be that of a watchdog against optimists, a man whose leading joy in life is to deflate enthusiasm and cut idealists down to size'.⁴⁸

The generally free trader McMahon had many fights in cabinet with the protectionist Country Party leader McEwen. McMahon generally believed governments should not try to preserve inefficient industries. But he also once claimed 'ours is a protectionist government which will always see to it that manufacturing gets a fair go – even perhaps more than a fair go'.⁴⁹

McMahon 'consulted widely and acted indecisively; he fussed about policy options and deferred hard decisions'.⁵⁰ McMahon used to include a lot of statistics in his speeches to give the impression of mastery of detail, with his staff correcting the figures when the draft Hansard appeared.⁵¹

McMahon and Treasury

McMahon (1972) said he had 'very deep liking and respect' for Treasury. The Department would have been pleased when McMahon made the Government's

44 Mitchell (2007, p 192) claims McMahon relied on his wife for political advice as 'he never felt he could trust anyone else'. Sonia claimed 'I changed the budget once. I didn't think there was enough in there for mothers and families and I convinced him to give them more money'; Mitchell (2007, p 25). Their son Julian is now a Hollywood star, best known as Dr Doom in the *Fantastic Four* films, and was briefly married to Dannii Minogue. While elder daughter Melinda (born while McMahon was treasurer) occasionally appears in the press as a socialite, she and younger sister Debbie (born while McMahon was prime minister) generally have a low profile.

45 Sekules (2000, p 319). Oakes & Solomon (1973, pp 73-75) paint a similar picture.

46 The other name mentioned was Alan Hulme; Frame (2005, p 141). McMahon also had the backing of the Packer press and some NSW business leaders.

47 Walsh (1971, p 4).

48 *Hansard*, 9 March 1966, pp 89-90.

49 *Hansard*, 9 March 1966, p 93.

50 Schedvin (1992, p 429).

51 Alex Millmow, *The Age*, 16 June 2009; Mitchell (2007, pp 39, 44).

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response to the Vernon Report, and rejected the idea of an Advisory Council on Economic Growth as Treasury already has 'men of ability, knowledge, qualifications and experience of an order most unlikely to be surpassed by anybody of persons within Australia'.⁵² McMahon called the report's conclusions unacceptable and stated the Government had no intention of setting economic growth targets. Furthermore, he said the Committee was 'over cautious in its views on the future possibilities of this country'.⁵³

McMahon's respect for Treasury was apparently not always reciprocated. The Treasury secretary, Sir Roland Wilson, often regarded as the outstanding public servant of his generation and one of the greatest economists to serve there, resigned in part because he could not abide McMahon.⁵⁴

McMahon 'fought relentlessly to maintain Treasury's influence, prestige and power'.⁵⁵ Gorton, however, had a dislike of Treasury which he regarded as 'conservatively sterile' and 'obstructive and slow moving', and which intervened to prevent worthwhile initiatives in areas such as education. Gorton's permanent head, Lenox Hewitt, was a disgruntled former Treasury officer.⁵⁶ As a result Gorton insisted that he and Hewitt were closely involved in preparation of budgets.⁵⁷

Views differ about McMahon's willingness to dispute and reject Treasury advice.⁵⁸ He talked to as many as a hundred Treasury officials in the course of preparing the budget.⁵⁹

McMahon spent a lot of time talking to business leaders by phone, so was not reliant on Treasury's advice in assessing the state of the economy. He travelled overseas extensively to gain insights into the global economy. He later described Treasury as 'not conversant with the lines of ordinary people or what's happening in the business world'.⁶⁰

52 *Hansard*, 9 March 1966, p 95.

53 *Hansard*, 9 March 1966, p 89.

54 Cornish (2007, p 314).

55 Reid (1971, p 126).

56 Reid (1971, pp 119, 123).

57 McMahon was somewhat exasperated by Gorton's involvement, complaining to a colleague that Gorton does not understand 'the elementary facts of Keynesian economics'; Peter Howson's dairy entry, 21 July 1968, in Howson (1984, p 441).

58 McEwen and Jackson (1983, p 79) describe him as 'always been very willing to accept the guidance of his treasury advisers', while Frame (2005, p 161) suggests he would dispute it.

59 *Canberra Times*, 11 March 1971, p 2.

60 Interview cited in *Canberra Times*, 10 April 1988, p 4. In McMahon (1973, p 21) he said 'it was a constant struggle to prevail upon the Treasury to discuss problems with industry'.

McMahon's budgets and macroeconomic policy

As treasurer McMahon delivered four budgets. Despite inheriting what he regarded as a 'fully employed economy', McMahon characterised the 1966 budget as 'expansionary'.⁶¹ There had been a drought-related slowdown in 1965-66, with real GDP growing by 2½ per cent rather than the over 6 per cent experienced in the three preceding years. In his budget speech McMahon emphasised increased spending on defence and age pensions.

When the sterling devalued by 14 per cent in November 1967, the cabinet agreed to McMahon's submission that the Australian dollar should only partly follow it.⁶² The decision was taken while Country Party leader McEwen was out of the country, but Holt supported McMahon when McEwen tried to have the decision reversed upon his return.

In his 1967 budget, which he dubbed a businessman's budget,⁶³ McMahon warned that growth in government spending could be crowding out the private sector and so the Government would 'draw the reins'.⁶⁴ But the reigning back was a modest one, from growth in outlays of 12 per cent to growth of 10 per cent.

The 1968 budget was damned by some as inflationary and by others as deflationary, and was regarded as reflecting Gorton's priorities.⁶⁵ There were increases in company tax and sales tax, largely offset by significant increases in social security payments. Indeed, with a 'generally buoyant economy'⁶⁶, McMahon opened his 1968 budget speech by emphasising social welfare payments, which had been reviewed by a cabinet committee and ended by referring to giving the 'aged and infirm, sick and handicapped...an honoured place'.⁶⁷ The budget also featured the introduction of 'drought bonds' which farmers could purchase with a tax deduction and redeem during droughts.

The 1969 budget was more expansionary than its predecessor notwithstanding warnings from Treasury of 'developing hypertension'.⁶⁸ Treasury had suggested increases in sales tax but the idea was rejected by Gorton due to the approaching

61 *Hansard*, 16 August 1966, pp 12-13.

62 The Reserve Bank opposed devaluation from concern about its inflationary consequences: Cornish (2010, p 58).

63 *Sydney Morning Herald*, 21 August 1967.

64 *Hansard*, 15 August 1967, p 8. Treasury had made this point in its 1967 survey; cited by Whitwell (1986, p 155).

65 Hancock (2002, pp 192-3). McMahon would have preferred a more cautious, less expansionary budget; Aitchison (1971, p 140).

66 *Hansard*, 15 August 1967, p 36.

67 *Hansard*, 15 August 1967, p 35.

68 Hancock (2002, p 229).

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election.⁶⁹ Max Walsh said this 'permissive' budget 'ushered in the era of cost inflation'.⁷⁰ Even more so than in 1968, the budget was regarded as largely reflecting Gorton's priorities.⁷¹

Around this time the Reserve Bank relied on requesting banks to rein in their lending. McMahon felt the Reserve Bank was too gentle and offered to speak to the banks himself.⁷² He also supported an increase in bank interest rates in July 1969 and rises in the SRD ratio. Real interest rates were at post-war highs.

For McMahon 'growth and development...are magic words' and the 'remarkable series of mineral discoveries during the 1960s raised the horizons of Australian growth'.⁷³

Other policies

While McMahon was away, Gorton as acting treasurer prevented a foreign takeover of insurance company MLC. Unlike McMahon, Gorton was sceptical about Australia's reliance on foreign capital and thought Treasury was too sympathetic to it.⁷⁴ This purportedly led to a long and heated argument between McMahon and Gorton.⁷⁵ Concerns the decision would unduly deter foreign investment, however, proved unfounded.

McMahon produced a plan for a consortium of banks to form the Australian Resources Development Bank, an alternative to the government owned Australian Industry Development Corporation which McEwen proposed to encourage Australian ownership of large projects. In 1967 the Holt Government rejected McEwen's idea but in 1968 the Gorton Government adopted it.

69 Whitwell (1986, p 186).

70 Walsh (1971, p 4).

71 Reid (1971, pp 119, 296).

72 Schedvin (1992, p 445).

73 McMahon (1969, p 2).

74 As Gorton put it, 'until very recently it has seemed to me that the posture of Australia in seeking overseas capital has been the posture of a puppy lying on its back with all legs in the air and its stomach exposed saying please, please, please give us capital. Oh, tickle my tummy. On any conditions'. Reid (1971, p 119).

75 The argument lasted two hours according to Reid (1971, p 126). McMahon (1969, p 4) believed 'foreign investment supplemented our own savings and permits us to undertake [extra] development'.

Prime minister

When Holt disappeared in December 1967, McMahon aspired to the top job⁷⁶ but Country Party leader McEwen threatened to take his party out of the coalition and the Liberals instead chose Gorton. McMahon unsuccessfully challenged Gorton for the leadership after the October 1969 election, but was re-elected deputy leader. Gorton then shifted McMahon from treasurer to minister for external affairs (soon renamed foreign affairs).⁷⁷

By March 1971, undermining by McMahon and others led Gorton to seek a vote of confidence in his leadership. After a tied vote led Gorton to fall on his sword, McMahon was chosen as leader.⁷⁸ McMahon initially considered being both prime minister and treasurer (as Fisher and Chifley had been) but felt 'it is a pretty difficult if not impossible task'.⁷⁹ He initially left Leslie Bury in the post but shortly after replaced him with Billy Snedden.

While McMahon improved relations with the states, overall 'an air of disorganisation at times verging on panic permeated the new government'.⁸⁰ By 1972 unemployment was at a ten-year high and inflation at a twenty-year high, particularly bad news for a prime minister whose strong suit was economics. The McMahon Government fell at the December 1972 election.

Subsequent career

In the tradition of earlier leaders such as Hughes and Scullin, McMahon stayed in parliament for many years after being prime minister. He initially stayed on the frontbench but was dropped after the 1974 election. Unlike Hughes he was never again

76 According to Warrender (1973, p 169) McMahon even rang Bolte in the afternoon of Holt's disappearance seeking support for the job, although McMahon denied this; Ramsey (1968, p 7). There are claims that McMahon was planning to challenge Holt before his death. Holt's housekeeper, Mary Lawless, recalled an agitated conversation Holt had with McMahon the morning of his death; Butt (2008). McMahon denied this, but it is hard to see any reason for the housekeeper to lie. McMahon's lobbying for a leadership vote before the memorial service, 'only seemed to confirm his opponents in their opinion of him as a man without decency'; 't Hart (2006, p 16). After his victory Gorton agreed with McEwen that they would never be out of Australia at the same time to avoid McMahon being acting prime minister; Davey (2011, p 123).

77 According to Reid (1971, p 78) Gorton had been planning to shift McMahon at least as early as March 1969.

78 McMahon sought the leadership while holidaying in Capri (Queensland) leading Whitlam to quip he was like 'Tiberius with a telephone'. Edwards (1972, p 2) believes the party wanted 'someone safe' after the turbulence of Gorton.

79 Press conference, 10 March 1971. McMahon acted as treasurer for a month in September/October 1971 when Snedden was overseas.

80 Sekules (2000, p 321).

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to serve as a minister and unlike Scullin he never became a respected elder statesman and adviser. Instead, he became a backbench critic of the Fraser Government, especially on economic issues, and wrote many newspaper articles.⁸¹ Some consolation was a companion of honour in 1972 and a knighthood in 1977. McMahon tried unsuccessfully to publish his memoirs.⁸² He retired from parliament in 1982 and died on 31 March 1988.

81 For example, he said 'I didn't like the [1981] budget at all' saying it should have included tax cuts; *Australian Financial Review*, 5 January 1982, p 3.

82 The memoirs, titled *A Liberal View* or *Sir William McMahon on Politics*, were rejected by six publishers. They apparently included vast slabs of budget speeches verbatim; *Sydney Morning Herald*, 5 July 1986, p 1; 3 October 1987, p11 and 11 April 1988, p 11. Barry Jones, one of the few to read them, called them 'dreadful'; *Hansard*, 12 April 1988 and Philip Adams had a similar view. Jones has subsequently lost his copy, as has Sonia McMahon; Mitchell (2007, p 47). Some drafts of the work are in the National Library but only a very small portion is publicly available. McMahon is one of the few prime ministers not to be the subject of a full-length biography.

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