INVESTMENT MANAGEMENT

Dynamic Currency Hedging:

A risk-controlled alternative to passive currency hedging

2018

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Lloyd heads up the Currency team where he is responsible for the oversight of all currency programs. His experience in trading (CBA - Head of Structured FX, ABN AMRO - CPI & Structured Interest Rate Trading) and his quantitative skill equip him for making strategic changes to programs.

Lloyd joined Macquarie Investment Management from CBA where he was Head of Structured FX in the FX trading team. Lloyd and his team were responsible for advising clients on FX option related strategies as well as trading and pricing exotic options. Prior to this role, Lloyd was at ABN AMRO as Associate Director Credit & CPI Trading where he ran the CPI-Linked bond, CPI-Linked swap and interest rate option trading books.

Lloyd holds a PhD from Cambridge University in Applied Mathematics and Theoretical Physics and utilises his widely regarded mathematical skills in providing thought leadership to the external market place through the development of research articles and seminars.

Executive summary

- Dynamic Currency Hedging (DCH) is a systematic trend-following hedge solution with strategic value-add
- It is difficult to pick the direction of currency moves correctly over an extended timeframe, but DCH seeks to do this for you – and has the track record to prove it
- DCH provides very strong liquidity risk management.

Introduction

Is it any wonder that online trading companies spruik currency trading as a road to riches? Currency is conceptually easy to understand and it is therefore easy for a novice to form a directional view. It is also exciting as it reacts to almost everything – economic news, political news, wars, natural disasters, facts and rumours! However, with so many events creating turbulence in currencies, is it any surprise that the ultimate direction of a currency turns out to be more difficult to predict than expected?

Currency management is even difficult for professionals. Part of the problem is that the valuation of a currency is vague. Currency is very different to other financial securities which generally have some defined cashflows or reference securities that allow valuation. That does not stop people creating 'fair value' models of currencies, but a currency can spend a very long time away from its calculated fair value.

From an investors' perspective this uncertainty in currency valuation creates a problem. Investors' portfolios typically contain a significant weight to offshore investments and therefore they have a significant level of currency risk to manage; and this risk is centred on something which is difficult to value. What strategy can an investor use to reliably hedge this risk, without the disappointment of finding that their currency view was incorrect and has reduced fund performance?

Remarkably there is a solution. Rather than trying to work out the valuation of a currency this solution simply takes the practical approach of going along with movements in the currency. This provides risk control, but also better returns over the long term.

We call this solution 'Dynamic Currency Hedging', or DCH for short. Its superiority stems from its systematic adjustment of the level of hedge according to the direction in which the currency is moving. It thus does not require accurate forecasting of exchange rates, which even the most skilful currency managers find difficult. More importantly, it protects portfolios from adverse currency movements when this protection is most needed; in other words, when the totally unexpected happens.

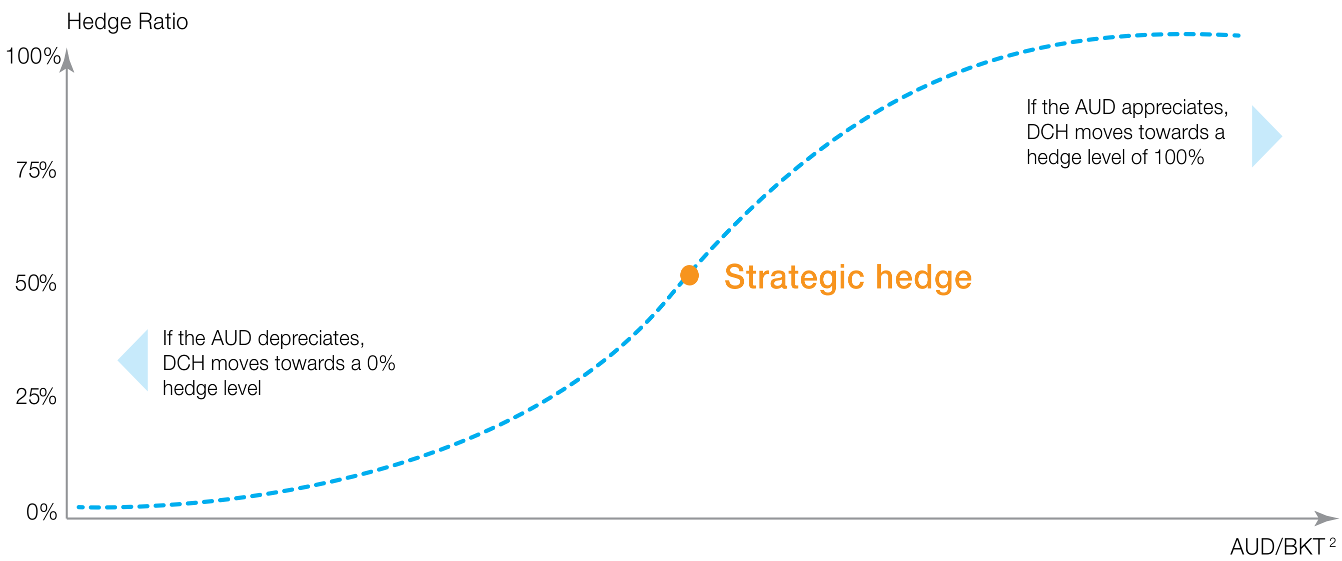
What is DCH?

DCH is a combination of two components that are described below. At its core is a systematic trend-following hedge strategy, but this model is fined-tuned using strategic value-adding decisions. The hedge level begins at the client's strategic hedge level (eg 50%), and resets to this level each year[1]. The hedge reset allows DCH to lock in gains relative to the strategic hedge level by reducing hedges after an AUD rally or increasing hedges after an AUD sell-off. This process crystallises the long-term outperformance.

Systematic model

The core systematic model is based on the Black Scholes replication of an AUD call option over a basket of currencies (see 'Technical description of DCH' for more detail). Diagram 1 shows how the model systematically increases the hedge level as the AUD appreciates and systematically decreases it as the AUD depreciates. In its purest form, the DCH hedge level can vary anywhere between 0% and 100%, although programs can be individually tailored for an investor if this range is too large.

Diagram 1: How the hedge level varies with a DCH program



Source: Macquarie.

1 A client's strategic hedge level can vary if required.
2 BKT refers to the basket of foreign currencies.

Technical description of DCH

In its most basic form, DCH replicates a call option on the client's base currency, versus a basket of foreign currencies. To understand the process of replication, an understanding of some option theory is needed – specifically the concept of the 'delta' of an option.

The delta measures how much the value of the option changes when the price of the underlying asset changes. For a call option, it can range anywhere from 0 to 1 where 0 implies the option is completely insensitive to the underlying asset, and 1 implies the option price moves in lockstep with the underlying asset. Importantly, Black Scholes option pricing theory is based on the assumption that the performance of an option can be recreated by buying a delta amount of the underlying asset. This is the principle of option replication and hence the principle underlying DCH.

While in theory the replication process can be achieved in the spot market, it is inconvenient for clients. It would essentially require borrowing in a foreign currency and investing those borrowings in the local currency. Instead, the actual replication is done using currency forwards, as these instruments are highly liquid and require no upfront cashflow.

As an example, let us assume an investor begins a DCH program at a strategic level of 50%. This means that they are replicating a call option on their base currency with an initial delta of 0.5 (basically an at-the-money option). To replicate the option a currency forward hedge of 50% is traded.

Now assume that their base currency appreciates so that the underlying option has a delta of 0.65. In this case, the hedge needs to be adjusted upwards to 65% by buying 15% more currency forward hedge. If their base currency now depreciates sharply so that the delta on the underlying option is 0.4, then their hedge needs to be adjusted down to 40% by selling 35% of the currency forward hedge. This process of buying and selling replicates the performance of the underlying option.

The above example is exaggerated for clarity; in practice our traders have trading bands around the option delta which prompt them to trade before the hedge gets too far away from the model while allowing them leeway to ignore smaller moves in the underlying currency.

Strategic value-add

A currency trend is rarely a straight line event – there are usually many ups and downs along the way. Macquarie Investment Management's currency team have limited leeway to over-ride the systematic model to help smooth out the bumps. Our independent risk management team monitor these deviations from the model to ensure that they remain within strict bands.

In addition, there are times when other strategic enhancements can add value. For example, say the base currency moves quickly to levels which are well over-valued. In this case, the hedge level will be much higher than the strategic hedge level and the hedge will have generated a large profit (offsetting currency losses on the underlying asset). Depending upon the outlook, a strategic decision could be taken to 'lock-in' the hedge profit earlier than the annual reset, by adjusting the hedge back to the strategic level.

There are a number of strategic enhancements that may be used depending upon the circumstances. These include early program resets, hedge level changes, the use of options, and utilising a part passive hedge (see 'Strategic enhancements' for more detail). Table 1 overleaf shows the historical performance of the strategic decisions that have been implemented by Macquarie Investment Management over the last nine years[3].

3 All the return data in this paper is generated from actual client performance plus all recommended strategy changes. The one exception to this is the 'Simulated DCH' performance in Table 1 that is based on an MSCI weighted exposure hedged with the core systematic DCH model.

Table 1: The value of the strategic overlay

Average hedge performance over nine years (January 2009 to December 2017)	
Simulated DCH	-2.1% pa
Actual DCH	-1.0% pa
Outperformance due to strategic value-add	**1.1% pa**

Source: Macquarie.

Strategic enhancements

The systematic component of DCH replicates a call option on the client's base currency. Generally, this works well, however our long term experience with this product has provided us with the insight to strategically alter this model and add value. These enhancements are generally only used opportunistically, when the market conditions are judged to be favourable.

Trading bands

Markets can from time-to-time exhibit directionless volatility, which can be detrimental to the systematic model. The simplest way to deal with such volatility is to temporarily reduce the amount of systematic trading that the model undertakes by widening the trading bands and giving our traders more discretion.

Reset the program early

In certain situations, and particularly when the currency has not moved much since the previous hedge reset, it can be beneficial to perform an early reset of the model. This can allow the client to better benefit from longer term currency trends and reduce the impact of market volatility on the systematic model.

Alter the hedge level

When the currency has moved a long way from its starting point, a DCH program will usually have generated very good outperformance. At such times resetting the hedge level back to the strategic hedge level effectively crystallises this benefit.

Over-the-counter (OTC) currency options

Sometimes the pricing of OTC currency options in the market are relatively cheap. At such times we can choose to purchase an OTC currency option to cover part of the systematic program. This locks in the low level of volatility for the life of the option, reducing the need for trading.

Mixing passive hedges with DCH

The introduction of passive hedges alongside DCH reduces the sensitivity of the program to currency movements, and hence the amount of trading that is needed for the strategy. It produces a hedge level profile slightly different to a pure DCH approach, but helps immunise the program against highly volatile markets.

The benefits of DCH

A passive hedge strategy can improve the theoretical risk characteristics of a portfolio, however the popularity of DCH is due to the fact that it provides this benefit as well as dealing with many of the real-life issues that can affect portfolios. This section highlights such benefits.

No need for a view on currency

Forecasting currency movements is difficult. Moreover, taking a view on the direction of the AUD as part of a hedge program can be extremely costly if it is incorrect. In fact, the losses from an incorrect directional hedging decision can easily swamp any gains from the careful management of the underlying assets that are being hedged.

In a given year, depending upon how the currency moves the best hedge choice from a performance perspective will be either 100% hedged or unhedged. By the same token, the worst hedge choice will be the alternative selection. For example, if the AUD rallies over the year, then the best hedge choice will be 100% hedged and the worst hedge choice will be unhedged.

Diagram 2: The return difference between the best and worst passive hedge

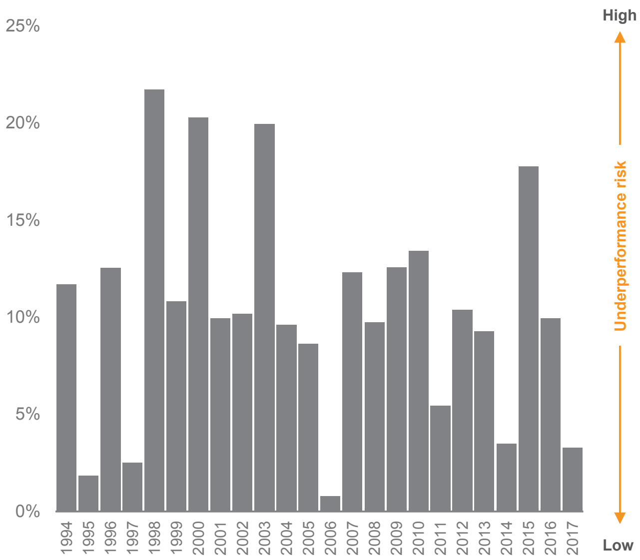
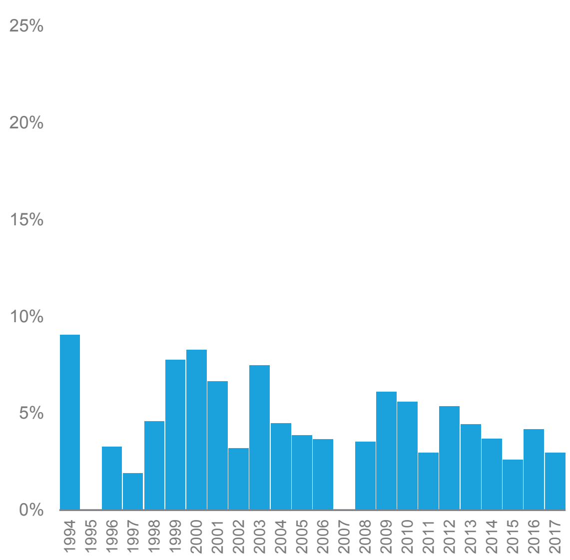


Diagram 3: The return differential between the best passive hedge and DCH



Source: Macquarie.

Diagram 2 shows there is often more than a 10% performance difference between the best and worst passive hedging choices, and it is almost always greater than 5%. Such large return differences on the international portion of an investment portfolio can easily mean the difference between being a top-quartile or bottom quartile fund. The currency hedging decision is thus crucial in terms of peer performance although (perhaps because it is so contentious) it is often neglected.

It is difficult to pick the direction of the currency (ie choose 100% hedged or unhedged) over a year's timeframe, although many investors effectively attempt to do this by varying their portfolio's hedge level – sometimes with dire outcomes. A primary benefit of DCH is that it has consistently performed close to the best hedge available, without the need to predict the direction of the currency. So it is possible for investors to enjoy consistent strong hedge performance, without ever taking the risk of getting a currency call badly wrong.

Diagram 3 shows that the performance differential between the best passive hedge strategy and DCH is substantially lower compared to the outcomes we saw previously in Diagram 2. Thus a DCH client can sleep soundly knowing they are unlikely to experience poor performance relative to their peers[4].

4 Diagrams 2 and 3 show that DCH successfully reduces the volatility of hedge outcomes which can occur with a passive hedge.

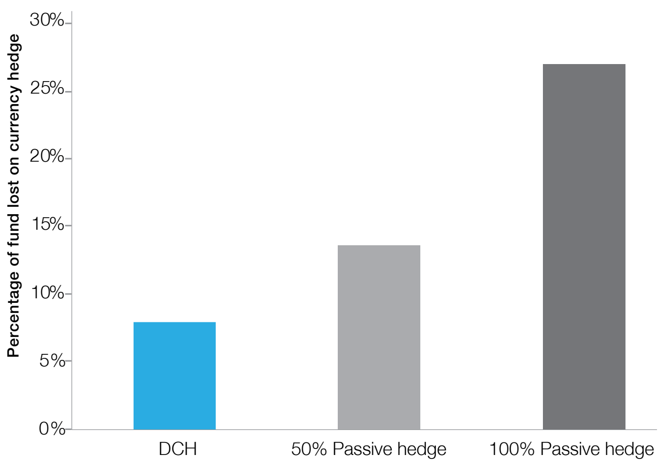
Liquidity protection

The large depreciation of the AUD against most currencies in late 2008 caused difficulties for many hedged Australian funds that had to find cash to pay for currency hedge losses. In some cases, funds became insolvent when they could not liquidate assets to meet these losses. Due to its trend following nature, DCH reduced its hedges as the AUD fell and hence provided clients some shelter from this financial storm, with such losses being minimised. Similarly, DCH helped control currency hedge losses throughout the large AUD depreciation between 2013 and 2015.

Any currency hedge will produce gains when the base currency appreciates and losses when it depreciates. The idea underpinning hedging is that the gains on the hedge go some way to offsetting the currency losses on the underlying portfolio (and vice versa). Unfortunately, this approach ignores the liquidity issues that are faced by funds in the real world; the P&L from a currency hedge is often paid quarterly or yearly, but assets in the underlying portfolio have to be sold or bought to pay for or absorb these hedge payments.

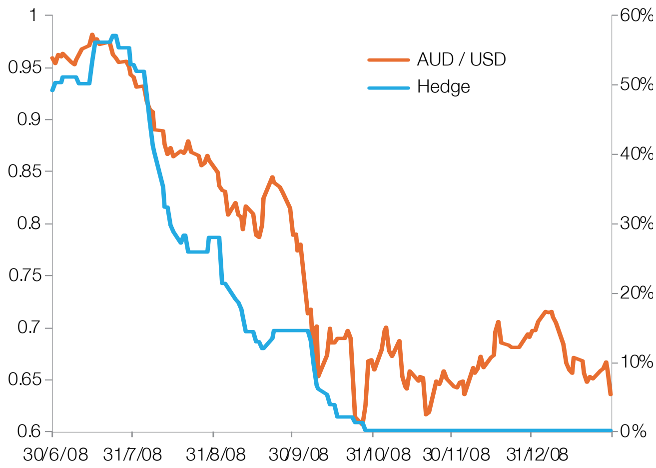
In the case of a large base currency depreciation, the portfolio can be subjected to significant pressure in paying for its currency hedge losses. While a textbook will tell you that these losses are offset by currency gains on the assets themselves, the cost of liquidating significant portions of a portfolio can be daunting. This is particularly the case when the underlying portfolio contains illiquid assets, such as unlisted property, private equity and so on, where assets are generally difficult and expensive to sell.

Diagram 4: Worst ever hedge losses (June 2008 to Jan 2009)



Source: Macquarie.

Diagram 5: DCH program hedge level (June 2008 to Jan 2009)



Source: Macquarie.

Diagram 4 shows the worst ever hedge losses for typical Australian funds, based on actual currency hedge returns from 30 June 2008 to 31 January 2009. Over this period the AUD had its largest and fastest decline, as a result of widespread fear surrounding all risk assets. Most currency hedge programs wore significant losses over the period, with a 100% hedge costing a portfolio over 25% of the asset value. Even a more conservative hedge of 50% would cost the fund almost 15% of its value. The cash to fund these disastrous hedge losses would have come from selling large pieces of the portfolio at the time when asset prices were at their absolute worst levels.

In contrast to a passive hedge, DCH systematically reduced the hedge level as the currency fell (see Diagram 5). The lower hedge level reduced the exposure of DCH clients to further falls in the currency when they subsequently occurred. Over the period, DCH showed only modest losses of around 7.5%. This was a time of unprecedented turmoil in financial markets, and DCH did its job – providing liquidity protection when it was most needed.

Strong historical long-term performance

Macquarie has been running the DCH strategy since 1992 and has built up an enviable track record. This period has encompassed numerous events in currency markets – from the Asian currency meltdown in 1998, the widespread carnage of the global financial crisis and the large depreciation in the AUD between 2013 and 2015. Throughout these periods (and the occasional intervals of relative calm in between), DCH has proven its worth by doing exactly what it was designed to do; protecting clients from currency downside, while allowing them to participate in upside.

The hedging approach that clients usually consider as an alternative to DCH is a passive hedge at their long-term strategic hedge level (the same level at which their DCH program would start). In the data presented in this paper, it is assumed that the strategic level is 50%, but similar results hold for other strategic hedge levels. Table 2 shows the actual returns generated by the strategic 50% hedge and DCH, and the shading on the table highlights years in which the DCH strategy has outperformed. Clearly, DCH has consistently outperformed the strategic benchmark (which then leads to the superior performance in the long-term averages).

Of course, the performance of a long-term hedge product such as DCH should always be assessed using a suitable long-term window – over years rather than month by month. Over such a timeframe, it would be difficult to find a hedging solution that has performed as well as DCH while simultaneously providing liquidity protection. The proof of the excellent long-term track record is emphasised by our client longevity – the founding investor from 1992 continues to use DCH as their hedging solution today. In fact, DCH has regularly outperformed its strategic benchmark since the product's inception – while never requiring the client to take a view on the direction of the currency.

Table 2: DCH and passive hedge performance

Date	50% hedged	DCH hedged
1993	7.1%	**11.0%**
1994	-4.3%	**-7.4%**
1995	1.8%	**2.9%**
1996	-2.5%	**0.5%**
1997	3.7%	**3.1%**
1998	10.7%	**16.9%**
1999	-5.6%	**-8.0%**
2000	8.8%	**10.7%**
2001	5.0%	**3.3%**
2002	-3.3%	**-1.4%**
2003	-8.1%	**-5.6%**
2004	-1.0%	**-0.7%**
2005	-1.4%	**-0.9%**
2006	2.7%	**-0.6%**
2007	-8.5%	**-2.4%**
2008	7.1%	**8.5%**
2009	-3.8%	**-3.7%**
2010	-2.9%	**-1.8%**
2011	2.0%	**1.8%**
2012	-1.6%	**-1.8%**
2013	7.6%	**7.8%**
2014	4.0%	**2.1%**
2015	12.1%	**18.4%**
2016	-3.2%	**-2.4%**
2017	-0.8%	**-2.1%**
Average	**1.0%**	**1.9%**

Source: Macquarie.

Conclusion

Choosing the correct level of a passive currency hedge is a difficult task. The hedge approach that worked over the last year may be inappropriate the following year. Furthermore, the benefits of currency hedging can introduce new unwanted risks like liquidity risk. However, this paper has shown that there is a solution, Dynamic Currency Hedging, which allows investors to sleep safely knowing that their currency risk is being appropriately managed.

DCH's systematic nature allows clients to benefit from currency trends while protecting them from the liquidity issues that can arise when the AUD falls. Macquarie has provided this solution to investors for almost 25 years, and the product has a strong track record of delivering a great hedge result – especially when times are tough.

For more information call Macquarie Investment Management on 1800 814 523, email mim@macquarie.com or visit the website at macquarie.com/investmentmanagement