

Using Foreign Exchange Markets to Outperform Buy and Hold

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ABSTRACT

“This year I invested in pumpkins. They’ve been going up the whole month of October and I got a feeling they’re going to peak right around January. Then bang! That’s when I’ll cash in.”

- Homer Simpson

As Homer Simpson will no doubt learn when he attempts to take profit on his long position in the spot pumpkin market... when it comes to active investment management, timing and liquidity are everything!

This paper will demonstrate how active investment managers can use foreign exchange markets to significantly improve risk-adjusted returns

on long exposure to various risky assets including S&P500. The paper will look at using currency markets to hedge long beta exposure using various methods and timing strategies and will outline several active strategies which significantly outperform buy and hold. By remaining long S&P500 and using high-beta FX crosses as a proxy hedge, active managers can outperform their benchmark.

In early 2013, S&P500 was close to its all-time highs. Although S&P500 returns have historically been positive, this performance has been accompanied by periods of rapid and substantial drawdowns, in particular following negative shocks such as the bankruptcy of Lehman Brothers.

During periods of considerable market optimism, investors exhibit risk-seeking behaviour and accumulate risky assets, which tend to be higher yielding.

However, when risk aversion grips markets, investors seek to preserve their capital, rather than attempting to maximise yields. The result is a herd of investors all attempting to exit risky assets at the same time. This type of behaviour gives rise to volatility and large drawdowns for investors who are long risky assets.

The ability to avoid large drawdowns is of considerable importance for investors. Large drawdowns often force investors to exit positions at the worst possible time in order to maintain solvency or provide liquidity to outside investors, who are all simultaneously favouring return of capital over return on

capital. Thus, a key task for holders of risky assets is to find ways to lessen drawdowns even if they cannot eliminate them. At the same time, by reducing the volatility without significantly lowering returns, investors can achieve superior risk-adjusted returns.

However, there can be considerable difficulty in exiting risky assets during times of market turbulence. Particularly for illiquid risky assets, it can be very difficult or impossible to exit exposure during periods of extreme stress. Even if it is possible to transact, spreads are likely to be much wider, given that market makers are taking considerably more risk by providing liquidity. Hence, investors should consider hedging long exposure to risky assets using other instruments, rather than simply exiting their positions. There is also a critical determination to be made around the timing of hedges and risk reduction.

Our paper will explain how investors can use foreign exchange markets to proxy hedge long positions in risky assets and achieve smaller drawdowns, less volatility and superior risk-adjusted returns. In other words, we are explaining how to use FX to proxy hedge beta exposure. This is different from traditional FX hedging, where investors are interested in purely hedging their FX exposure, not the underlying beta.

An important benefit of proxy hedging using FX markets is that FX markets are very liquid, especially for the major currencies. Therefore even during times of considerable risk aversion, investors are likely to be able to transact.

When it comes to the task of timing hedges, we determine that the Nomura GRAM+ (Global Risk Appetite Monitor) indicator is a superior indicator to a simple VIX rule as a way of identifying periods of risk aversion. GRAM+ measures various market risk factors such as VIX, emerging market CDS spreads and financial market liquidity and then comes up with an average score to measure global risk appetite.

We identify which currencies can be used as FX proxy hedges for risky assets. We find that higher-yielding currency pairs such as AUD/USD are good proxy hedges, as they are highly correlated to risky assets. We find that a strategy that employs active FX proxy hedging using GRAM+ for timing considerably outperforms a buy and hold strategy. It is also much better than a strategy that uses VIX instead of GRAM+ as a risk indicator. Furthermore, an active FX proxy hedge strategy outperforms actively buying and selling S&P500 using either GRAM+ or VIX.

Later, we also look at using FX options to proxy hedge exposure. This strategy offers the ability to hedge on a passive basis, avoiding the need to time our hedge. We examine a strategy which involves buying a put on the higher yielding/higher beta currency (AUD) and a call on the lower yielding/lower risk currency (USD), while remaining long the underlying risky asset. We look at a range of different strikes and show that generally out-of-the-money strikes

perform better than at-the-money. When markets are in risk-seeking mode, we find that buying FX option hedges results in the loss of premium. However, when there is considerable risk aversion in the market place, the increase in value of our FX option hedge considerably reduces drawdowns on long risky asset strategies.

In summary, we find that using FX to proxy hedge long exposure to risky assets such as S&P 500 generates superior performance to buy and hold by reducing drawdowns and increasing risk-adjusted returns.

Introduction

Despite constant turbulence and a series of rolling crises in financial markets over the past ten years, S&P500 is now over 200 points higher than where it traded a decade ago and sits close to record levels reached in 2007. These returns, however, were accompanied by significant drawdowns. The ability to actively manage long exposure to improve risk-adjusted returns requires the identification of a suitable hedge. This also requires the development of a timing strategy to implement the hedging strategy in an efficient way. This paper looks at using foreign exchange markets to hedge long beta exposure using various methods and timing strategies. We find several active strategies which significantly outperform buy and hold.

We can think of S&P500 as a proxy for risky assets and market beta. During times of optimism in the market, investors are prepared to take risks to achieve higher returns. Hence they are keen to invest in risky assets, which tend to offer higher yields to compensate for their higher levels of risk. This contrasts to periods of risk aversion, when investors' priorities shift to preservation of capital and they seek to exit their exposure to risky assets, often rapidly and without warning. This herding effect, where many investors try to exit risky assets simultaneously, creates poor liquidity during times where liquidity is needed most, exacerbating drawdowns and harming risk-adjusted returns. Indeed, during this decade financial markets have been

buffeted by considerable market turbulence, most notably in the period following the bankruptcy of Lehman Brothers in 2008.

In this paper, we discuss the use of Foreign Exchange (FX) markets to proxy hedge exposure to risky assets. The advantage of FX is that it is a very liquid market. Hence, even when liquidity is at a premium, it is still possible to transact with relative ease in currency markets. This stands in stark contrast to many other risky asset markets where liquidity can disappear partially or even completely during periods of significant risk aversion.

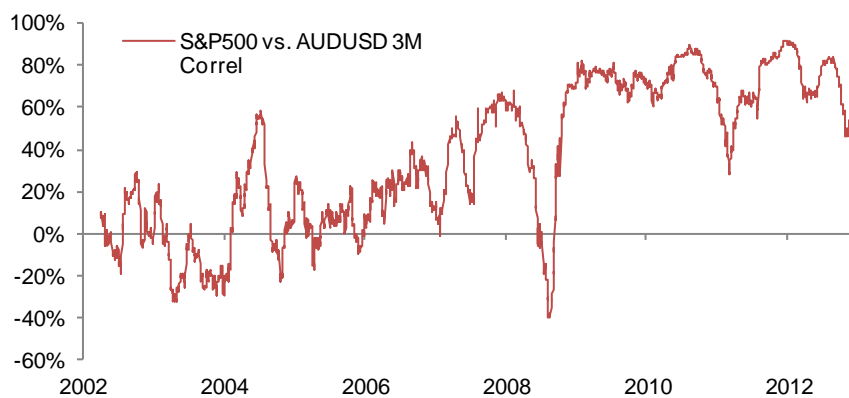
We will first investigate using FX cash instruments to proxy hedge and then later investigate the use of FX options to passively proxy hedge exposure. Our objective is to understand how active management via FX proxy hedging can reduce drawdowns and improve risk-adjusted returns compared to long only risky asset strategies.

The relationship between high beta FX and broader risky assets

In order to proxy hedge exposure to risky assets, we need to first understand the relationship between risky assets and FX. Our focus will be on high beta FX crosses. One of the most popular strategies within FX is the carry trade. This involves borrowing low-yielding currencies such as the USD or JPY, which are often perceived as having low risk, and buying high-yielding currencies such as AUD, which are considered higher risk. As we might expect, the behaviour of the FX carry trade is similar to that of S&P500, which

is also considered higher yielding and higher risk. Indeed, we can see this if we plot a 3-month rolling correlation between AUD/USD and S&P500 (see Figure 1), as the correlation tends to be strongly positive. Notably, the returns from long AUD/USD positions are characterised by large drawdowns during periods of risk aversion, as investors seek to liquidate during market turbulence.

Figure 1 – 3-month rolling correlation between AUD/USD and S&P500



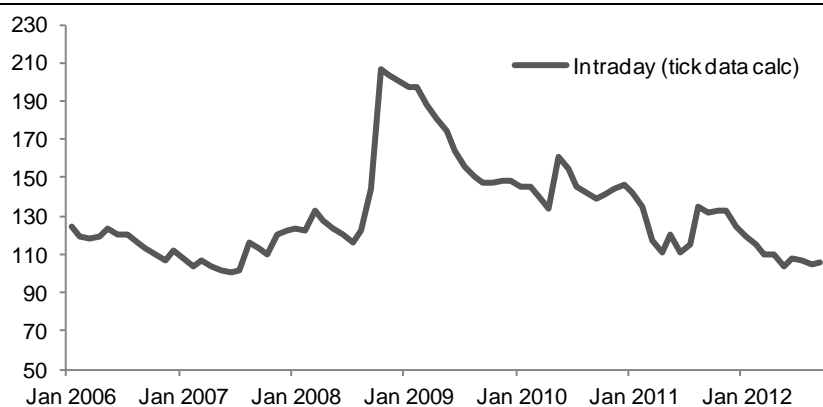
Source: Nomura, Bloomberg

The major risk to proxy hedging via FX (or via any proxy hedge) is that the correlation between the hedge and the underlying asset is not always positive. There could be occasions where we lose money on both our underlying exposure and the short FX proxy hedge. On the flipside, there could also be occasions where this lack of correlation works in our favour and we profit on both our long risky asset exposure and our short FX proxy hedge.

Assessing liquidity around crises

One of the main reasons we explore using FX to proxy hedge risky assets is the high level of liquidity in the FX market. In Figure 2, we have calculated bid/ask spreads for the DXY (the US Dollar index) using historical intraday data indexed to 100 as of June 2007 (the approximate start of the credit crunch). Even in this highly-liquid asset we see that spreads nearly doubled during the Lehman crisis. For illiquid assets, where accurate bid/ask data is less available, the widening of spreads was much more substantial. An example is CDS spreads (Egami, Kato and Sawkai 2013), but many markets were completely dysfunctional at this time while FX remained (relatively) liquid and returned to normal functioning fairly quickly.

Figure 2 – DXY bid/ask spread indexed at 100 in June 2007 using intraday bid/ask data – monthly average



Source: Nomura, Bloomberg

Actively trading S&P500 vs. long only

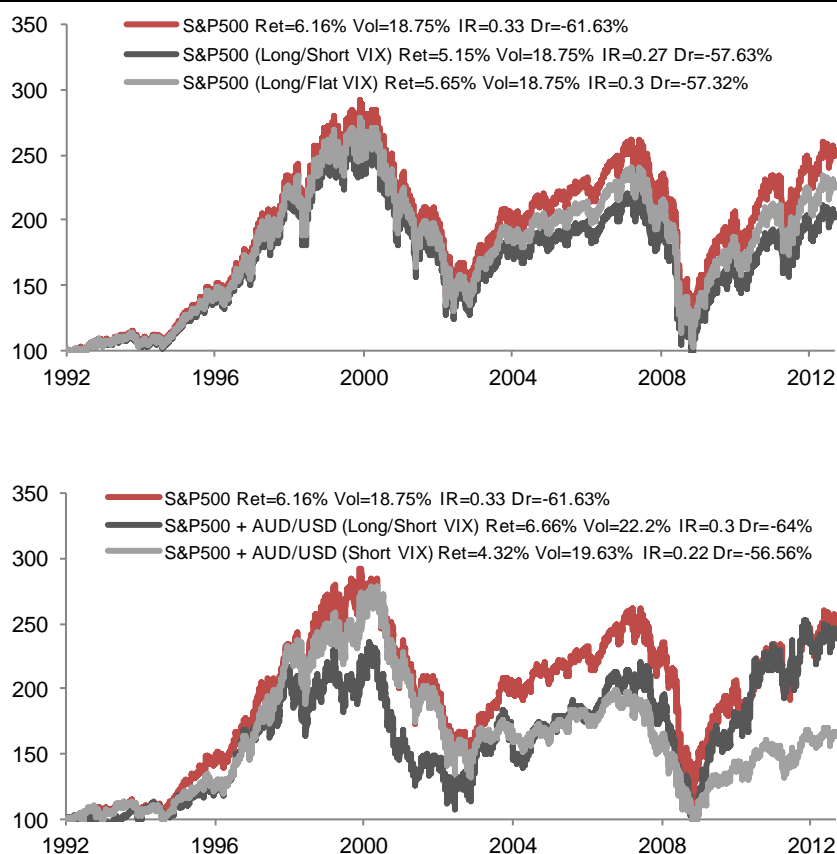
One of the most common ways to measure risk appetite is to use the VIX index, which measures the implied volatility on S&P500. Higher values indicate market tension as investors purchase options to protect their long positions in the underlying. So can we use some type of signal based on VIX to trade in and out of S&P500? Also, can we use it to proxy hedge using AUD/USD? The idea would be to try several rules around the principle that:

- when VIX rises above a specified moving average (i.e., risk aversion), we exit S&P500 risk; and
- when VIX is below a specified moving average (i.e., risk seeking), we remain long S&P500.

We also run a variation where we go short S&P500 when VIX spikes. In order to test our hypothesis, we look at the historical returns of a long S&P500 investment (taking into account dividends and funding costs) and these variations in Figure 3. We also examine a trading rule which uses active proxy hedging via AUD/USD, while remaining long S&P500. We find that actively trading S&P500 via VIX signals does improve drawdown slightly. When looking at the proxy hedged versions, we find that both going long AUD/USD when VIX is breaking lower and selling AUD/USD when VIX is breaking lower has worse drawdowns. The version which sells AUD/USD does improve upon

the drawdown. However, in all these cases, the improvement between the active results and remaining passively long S&P500 is not dramatic.

Figure 3 – Trading S&P500 actively using VIX – top (and proxy hedging – low)



Source: Nomura, Bloomberg

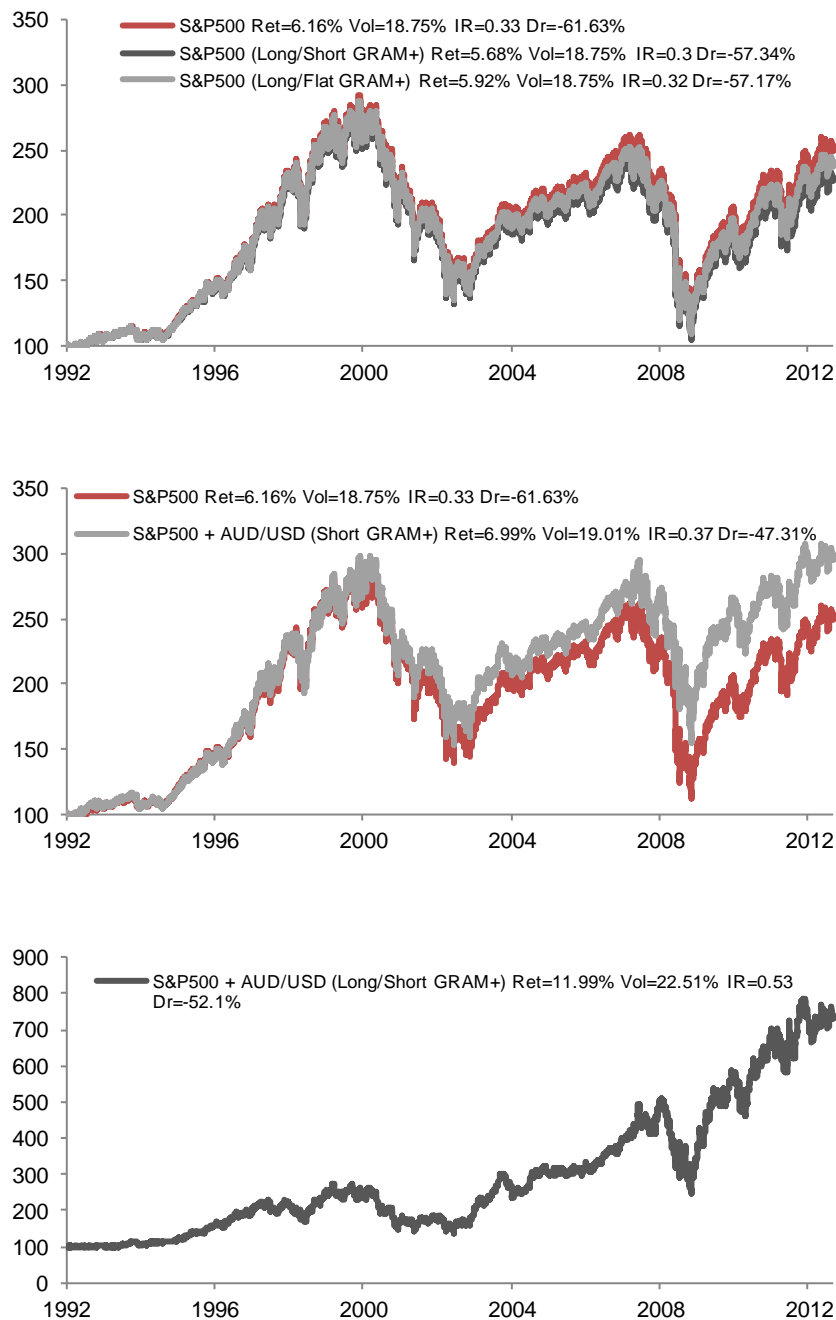
One problem with VIX is that it only measures one type of risk. However, risk events can emanate from many different areas so a more sophisticated, multi-factor measure could offer a superior signal. Hence, if we want a better measure of risk, we need to measure many different types of risk, such as credit risk, risk associated with emerging markets, liquidity risk, etc.

GRAM+, Nomura's global risk appetite monitor, attempts to do this. GRAM+ uses inputs from the capital markets which measure various types of risk, such as equity volatility (VIX), liquidity risk (relative difference between large caps and small caps) and credit risk (in EM and also developed markets). It then aggregates them into a single score, bounded between 0 and 1. Values between 0 and 1/3 are "risk averse", where typically risky assets underperform and safe haven assets do better. Values between 1/3 and 2/3 are "risk neutral", whereas those between 2/3 and 1 are "risk seeking". Historically, risky assets have outperformed during both "risk neutral" and "risk seeking" markets as defined by GRAM+. The data is freely available to download on Bloomberg at [NFXMGRAM Index<GO>](#).

In Figure 4, we run the analysis above, but this time we use GRAM+ as opposed to VIX. First, we present our results for actively trading S&P500 using GRAM+, both going long (when GRAM+ signals "risk seeking/risk neutral") and short (when GRAM+ signals "risk aversion"), and then we show a version which goes long and flat. Second, we do something similar, but using AUD/USD as a proxy hedge (in the same notional amount as our S&P500 investment). Using GRAM+ to actively trade S&P500 does improve results compared to using VIX, but not by a significant margin. The greater value of GRAM+ appears to be when applying the AUD/USD proxy hedge. The version where we go flat/short AUD/USD based on GRAM+ signals significantly

reduces drawdowns and increases the information ratio (see middle of Figure 4). Meanwhile the long/short AUD/USD proxy hedge based on GRAM+ doubles returns while only slightly increasing volatility (see bottom of Figure 4). Of course, by actively taking long AUD/USD positions we would be increasing our beta risk during periods of buoyant risk sentiment, so this is a very aggressive form of active management, but drawdowns are still lower than a simple long S&P500 strategy. Hence, we can conclude that proxy hedging via AUD/USD using GRAM+ offers significant value compared to a passive long S&P500 strategy.

Figure 4 – Trading S&P500 actively using GRAM+ – top, proxy hedging via short AUD/USD – middle, proxy hedging via long/short AUD/USD – bottom



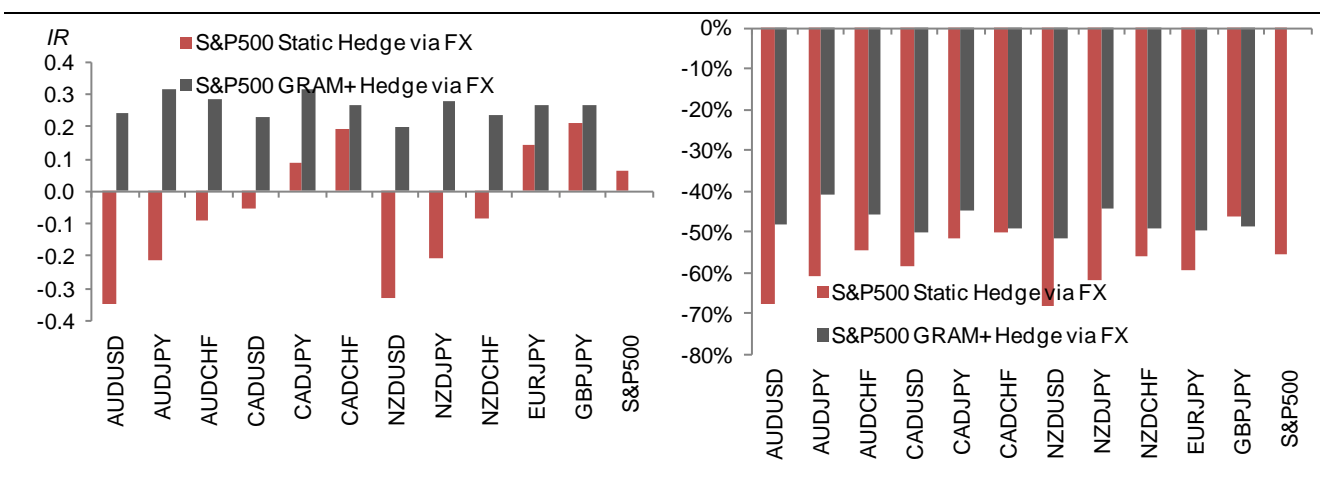
Source: Nomura, Bloomberg

What about using other high beta crosses as hedges for S&P500?

In our earlier example we saw that selectively hedging long S&P500 exposure via short AUD/USD positions timed using GRAM+ improves return statistics compared to a long only position, beating using VIX as an indicator, and also compared to actively trading S&P500 using GRAM+.

In this section, we analyse whether other high beta FX crosses can also be used in a similar way to proxy hedge long S&P500 exposure (we test a static hedge and an active short GRAM+ hedge). We focus on developed market high beta crosses because these are generally more liquid than high beta crosses in emerging markets. In Figure 5, we present our results using a sample of the past 10 years, comparing it with long S&P500 as a benchmark. We generally find that static FX proxy hedges tend to be loss making and the information ratios from our selective GRAM+ FX proxy hedge are higher than simply being long S&P500. This is because being continuously short high beta currencies in a static manner is costly from a carry point of view. Furthermore, drawdowns in every case are better for active hedging (compared to long S&P500 or static FX proxy hedging). Hence, we see that the behaviour we observed using AUD/USD as an FX proxy hedge is not unique, and applies more generally to other developed market high beta FX crosses.

Figure 5 – Information ratios (LHS) and drawdowns (RHS) for FX proxy hedging long S&P500

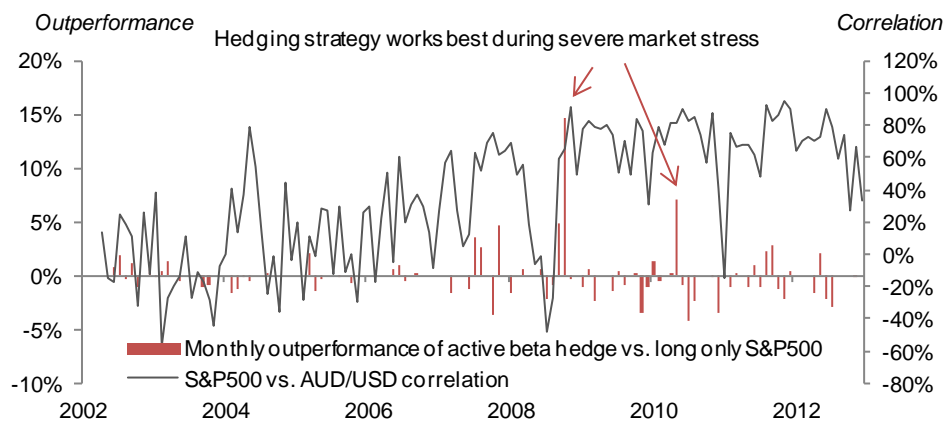


Source: Nomura, Bloomberg

Analysing the returns in more detail

One of the risks of proxy hedging (whether using FX or any other instrument) is that there might be periods where we can lose money on the proxy hedge and the underlying asset. So we are compelled to ask: How frequently does our proxy hedge strategy underperform a long only risky asset strategy? In Figure 6, we plot the monthly outperformance of long S&P500 actively hedged using short AUD/USD (using GRAM+) compared to long only S&P500. For reference, we also plot the 3-month correlation between S&P500 and AUD/USD once a month. We see that there are some instances where the proxy hedge strategy underperforms. However, what is crucial is that the magnitude of these underperforming months is much less than the magnitude of the outperforming months—notably during the Lehman crisis in 2008 and the European debt crisis in 2010.

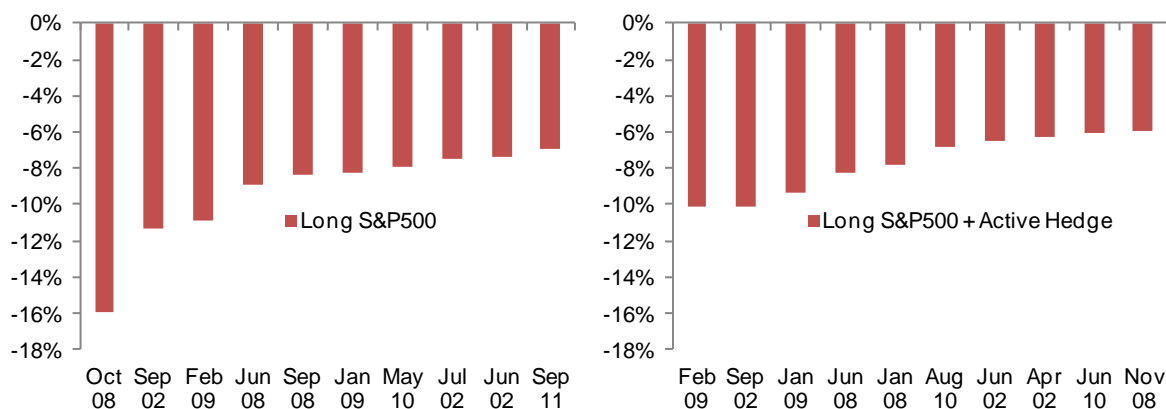
Figure 6 – Information ratios (LHS) and drawdowns (RHS) for FX proxy hedging long S&P500



Source: Nomura, Bloomberg

Another way we can look at returns is by looking at the worst months (Figure 7) and the best months (Figure 8) in our 10 year sample. We compare a long only strategy with our active AUD/USD proxy hedge (using GRAM+ for timing). We observe that the worst months are generally much better when we look at our active proxy hedge, which fits with our earlier observations about the reduction of drawdowns.

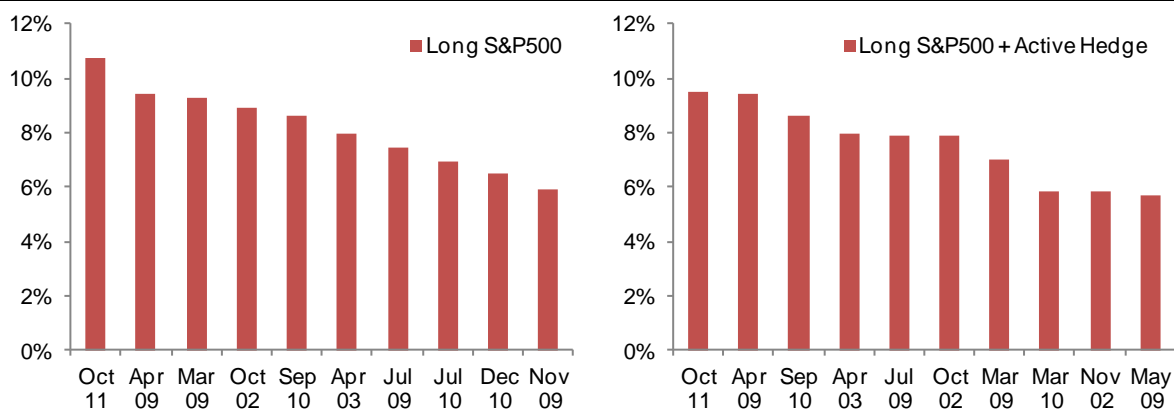
Figure 7 – Worst months with long only S&P500 (LHS) with active hedge (RHS)



Source: Nomura, Bloomberg

At the same time, the active hedge does not reduce returns dramatically in the best months, so the active strategy is superior. We minimize the impact of the worst months while preserving most of the strong returns during the best months.

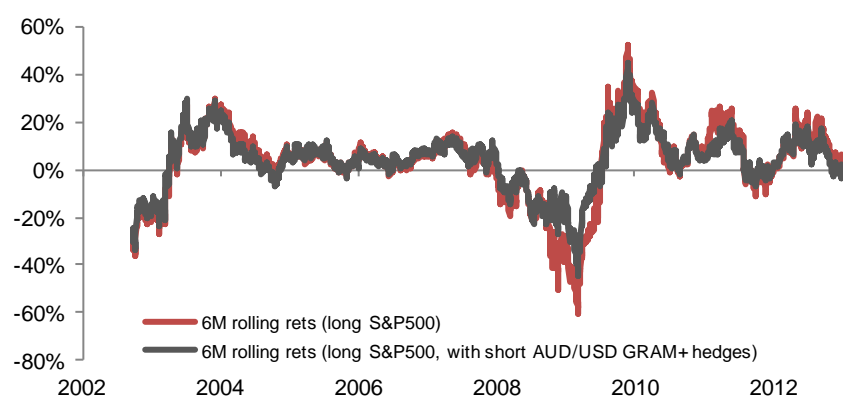
Figure 8 – Best months with long only S&P500 (LHS) with active hedge (RHS)



Source: Nomura, Bloomberg

We can also take another tack, looking at the 6-month rolling return of both strategies in an effort to assess rolling drawdowns (see Figure 9). Again we see that over the Lehman period, the buy and hold strategy has worse returns. In general, the 6-month rolling returns from the actively hedged proxy strategy are less volatile.

Figure 9 – Rolling 6-month returns long only S&P500 and also with active hedge



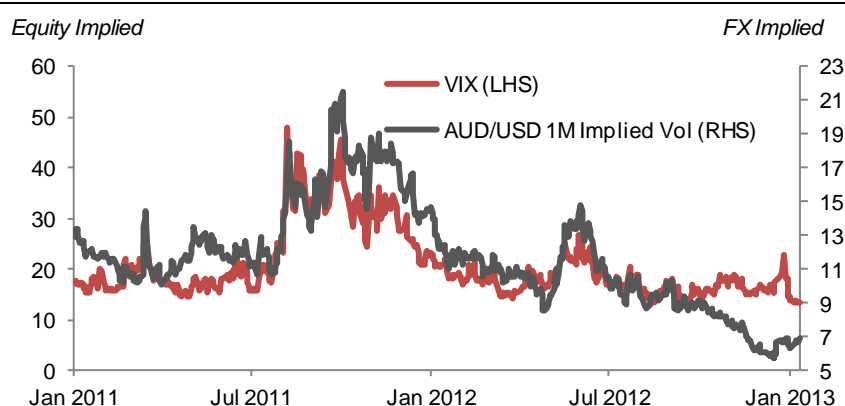
Source: Nomura, Bloomberg

Using FX options as proxy hedges for long risky assets

We have shown that an active investor can improve performance using FX cash positions to proxy hedge long S&P500 exposure, using GRAM+ to time the trade. However, this approach requires active trading. By contrast, a static hedge such as short AUD/USD can result in worse returns than simply being long S&P500. Here, we try to assess whether we can use AUD/USD put options to hedge our long S&P500 exposure. This eliminates the problem of timing the hedge and allows an active but lower maintenance strategy. While the AUD/USD cash hedging approach is fairly simple to execute, from an operational point of view, the put option approach would be even easier to implement. Constantly trading in and out of options positions would be costly from a transaction cost point of view so we maintain the hedge at all times. We do note, however, that an investor still has to roll the position at expiry four times a year when using 3-month options. An attractive feature from a risk

management perspective is that the loss on the option hedge is capped at the cost of the premium. In Figure 10, we plot VIX against AUD/USD implied vol, showing that there is a strong relationship between the two. So buying AUD/USD options as a proxy for VIX looks reasonable.

Figure 10 – VIX vs. AUD/USD implied vol



Source: Nomura, Bloomberg

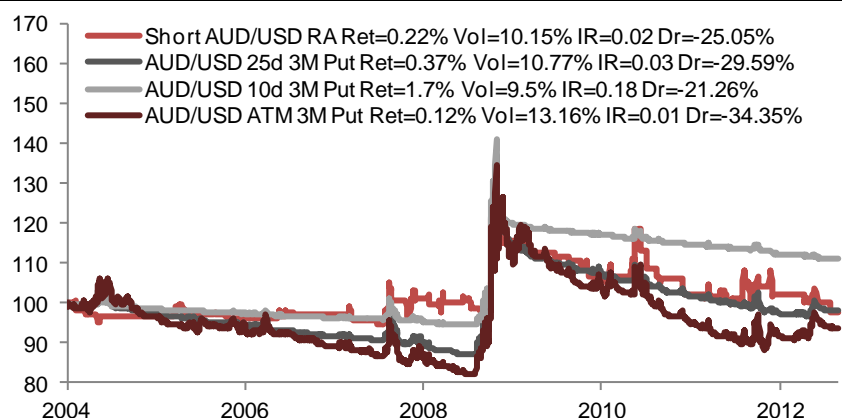
First, we examine the historical P&L of the option itself, without including long S&P500 exposure. We compare the returns of 3-month AUD/USD put options with several different strikes: at-the-money (ATM), 25-delta out-of-the-money (OTM) and 10 delta out-of-the-money (OTM), all rolled at expiry. The benefit of using AUD/USD over another higher-yielding currency such as NZD/USD is that the AUD/USD options and cash markets are more liquid.

The option returns are compared with returns from being short AUD/USD spot when GRAM+ is in risk aversion and flat at other times (labelled RA). We include transaction costs in both options and spot trades, as well as carry for our spot positions, in Figure 11. We have marked-to-market the option

premium on a daily basis, not only at expiry, to get a better idea of how P&L evolves. Our data sample is from 2004 (a smaller sample due to less availability of option volatility data).

Our first observation is that during times of market calm, buying puts in AUD/USD is (unsurprisingly) not profitable—we lose our premium. In particular this is true of the ATM option, which is most costly. However, during periods of significant risk aversion, like the Lehman crisis in autumn 2008 and the European debt crisis in summer 2010, we see a notable jump in returns, precisely at the points when risky assets underperformed. We note that the out-of-the-money options outperform the active short AUD/USD during times when GRAM+ is in risk aversion.

Figure 11 – Returns for AUD/USD put options and selective short AUD/USD (via GRAM+)

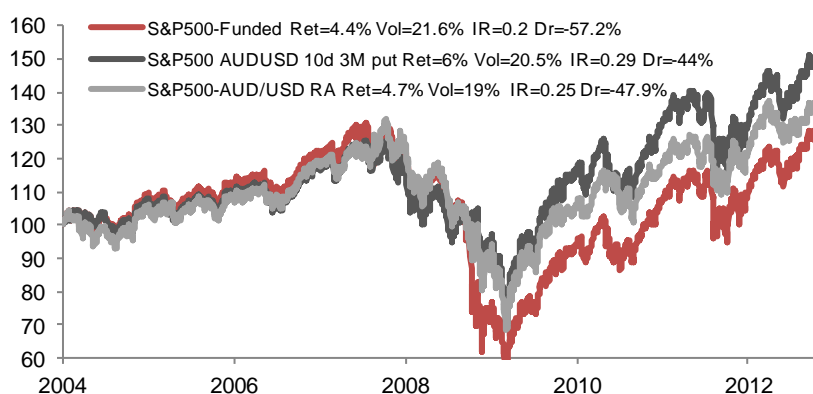


Source: Nomura, Bloomberg

However, the point of proxy hedges is not to run them in isolation. The main idea is to see how these FX proxy hedges impact returns for investors who are

long risky assets. In Figure 12, we plot the returns for long S&P500 since 2004, with an FX options hedge (3-month AUD/USD 10-delta put) and the FX proxy hedge we have used earlier, namely short AUD/USD when GRAM+ is in risk aversion.

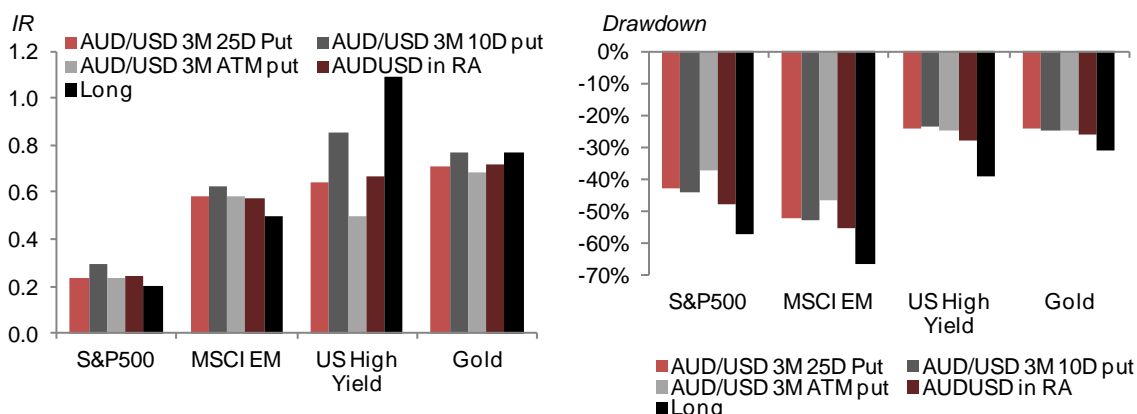
Figure 12 – Long S&P500 returns with active spot hedge and also options hedge



Source: Nomura, Bloomberg

We note that the drawdowns are least when we use the FX options hedge. Furthermore, the information ratio is higher. In Figure 13, we expand upon our analysis by looking at the risk-adjusted returns and drawdowns for a broader array of risky assets (S&P500, MSCI EM, US high yield and gold), when applying the various FX options hedges and FX cash hedge. In every case other than US high yield, we find that the information ratio is higher for the FX proxy hedge approach and in particular for the 3-month 10-delta AUD/USD put option strategy. The proxy hedged cases are also superior to the long only strategy when we compare drawdowns.

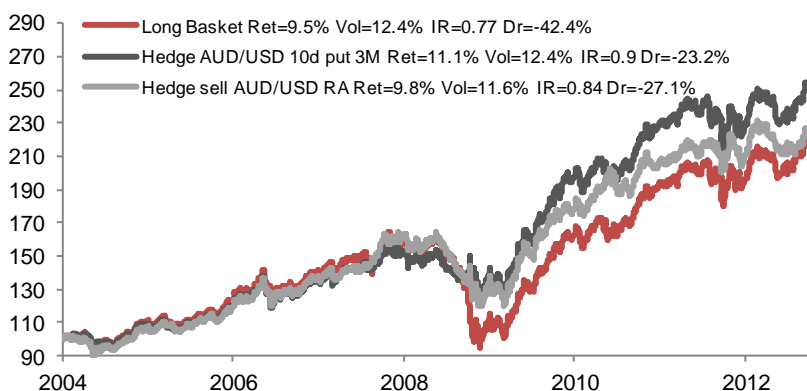
Figure 13 – Long risky assets and FX proxy hedges IR (LHS) and drawdowns (RHS)



Source: Nomura, Bloomberg

We can create an equally-weighted basket of risky assets and examine the historical returns using various FX proxy hedges. In Figure 14, we again see the outperformance of the basket using the 3-month 10-delta AUD/USD put options.

Figure 14 – Long risky asset basket with and without FX proxy hedges



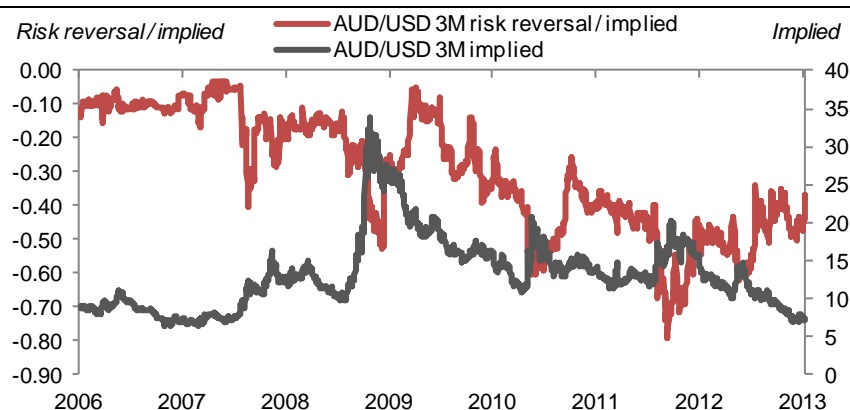
Source: Nomura, Bloomberg

Has it become more expensive to hedge tail risks?

Our purchase of an out-of-the-money AUD/USD put is a hedge against downside tail risk. However, following the Lehman crisis and the evolving

recognition of the greater than model expectation frequency of tail risk events, is this type of tail risk hedge more expensive? One way we can measure this is to look at the pricing of deep out-of-the money risk reversals compared to at-the-money implied volatility (10-delta call minus 10-delta put implied volatility / at-the-money implied volatility). We compare this with at-the-money implied volatility for the 3-month tenor in Figure 15. Unsurprisingly, the AUD/USD risk reversal is systematically negatively skewed; in other words, puts are always more expensive than calls. Still the skew is now more negative relative to ATM than it was pre-Lehman. However, on an absolute basis, ATM implied volatility is as low now as it was pre-Lehman. This suggests that the actual premium we would pay is not much different now compared to pre-Lehman, even with the added skew.

Figure 15 – 3-month AUD/USD at-the-money implied vol is as low as it was pre-Lehman



Source: Nomura, Bloomberg

Conclusion

Although buy and hold in S&P500 (and other risky assets) has been profitable over the past ten years, drawdowns have been considerable during times of market turbulence, most notably following the bankruptcy of Lehman Brothers. In this paper, we show that using FX as a proxy hedge for long risky asset exposure improves returns significantly. A major benefit of this strategy is that FX is a very liquid market, so it will be possible to apply a proxy hedge in the FX market during risk averse market regimes, even if liquidity makes it difficult to exit the risky asset itself. Liquidity may not be an issue with S&P500, but it can be a major issue in lesser-traded risky assets.

We find that actively selling high beta FX crosses as a proxy hedge during times of risk aversion (using our GRAM+ indicator for timing) reduces drawdowns considerably compared to buy and hold, and also improves risk-adjusted returns. Using GRAM+ has better return statistics than VIX, which is a more commonly used method of gauging risk appetite.

We also discuss the less active approach of buying 3-month AUD/USD puts and rolling them at expiry. Using AUD/USD puts to proxy hedge reduces drawdowns compared to buy and hold. This approach is also simpler to execute, as it simply requires the investor to roll the trade at expiry every three months, rather than more actively trading as in the cash FX proxy hedge strategy using AUD/USD. Since the hedge is continuous, we do not need a

timing strategy. Furthermore, the losses on the option hedge are limited to the option premium itself, which is not the case when trading a cash FX position.

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