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Currency intervention: the profitability of some recent international experiences

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ABSTRACT

In recent years there have been high profile foreign exchange interventions by the Swiss National Bank (SNB) and the Bank of Japan (BoJ). There can be several reasons for a central bank to intervene in the currency market, including trying to stabilise the level of the exchange rate, reduce its volatility, or to inject liquidity into the market. Although central banks do not usually intervene solely to generate profits, the profitability (or lack of it) of intervention is of interest to central banks, fiscal authorities and financial market participants. Unprofitable intervention may damage the central bank's credibility in financial markets, reduce the likelihood of future intervention and attract greater scrutiny from fiscal authorities and government.

In this note we look at the recent experiences of the SNB and the BoJ, and examine how the profitability of currency intervention is measured and the relationship between profitability and the degree of exchange rate stabilisation. In both recent cases, the central banks appear to have made losses on the foreign reserves accumulated from their intervention, but it is impossible to say how much of these losses was realised and how much unrealised. The experiences of the SNB and the BoJ, while interesting, are not particularly relevant for New Zealand at this time, given the quite different economic backdrop. In particular, the heavy Swiss intervention has taken place against the backdrop of, on the one hand, a flight to safety in Europe, and on the other hand, the zero interest rates and negative inflation prevailing in Switzerland.

INTRODUCTION¹

In recent years there have been high profile currency interventions by the Swiss National Bank (SNB) and the Bank of Japan² (BoJ). In this note, we review these interventions, with a focus on the profitability of currency intervention, along with the relationship between profitability and the degree of exchange rate stabilisation. We also highlight the ways in which these interesting international episodes are of only limited direct relevance to thinking about current New Zealand exchange rate issues.

MEASURING PROFITS FROM CURRENCY INTERVENTION

Measuring profits from foreign exchange intervention by central banks is difficult. Many central banks are not transparent about the precise details of their intervention in the foreign exchange market, and do not publish information about the size of their positions, pricing and the timing of entering and exiting trades.

¹ We would like to thank Mike Coghlan, Rebecca Craigie, Bernard Hodgetts, Michael Reddell and Jason Wong for helpful comments on earlier drafts.

² In Japan's case, the Ministry of Finance signs off on interventions but the BoJ is responsible for the execution, and carries the position on its balance sheet.

Empirical studies that try to estimate the profits from intervention have produced mixed results. An early study by Taylor (1982), which examined intervention by nine industrial countries during the 1970s, suggested central banks lost more than US\$11bn over the whole period. However, subsequent studies³, based on a longer sample period and including differentials between foreign and local currency interest rates concluded the 1970s interventions had been generally profitable.

Researchers tend to divide estimates of the profits from intervention into several components⁴:

1) Realised trading profits

Realised trading profits from currency intervention are those earned by a central bank when it closes out part or all of an open currency position. The cumulative profits or losses earned depend on the change in the exchange rate from when the currency position was opened.

2) Unrealised trading profits

Unrealised trading profits from currency intervention represent the profits or losses calculated by marking to market open foreign currency positions. These cumulative gains or losses are based on the difference between the current exchange rate and the rate at which the currency position was opened.

3) Net interest earnings

In addition to realised and unrealised capital gains or losses on central banks' foreign currency positions, some researchers also include the net interest income earned by switching between domestic and foreign currency assets. In this case, even if a central bank is generating capital losses (for example, if the bank buys foreign currency assets when the exchange rate is rising), the net interest earned on its foreign currency position could still contribute positively to its profitability.

In New Zealand, intervention by the Reserve Bank of New Zealand (RBNZ) at the top of an exchange rate cycle (sell NZD, buy USD reserves) would tend to have negative net interest returns, as the interest rates on foreign currency assets (such as US Treasuries) are likely to be lower than on New Zealand dollar-denominated assets (such as NZ government bonds).

PROFITABILITY AND EXCHANGE RATE STABILISATION

As noted above, one possible motivation for currency intervention is to stabilise the exchange rate. The nature of the relationship between the profitability and degree of currency stabilisation caused by foreign exchange intervention has been widely discussed and debated in the literature. The basic problem in determining the nature of the relationship between profitability

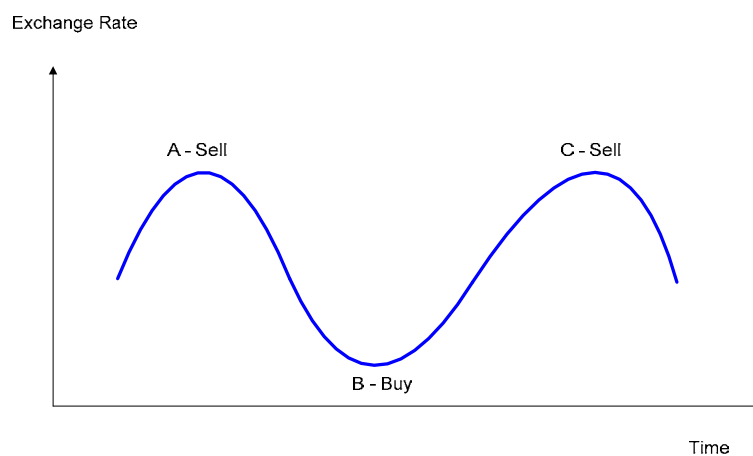
³ See, for example, Argy, V. (1982) and Jacobson, L. (1983)

⁴ See, for example, Becker, C. and Sinclair, M. (2004)

and stabilisation is that the counterfactual of what the exchange rate would do if no intervention occurred is unknown.

An early contribution to the debate was Friedman's 'Profits Test'⁵, which assumed central banks that were trying to minimise fluctuations in the exchange rate behaved like speculators when intervening. As a result, they tend to buy local currency / sell foreign currency when the exchange rate is low, to support the local currency, and sell local currency / buy foreign when the exchange rate is high to depreciate the local currency. The combination of 'buying low and selling high' implies that if the central bank succeeded in stabilising the exchange rate, then its operations would be profitable (Figure 1).

Figure 1
Profitable and stabilizing currency intervention



However, Friedman's link between currency stabilisation and the profitability of intervention does not always hold. Other studies have examined alternative scenarios where the relationship between profitability and stabilisation differs.⁶

I. Stabilising but not profitable intervention

In some circumstances, intervention may succeed in stabilising the exchange rate, but not be profitable for the central bank. An example of this is if the exchange rate is on a consistent upward or downward trend (Figure 2). The central bank may be able to reduce the volatility of the exchange rate around the trend (buying at point A and selling at point B), but the intervention would not be profitable because the central bank would be selling at a loss.

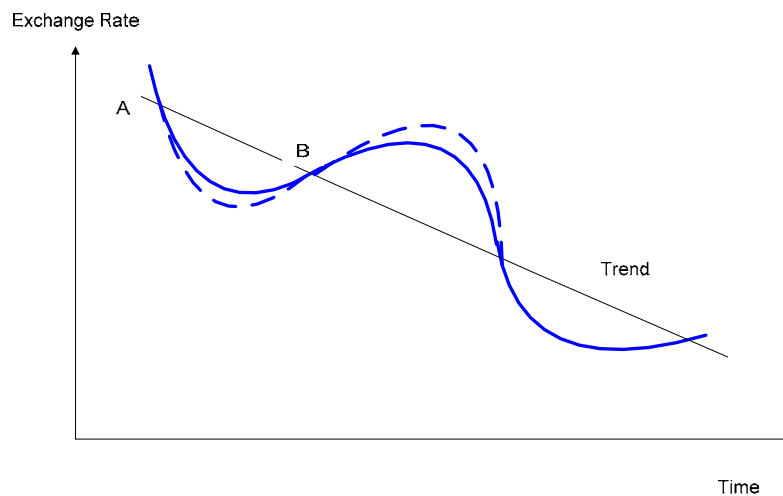
Even if the exchange rate does not have a trend, foreign exchange intervention that successfully stabilises the currency may still be unprofitable, at least in the short term. Central banks can rarely pick turning points in the exchange rate accurately. If the currency is depreciating, the central bank may start buying currency before the low point, generating losses until it passes its low point and then starts to appreciate. As a result, central banks often judge the success of their intervention in terms of stabilisation and profitability over an extended period, such as a full economic cycle, rather than immediately after the intervention occurs. This is consistent with the RBNZ's view on currency intervention, which states "this buy low /

⁵ See Friedman, M (1953)

⁶ See Andrew, R and Broadbent, J. (1994)

sell high strategy is profitable over the medium-term as long as the exchange rate continues to show a cyclical pattern, and the Bank is not forced to exit its position prematurely".⁷

Figure 2
Stabilising, but not profitable intervention



II. Profitable but not stabilising currency intervention

Alternatively, currency intervention may be profitable for the central bank but not necessarily successful in stabilising the exchange rate. For example, if the market knows that a central bank is intervening, speculators may adjust their behaviour. This may increase the amplitude of exchange rate cycles compared to the path that would have occurred without intervention. However, if the central bank bought local currency near the cyclical low and sells near the peaks, its intervention will be profitable. It is also possible that the currency intervention could be profitable but have little or no impact on the currency. In this case, the central bank may make profits from its currency trading purely as a result of the time horizon considered for calculating the profitability, its analytical skill or simply due to luck.

LOSSES ON INTERVENTION AND CENTRAL BANK CAPITAL

If the authorities choose to intervene in the foreign exchange market, it raises the question of how much capital the bank needs to absorb potential losses. If losses on intervention are large, they could potentially wipe out the bank's capital. There is significant debate about the appropriate level of capital that a central bank should hold. In principle, a central bank can operate even with negative capital, since most of its liabilities are denominated in its own currency, and liabilities such as currency in circulation do not mature and pay no interest. Several central banks, including the Central Bank of Chile, and the Czech National Bank, have operated with negative capital for extended periods.⁸ Most cases of

⁷ See Foreign Exchange Intervention Options,

<http://www.rbnz.govt.nz/finmarkets/foreignreserves/intervention/index.html>

⁸ See, for example, Horakova, M. (2011) and Frait, J. (2006)

negative central bank capital have occurred as a result of losses on foreign reserves accumulated during currency intervention to manage large capital inflows.

Despite these specific exceptions, most central banks prefer to maintain a positive capital buffer against losses. It is usually argued that this preference is because positive capital helps the central bank maintain credibility. For example, the impact of central banks' balance sheet structure on monetary policy has been examined by some recent studies.⁹ It may also protect a central bank's independence, as it avoids having to seek a recapitalisation from the government. In New Zealand, the Reserve Bank takes into account the level of risk on its currency market exposure in estimating its own capital requirements. In addition, for currency market intervention directed by the Minister of Finance, the Reserve Bank of New Zealand Act 1989 states that any gains or losses are carried by the Crown.¹⁰

RECENT INTERVENTION EXPERIENCES

As mentioned earlier, we can not definitively say whether a specific intervention by a central bank has generated profits or losses. Central banks do not usually provide enough details in their financial statements to determine if the profits or losses from intervention are realised or unrealised. However, we can look at the central banks' financial statements and examine changes in the value of their foreign-currency assets. Recent interventions that we look at are so substantial in size that these interventions are likely to dwarf day-to-day business effects on the central bank's balance sheets.

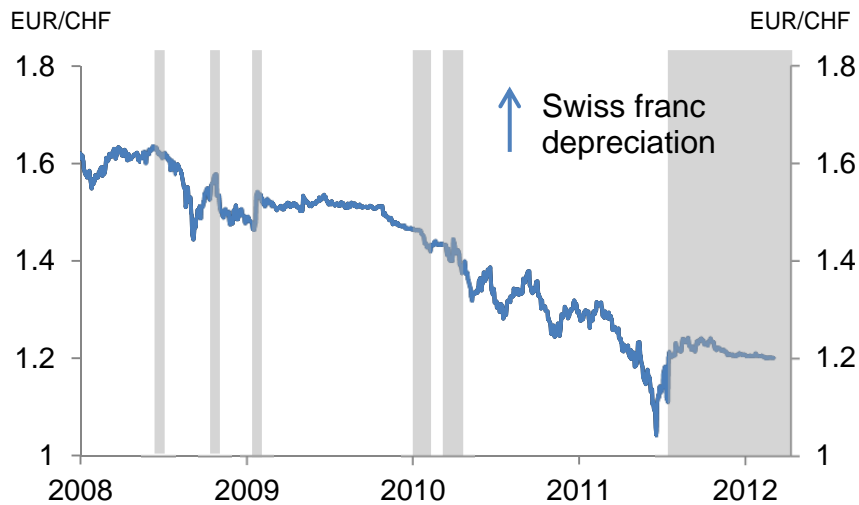
Foreign exchange interventions since 2008 have largely resulted in financial losses for the SNB and the BoJ. Both central banks stepped up their intervention programmes in an attempt to counter 'safe-haven' demand that saw their respective currencies appreciate significantly against the euro and US dollar. Since 2008, the Swiss franc has appreciated 27 percent against the euro (and 15 percent against the US dollar). Since 2008, the Japanese yen has appreciated 29 percent against the US dollar (and 39 percent against the euro).

⁹ See, for example, Adler, G. et al (2012)

¹⁰ Sections 17 and 18 of the Act cover currency intervention directed by the Minister. Section 21 covers the treatment of gains and losses of this form of intervention.

Figure 3

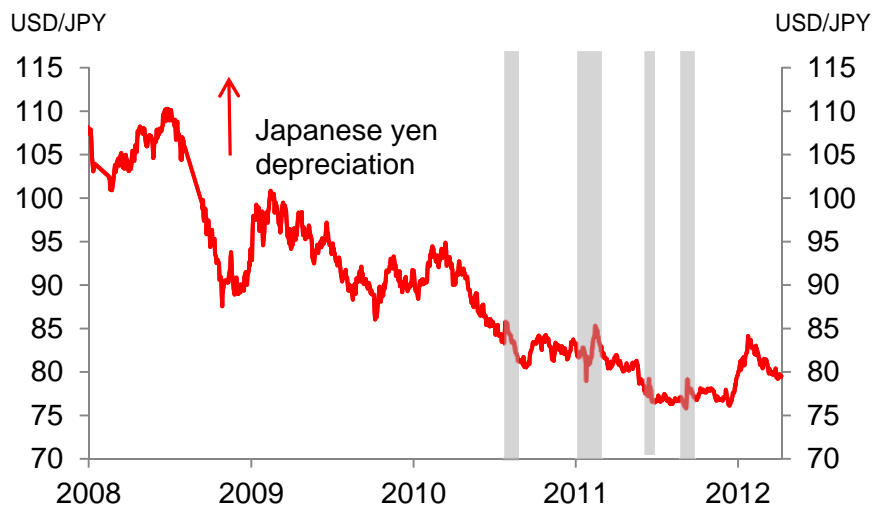
Swiss franc and known intervention zones (grey bars)



Source: Bloomberg, Swiss National Bank

Figure 4

Japanese yen and known intervention zones (grey bars)



Source: Bloomberg, Bank of Japan

Economic reasons for intervention

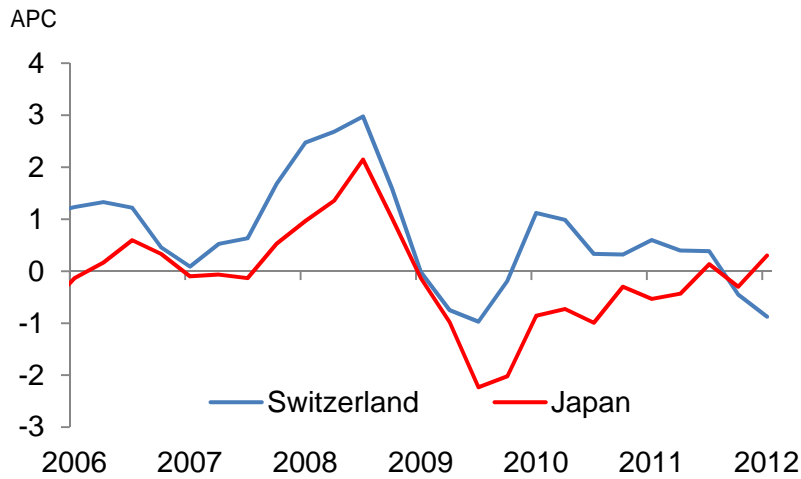
The economic reasons for foreign exchange intervention by both the SNB and the BoJ are similar. Both banks have been concerned about deflation and the effects of the high exchange rate on their economically important export sectors. Both central banks viewed the appreciation of their currencies as unjustified, particularly given the weak domestic economic fundamentals in each country. In both countries, interest rate settings have been at or near zero for some time, yet the easy policy settings have not prevented currency appreciation.

CPI inflation in Switzerland has been trending lower since the start of the Global Financial

Crisis (GFC) in 2008. Japan has had also persistent deflation since start of the GFC, although the rate of deflation has moderated over the past year.

Figure 5

CPI inflation for Switzerland and Japan

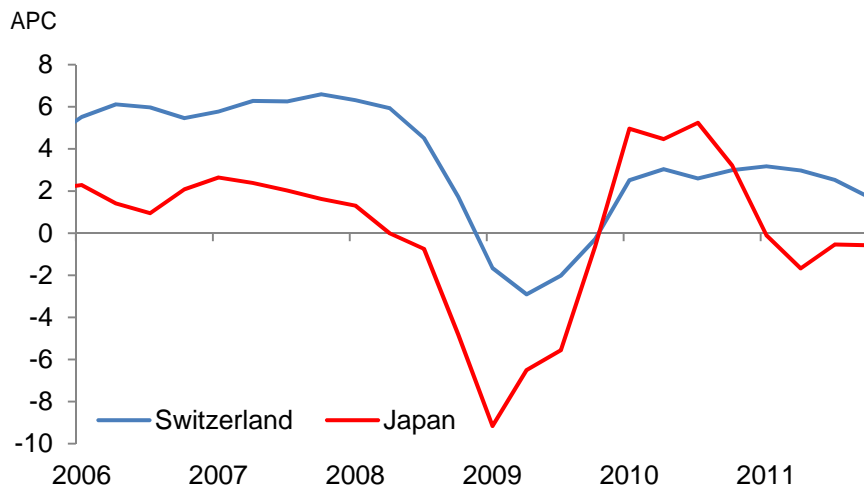


Source: Haver

Along with deflation concerns, there were concerns of a recession in Switzerland in 2011, with sectors exposed to the appreciating currency (such as manufacturing, retail, and tourism) showing weakening growth. The latest SNB economic forecasts show that a recession is expected to be avoided but deflation risks are likely to persist. This prompted the SNB to reiterate its target for the EUR/CHF at 1.20, known as the 'floor', which was introduced in September 2011. In 2011, the Japanese economy entered a recession. This, along with persisting deflation concerns, prompted officials to significantly increase the currency intervention programme to help facilitate rebuilding after the March 2011 earthquake and stimulate export growth.

Figure 6

GDP growth for Switzerland and Japan



Source: Haver

Financial market reasons for intervention

Financial market conditions may have also prompted the SNB and the BoJ intervene to lower the value of their currencies. The onset of the Global Financial Crisis and the euro area debt crisis meant that market liquidity could be sparse, leading to distorted market pricing, particularly given the one-way 'safe-haven' flows into the Swiss franc and Japanese yen. With so many market participants wanting to buy Swiss francs and Japanese yen, the central banks may have decided to step into the market to provide liquidity.

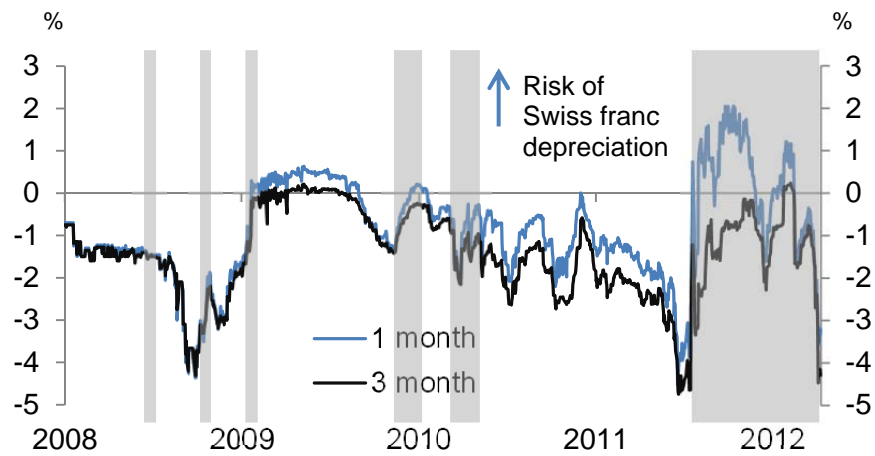
To highlight the balance of market sentiment towards the expected direction of exchange rate moves, we can look at risk reversals. A risk reversal is an option strategy combining the purchase of a call and a put option with the same expiry date, and which are "out-of-the-money" to an equivalent degree. Risk reversals indicate how options prices are skewed towards the risk of appreciation or depreciation. For example, if traders are more concerned about an exchange rate depreciating than appreciating, then they are willing to pay more to buy options that protect them from the risk of depreciation than they will pay to protect against the risk of appreciation. Intuitively, this can be thought of as a form of insurance and paying premiums to protect against different risks.

Generally, prior to the central banks' currency interventions, the market was positioned for the Swiss franc and Japanese yen to appreciate further against the euro and US dollar respectively. This skew typically unwinds immediately after an intervention. However, the impact appears to be short-lived, with the current EUR/CHF floor being an exception, and pricing reverting to the prevailing trend. The trend for the USD/JPY shows diminishing risk of appreciation over time throughout the currency intervention periods.

The implementation of the EUR/CHF floor saw 1-month option pricing change from extreme skewness of CHF appreciation to depreciation. Pricing remained far from levels of extreme appreciation until recently.

Figure 7

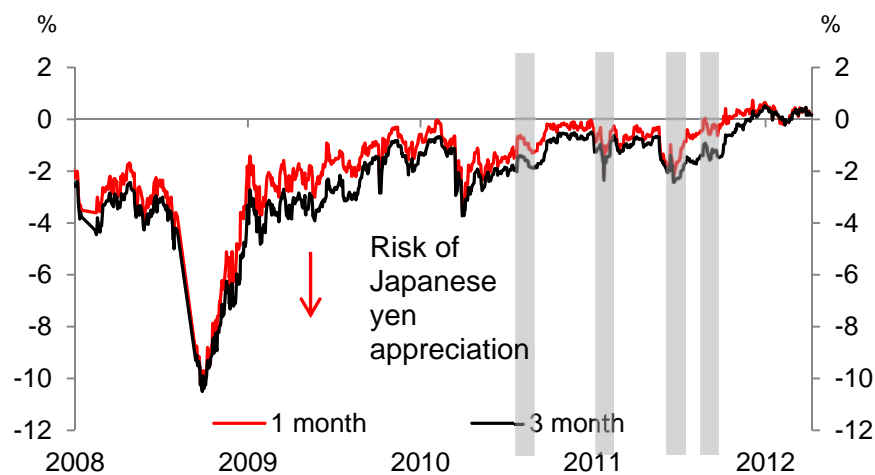
EUR/CHF risk reversals



Source: Bloomberg, Swiss National Bank

Figure 8

USD/JPY risk reversals

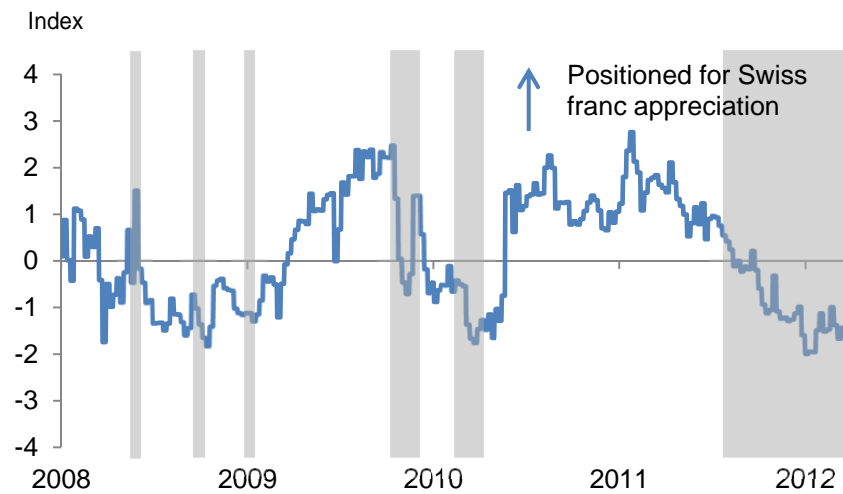


Source: Bloomberg, Bank of Japan

We can also examine the positioning of speculative investors in the futures market ahead of the central bank intervention. Consistent with the movement in risk reversals, speculative investors were positioned for further Swiss franc and Japanese yen appreciation prior to the interventions. The degree of 'success' in changing speculators' positions is difficult to gauge, but investors did pull back their net-long positions immediately following an intervention. However, with the exception of the current EUR/CHF floor, this impact was short-lived.

Figure 9

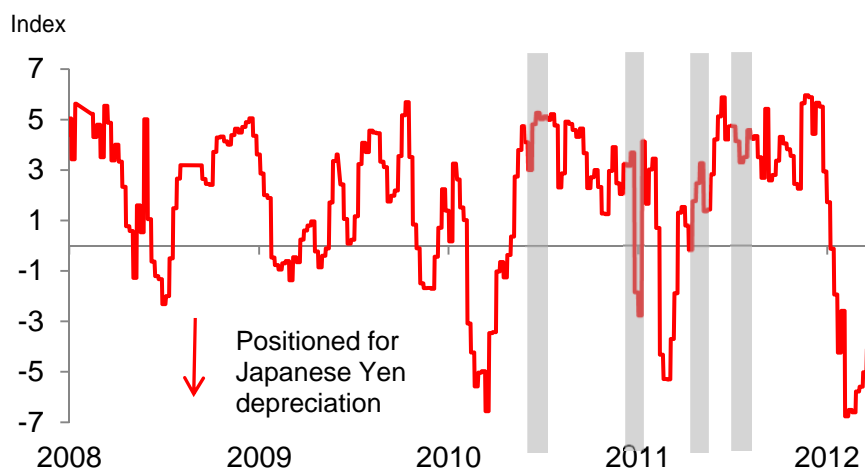
Net-long speculative positions for Swiss franc appreciation



Source: Bloomberg, Swiss National Bank

Figure 10

Net-long speculative positions for Japanese yen appreciation



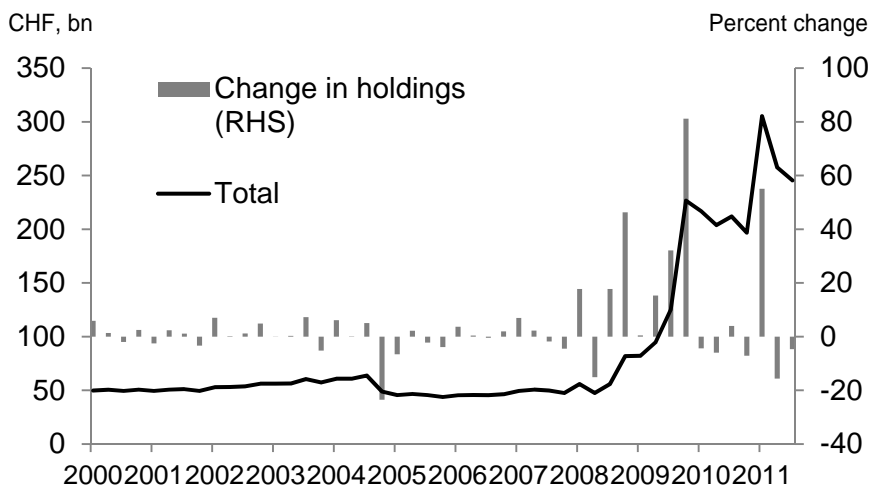
Source: Bloomberg, Bank of Japan

Swiss National Bank profit/loss

According to SNB data, since 2008 SNB's foreign currency investment holdings have increased around 400 percent, from CHF50bn to CHF250bn. Its balance sheet, as a percentage of nominal GDP, has more-than doubled from a historical average of around 25 percent to 60 percent. As mentioned earlier, foreign currency holdings include day-to-day business for central banks. However, the interventions since 2008 are so substantial in nature that the majority of these changes likely reflect currency intervention.

Figure 11

Swiss National Bank foreign currency holdings



Source: Bloomberg, Swiss National Bank

According to SNB financial statements, since 2008 the SNB has lost over CHF20bn due to currency investments. The 2010 intervention, which was quickly abandoned, led to a record loss of CHF27bn. Accumulated (realised and unrealised) losses since 2008 have been mitigated by a small gain of CHF2bn in 2009 and a gain of CHF7.7bn in 2011. These gains are mostly attributable to favourable interest rate differentials, where Swiss interest rates have been lower than the US and euro area.

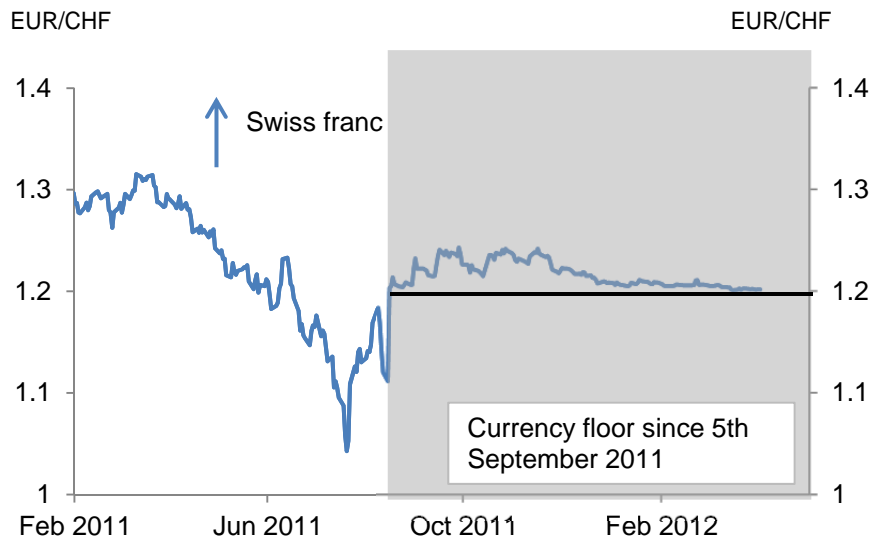
Since the currency floor of 1.20 was introduced for the EUR/CHF, it has not been breached¹¹. However, in 2012Q1 the SNB lost CHF2.6bn due to currency investments, with the Swiss franc appreciating against the Japanese yen and the US dollar. It should be noted that this cost is due to the SNB adjusting the composition of its foreign reserves rather than purely the result of intervening in the EUR/CHF market. Maintaining the floor also came at a cost. These losses were partially mitigated by gains on the interest rate differential.

The SNB has been able to maintain the currency floor despite reducing its foreign currency investments in recent months. This suggests that there was less pressure on the target.

¹¹ Strictly speaking, the EUR/CHF dipped below 1.20 briefly on two occasions in April 2012. However this was due to practical issues rather than investors breaking through the floor.

Figure 12

Swiss National Bank foreign currency holdings



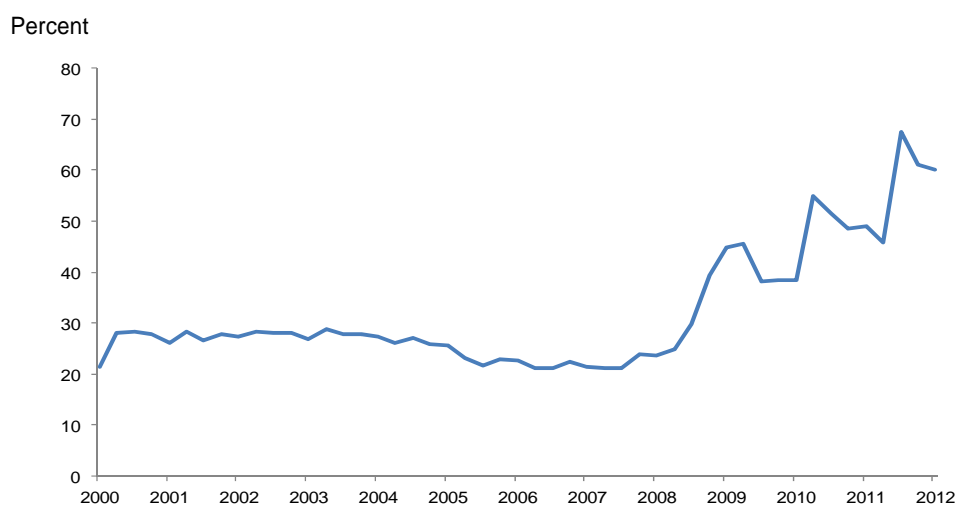
Source: Bloomberg, Swiss National Bank

Given the build-up of foreign currency assets on the SNB balance sheet from significant levels of intervention, there is a risk that these unrealised positions could have significant implications for its financial position, especially if the currency breaks through the floor.

The SNB is different to most central banks in that it has a number of public sector and private sector shareholders, rather than just central government. Among its shareholders, Swiss states (cantons) rely on the SNB making a profit and paying out a dividend.¹²

Figure 13

Swiss National Bank balance sheet relative to nominal GDP



Source: Bloomberg, Swiss National Bank

¹² Around 37% of the SNB's shares are owned by private shareholders, and the remaining 63% are owned by the public sector, mostly by the cantons and a smaller amount held by other public authorities.

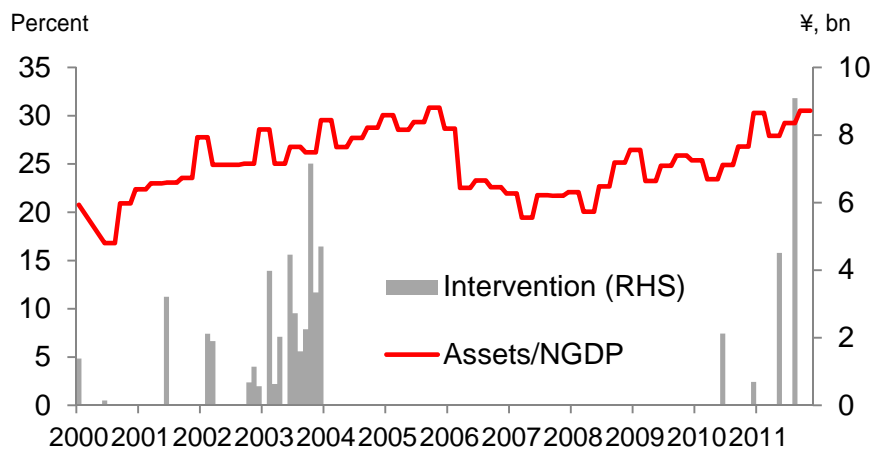
Bank of Japan profit/loss

The Bank of Japan and the Japanese Ministry of Finance began currency intervention in 2010 after a hiatus of 6 years, according to official data. In 2010 the BoJ spent ¥2.7tn (USD35bn) on currency intervention and in the 2010 financial year lost ¥481bn (USD6.2bn) because of currency fluctuations. The 2010 interventions are dwarfed by the larger 2011 interventions, with around ¥13.5tn (USD175bn) spent over the year. We do not know the exact financial cost of these interventions to date, but the BoJ's half year results for the 2011 fiscal year show a loss of ¥390bn on foreign exchange. The BoJ will release its annual report for the full 2011 financial year in August 2012.

The current size of BoJ's balance sheet suggests that much of the foreign currency assets accumulated from the interventions are still on the Bank's books so the profit/loss is unrealised. As with the SNB, there is a risk that these unrealised foreign exchange positions could have a significant impact on the BoJ's balance sheet.

Figure 14

Bank of Japan balance sheet relative to nominal GDP versus official intervention



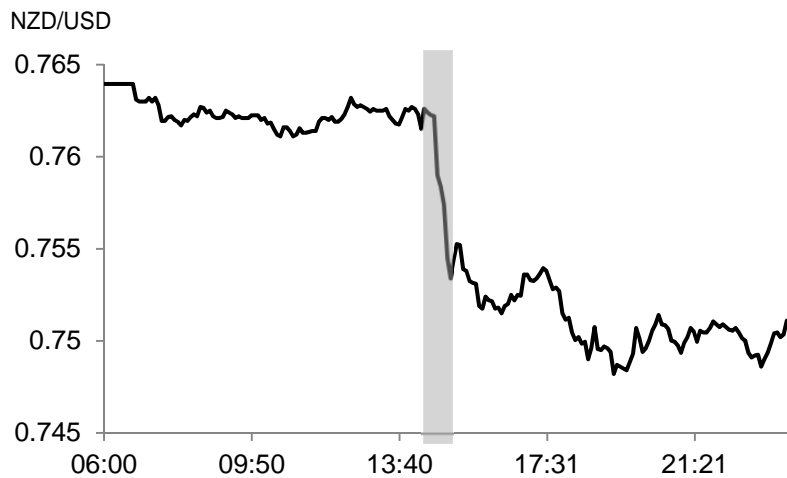
Source: Bloomberg, Bank of Japan

COMPARISON WITH NEW ZEALAND

Unlike other central banks, the Reserve Bank of New Zealand has made very limited use of openly announced intervention since the New Zealand dollar was floated in March 1985. On 11 June 2007, the Bank announced its only openly publicised intervention, when it issued a press release saying it had intervened as it regarded the value of the currency as “*exceptional and unjustified in terms of the economic fundamentals*”. The NZ dollar was trading at around 0.76 against the US dollar (a post-float high at the time), and fell by around 1 cent after the announcement.

Figure 15

Intervention announcement effect



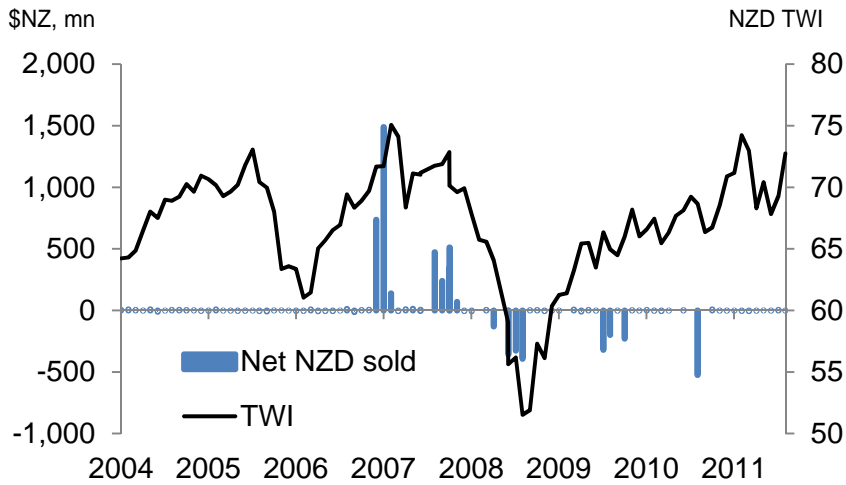
Source: Reuters, Reserve Bank of New Zealand

At other times, the Bank has intervened less openly by buying or selling NZ dollars to adjust the size of its open foreign exchange position around its benchmark level¹³. The Bank aims to increase its open position (sell NZ dollars / buy additional foreign reserves) when it judges the dollar is near a peak in the exchange rate cycle and return to its benchmark position when the exchange rate is near its historical averages. Conversely, the bank also aims decrease its open positions when it judges the dollar is a trough in the exchange rate cycle and return to its benchmark position when the exchange rate is near its historical averages. These adjustments to the Bank's foreign exchange position have not been accompanied by open announcements of intervention, although market traders closely monitor monthly statistics on the RBNZ's net currency purchases for signals to the Bank's activity in the market, which are published with a one month lag. For example, during June-August 2007, a net \$2.4bn in reserves was purchased, with another \$1.6bn added in early 2008. Some of this position was reduced as the exchange rate fell during the GFC, resulting in realised profits for the Bank. In 2008 and 2009 the RBNZ made \$344mn and \$481mn respectively from foreign exchange changes. Since then, the appreciation in the currency has resulted in mark-to-market losses on the open position. In 2010 and 2011 the RBNZ's mark-to-market losses were \$270mn and \$144mn respectively from foreign exchange changes.

¹³ See Eckhold and Hunt (2005) for detail on the Bank's foreign currency intervention policy and Eckhold (2010) for detail on the Bank's open foreign currency management regime.

Figure 16

Intervention and the NZD TWI



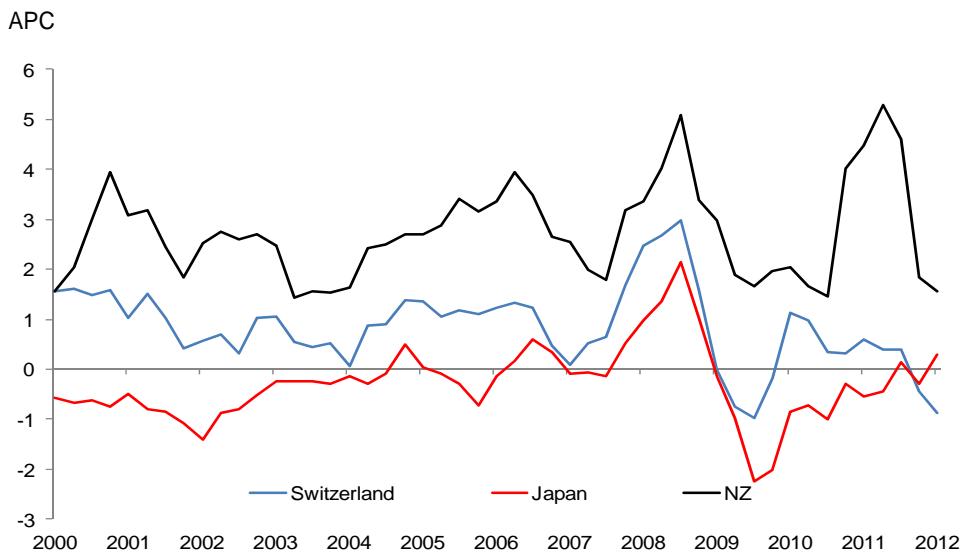
Source: Bloomberg, Reserve Bank of New Zealand

Economic comparisons

Although the Reserve Bank has had to address an appreciating currency like central banks in Japan and Switzerland, the New Zealand economic environment is quite different from conditions in those countries. Japan and Switzerland have both experienced deflation recently, at least partly due to the strong currency appreciation. In contrast, while the NZ dollar has appreciated, headline CPI inflation has held up, as low tradables inflation has been more than offset by persistent inflation in the non-tradables sector.

Figure 17

CPI inflation

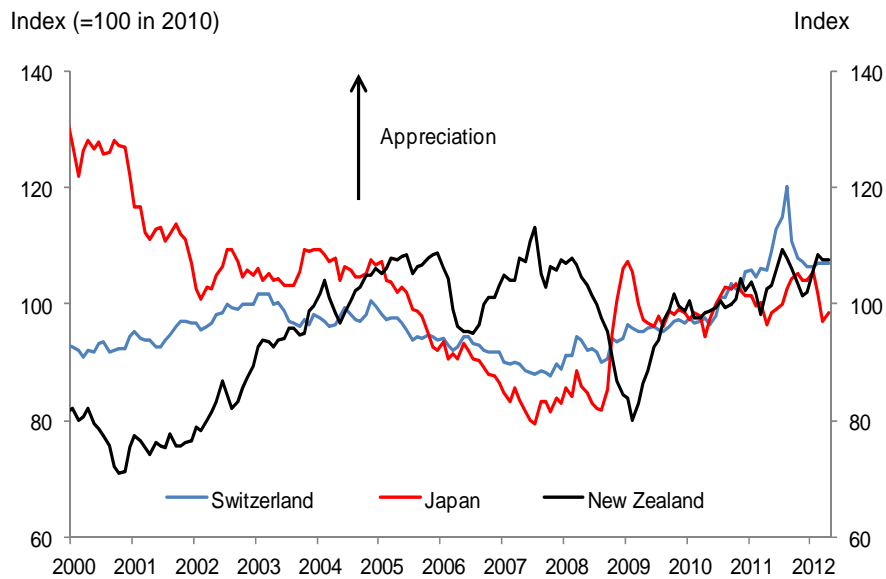


Source: Haver

The real effective exchange rates for the three countries have generally appreciated since 2009 (figure 18). However, New Zealand experienced an increase in its terms of trade during this period (figure 19), contributing to the upward pressure on the exchange rate. In contrast, Switzerland's terms of trade remained stable, while Japan's terms of trade declined, suggesting the Swiss and Japanese currency appreciations were less underpinned by fundamental factors, compared to New Zealand.

Figure 18

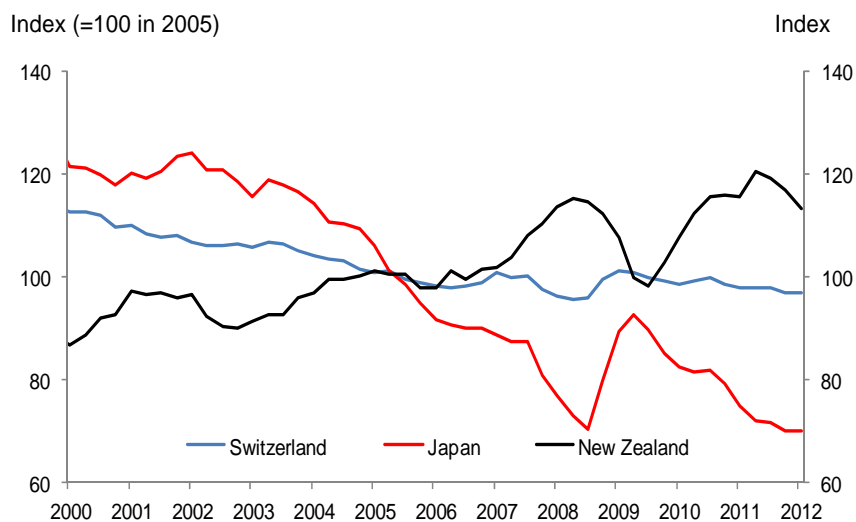
Real effective exchange rate



Source: Bank for International Settlements

Figure 19

Terms of Trade

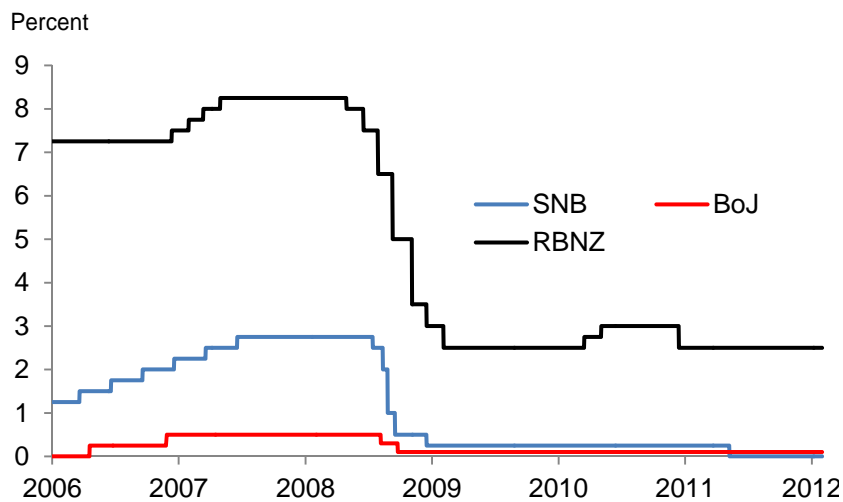


Source: Haver

Also, as mentioned earlier, the BoJ and the SNB both faced the problem of a zero lower bound on their policy rate, forcing them to ease conditions by trying to lower the value of the currency. In contrast, with the OCR still at 2.5%, the RBNZ would still have room to ease policy, if desired, by cutting its policy rate.

Figure 20

Policy rates



Source: Bloomberg

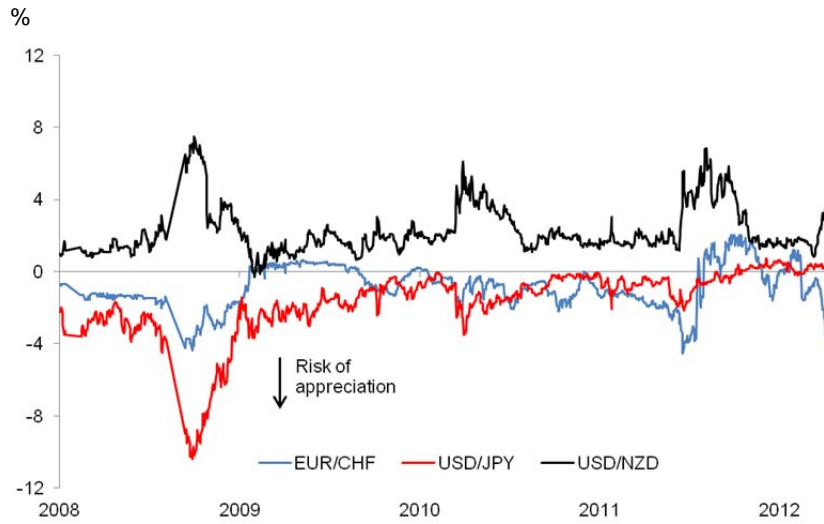
Financial market comparisons

Since the GFC, risk reversals on the Swiss franc and Japanese yen have generally shown a greater risk of appreciation than depreciation is priced into currency options. This is consistent with their role as safe haven currencies. In contrast, NZ dollar risk reversals have generally been biased towards greater risk of depreciation. Given the NZ dollar is viewed as risky and not hugely liquid, market participants essentially take out 'insurance' against NZ dollar depreciation.

Figure 21

Risk Reversals

1-month horizon (note that NZD is expressed as USD/NZD not NZD/USD)



Source: Bloomberg

Overall, the RBNZ has participated in the currency market but to a much lesser extent than the BoJ and SNB. The BoJ and SNB intervention policies have been highly public, aimed at addressing deflation in a zero lower bound environment as well as countering safe-haven flows resulting from the GFC. In comparison, intervention by the RBNZ has been more gradual, typically unannounced, and of a more cyclical nature.

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