

Hedging a Foreign Equity Position

Hedging a US Equity Position in a Portfolio Based in Canadian Dollars : An Example Comparing Strategies

SUMMARY

We compare three different strategies for hedging a long position in the S&P 500. We look at October 2008 in detail, and more generally at the second half of 2008. The three strategies compared all use cash FX transactions to offset the currency exposure, but with different hedging frequencies. The strategies used are (i) monthly hedging, (ii) daily hedging and (iii) intra-day hedging.

- While currency exposure cannot be eliminated completely using any of the strategies, it is possible to very significantly reduce FX related profits or losses. In our example, during October 2008 FX losses were reduced from 2.40% to 0.12% using intra-day hedging.
- When the FX exposure is hedged more frequently, the return in the portfolio base currency (Canadian Dollars) tracks the return in the position currency (US Dollars) more closely.
- The SGGG Portfolio System helps managers use any one of these strategies by calculating FX exposure continuously in real-time. Without a system like this portfolio returns will always be subject to currency 'surprises'.

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Hedging a US Equity Position in October 2008

The recent volatility in equity and currency markets has increased concern about currency hedging in Canadian hedge funds. Both managers and investors are interested in finding the best approach to managing the currency exposure inherent in assets denominated in foreign currencies.

In this example we look at a position in US equities held in a portfolio based in Canadian dollars, using different hedging strategies.

For simplicity we assume that the FX hedging is done by buying or selling spot FX. A hedged position is one where the market value of foreign denominated securities is offset by an equivalent FX position in the respective currency. In our example, the long US equity position is offset by a short US dollar cash position.

The hedges could also be structured in other ways (e.g., spot and forward FX transactions) and the results would be very similar. The net FX exposure of the portfolio would be the same as in our examples, and so would the corresponding P/L. The main difference between a cash hedge and a forward/futures hedge is that typically a cash-only hedge will have lower transaction costs and a forward/futures hedge will have lower interest costs. However, the relative costs will vary depending upon the particular situation. Note however, that FX option hedges could have very different results, and are not covered by this example.

Three hedging strategies are compared in this analysis:

1. Monthly hedge rebalancing – the positions are FX hedged at the start of each month.
2. Daily hedge rebalancing – the positions are FX hedged at the open each morning if the exposure has exceeded a pre-defined threshold.
3. Intra-day hedge rebalancing – the hedge is rebalanced during the day, whenever the FX exposure exceeds the threshold.

In our example we use a long \$10 million USD position in SPDRs (S&P500 ETF) and a hedge rebalance threshold of \$200,000 USD.

Monthly Hedging

In October 2008 US equity markets declined sharply as the US dollar rose against other currencies. For a Canadian fund (with a base currency of CAD) holding a net long position in US equities this meant that the net USD currency exposure decreased as the USD strengthened.

Figure 1 below shows the value of a \$10 million USD position in SPDRs over the month of October, with the corresponding CAD/USD FX rate.

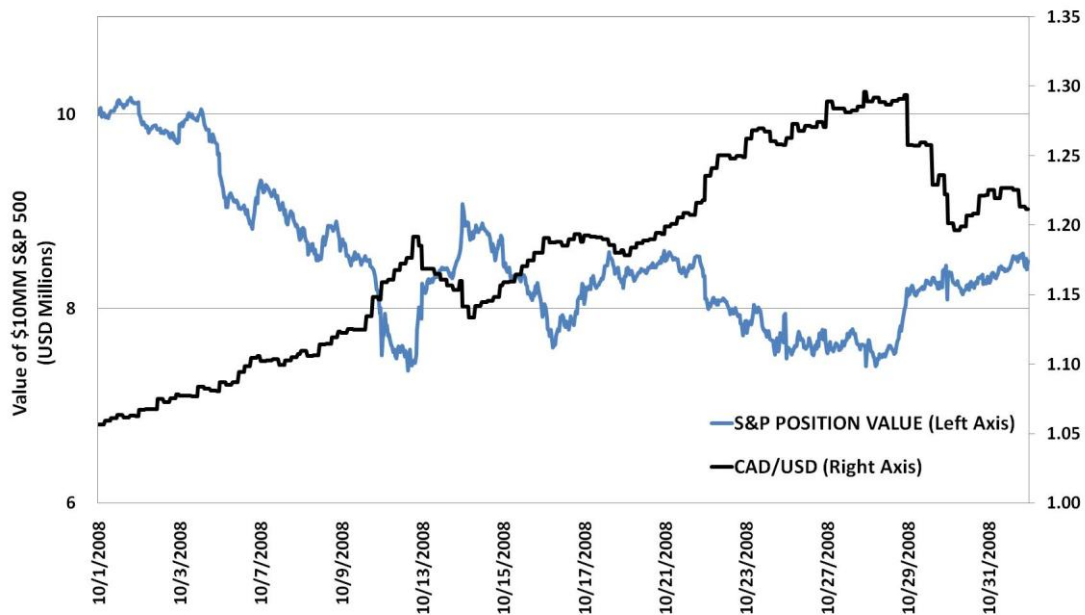


Figure 1 Value of 10 Million USD in S&P 500 vs. CAD/USD FX, October 2008

If a manager bought USD 10,000,000 of US equities (SPDRs) on September 30th, the position would be:

US Equities	10,000,000 USD
US Cash	(10,000,000) USD
Net Currency exposure	0 USD
CAD Value of US Equities [1USD=1.0583 CAD]	10,583,000 USD

If the position was maintained without further rebalancing on October 31st it would be:

US Equities	8,338,913 USD
US Cash	(10,000,000) USD
Net Currency exposure	(1,661,087) USD
Profit/Loss	(1,661,087) USD
CAD P/L @ Oct 31 st FX [1USD=1.2115CAD]	(2,012,407) CAD
USD return [-1,510,389/10,000,000]	-16.61 %
CAD return [-2,012,407/10,583,000]	-19.02 %

These results above would have been achieved if the currency exposure was rebalanced at the beginning and end of the month only – i.e., monthly hedging. The graphs below show the portfolio return in CAD and USD, as well as the currency exposure of the fund during the month of October. The return on the position measured in CAD was -19.02%, with 2.40% of that due to changes in the FX rate.

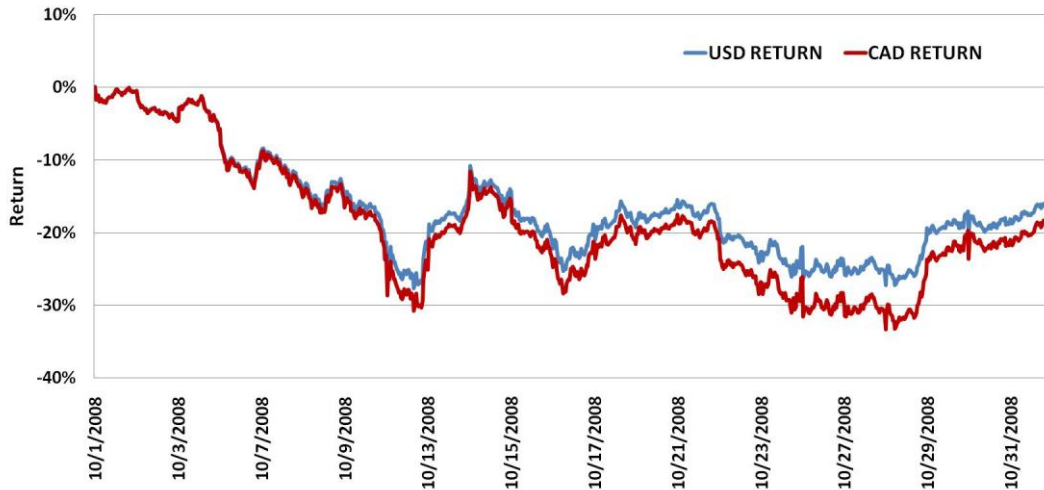


Figure 2 Monthly Hedging: portfolio returns

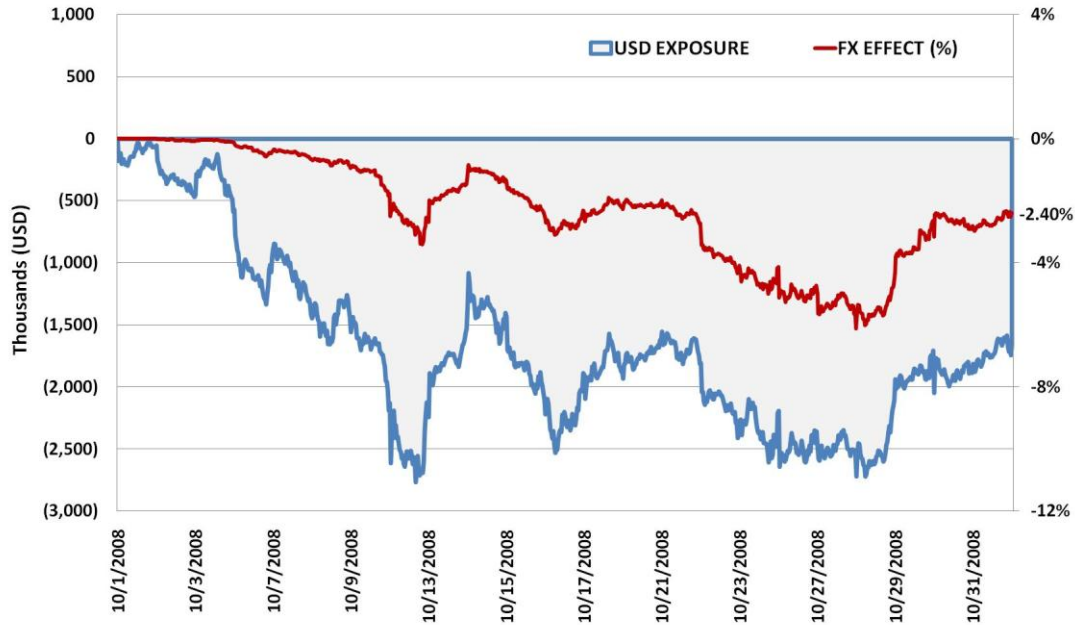


Figure 3 Monthly Hedging: exposure vs. currency profit/loss

Daily Hedging Strategy

In the second strategy we rebalance the hedge at the open each day. If the exposure to USD FX rates was less than \$200,000 no USD were purchased or sold. Figures 4 and 5 below show the cash and position values as well as currency exposure and FX profit/loss with daily hedging.

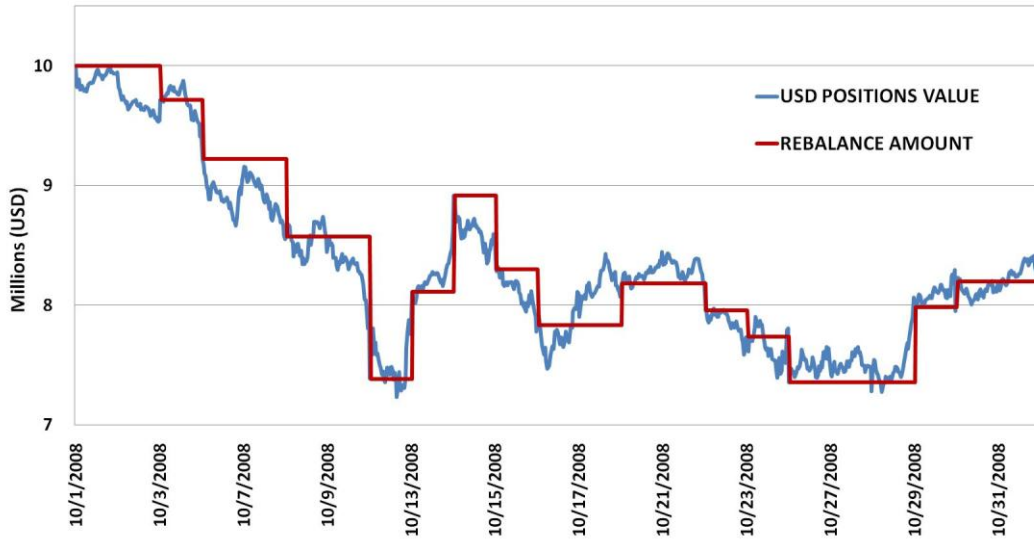


Figure 4 Daily Hedging: USD cash compared to USD equity position value

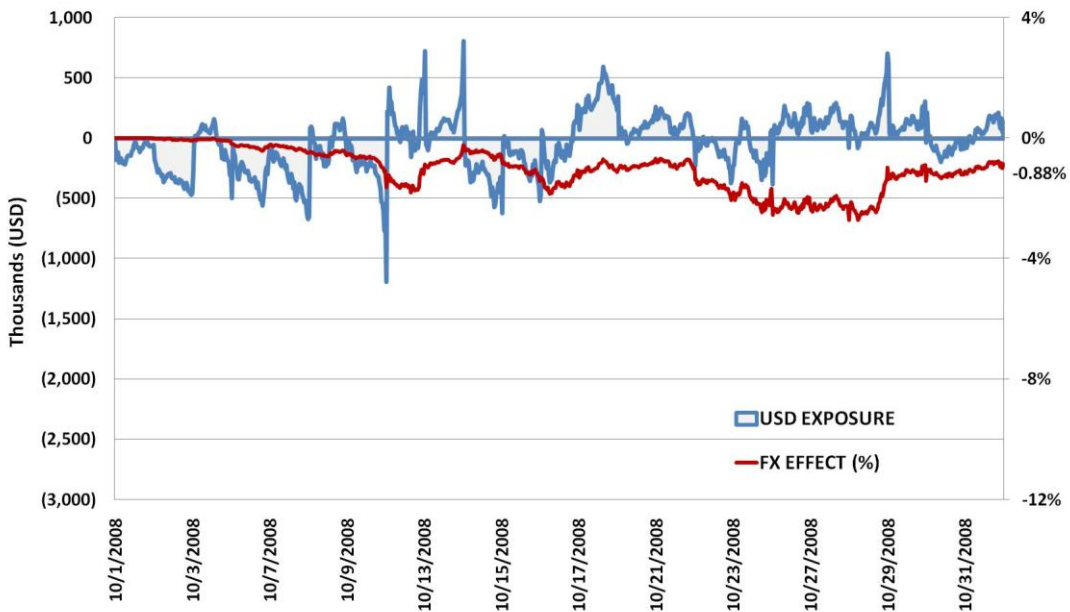


Figure 5 Daily Hedging: exposure vs. currency profit/loss

From figure 5 above it is clear that exposure to USD/CAD FX rates has been significantly decreased through a single purchase or sale of US dollars at the start of each day. Over the month the USD cash position was rebalanced 14 times, with a total transaction volume of \$7.3MM USD. Using daily rebalancing, October's losses due to currency were reduced to 0.88%; from 2.40% with just monthly hedging.

Intra-Day Hedging

The third strategy was to rebalance whenever the currency exposure reached the maximum permitted level. As with the daily rebalance we set this threshold to be \$200,000. Since October was a very volatile month it resulted in rebalancing more frequently than once a day and provided a tighter hedge on currency exposure. In total there were 52 rebalancing cash transactions with a total volume of \$13.3MM USD.

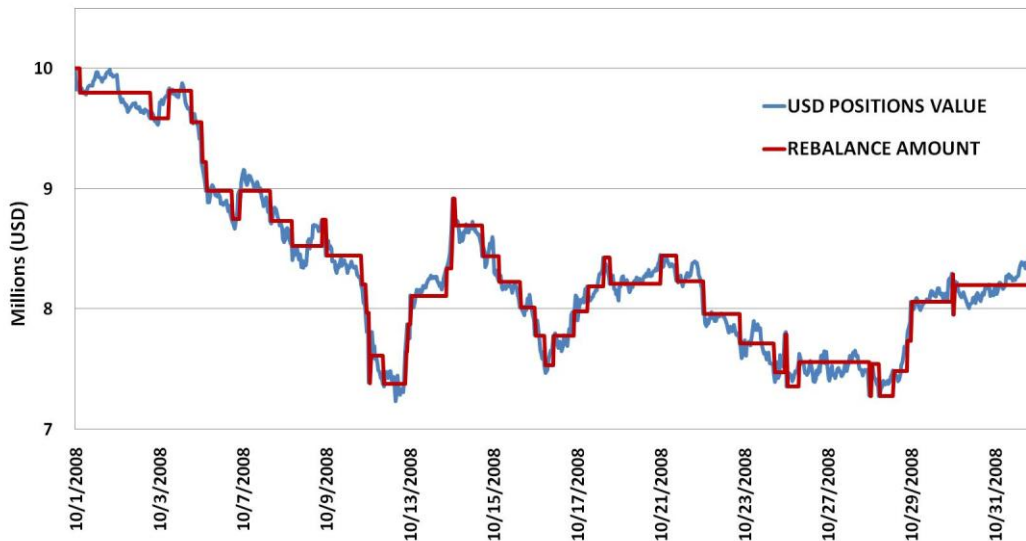


Figure 6 Intra-Day Hedging: USD cash compared to USD equity positions value

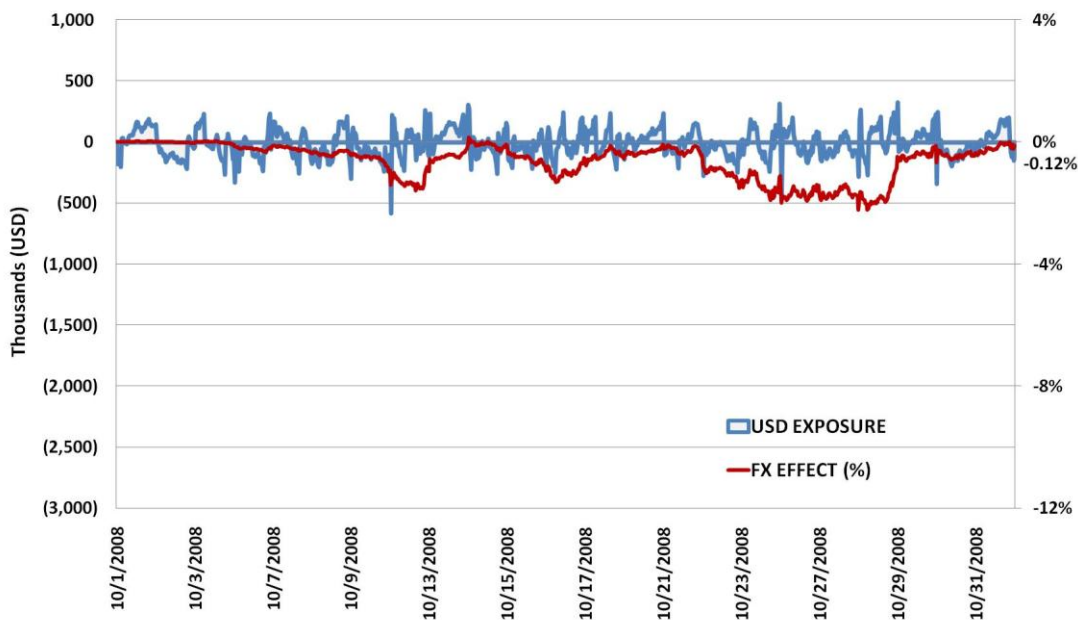


Figure 7 Intra-Day Hedging: exposure vs. currency profit/loss

The more frequent hedging resulted in smaller FX losses through October. The loss from FX exposure was 0.12% compared to a 0.88% loss with daily rebalancing and a 2.40% loss from monthly rebalancing.

Trend Direction and Hedge Effectiveness

Daily and intra-day hedge rebalancing will almost always provide a closer hedge than monthly rebalancing, i.e. it will result in the return in the portfolio currency (CAD in our example) being closer to the return in the local currency (USD).

Although October returns were improved by hedging the foreign positions, there will also be times when the hedge decreases returns in the portfolio currency.

The general rule is that when the value of the foreign equities and the foreign currency move in opposite directions, the monthly rebalanced portfolio will underperform the daily or intra-day rebalance. When the foreign equities and the foreign currency move in the same direction, the monthly rebalance will outperform relative to the daily or intra-day rebalance. In our example, if USD had weakened instead of strengthening while the equities declined, monthly rebalancing would provide a higher CAD return than more frequent rebalancing. However, in all cases, the USD return and the CAD return would be closest to each other with more frequent rebalancing.

If the strong trends experienced in October reversed (i.e. US equities rose and the USD weakened) would the effects of hedging reverse too? In fact they would not – the better hedged portfolio would still outperform the less frequently hedged portfolio if October's trends reversed because the equities and FX rates would still be moving in opposite directions to each other.

Hedging over a longer period

If we test the hedging strategy through the second half of 2008 the results are consistent with what we observed for October.

Month	Jul	Aug	Sep	Oct	Nov	Dec	Total
Intra-Day Rebalance	0.06	1.47	-9.20	-16.76	-8.25	0.50	-29.24%
Daily Rebalance	0.06	1.51	-9.32	-17.41	-8.83	0.46	-30.34 %
Monthly Rebalance	0.07	1.52	-9.39	-19.01	-9.15	0.48	-31.95 %
No Rebalance	0.07	1.52	-9.39	-20.27	-10.34	1.72	-33.06 %
S&P 500 (SPDR) Returns	0.07	1.51	-9.39	-16.61	-7.55	0.40	-28.75 %
FX Percent Change	0.95	3.69	-0.41	14.48	2.87	-2.36	19.85 %

Table 1 Monthly percent returns for different strategies

Over the 6 month period intra-day hedging resulted in a 2.71% improvement in CAD based returns when compared to monthly rebalancing, and a 3.82% improvement compared to no hedge rebalancing at all.

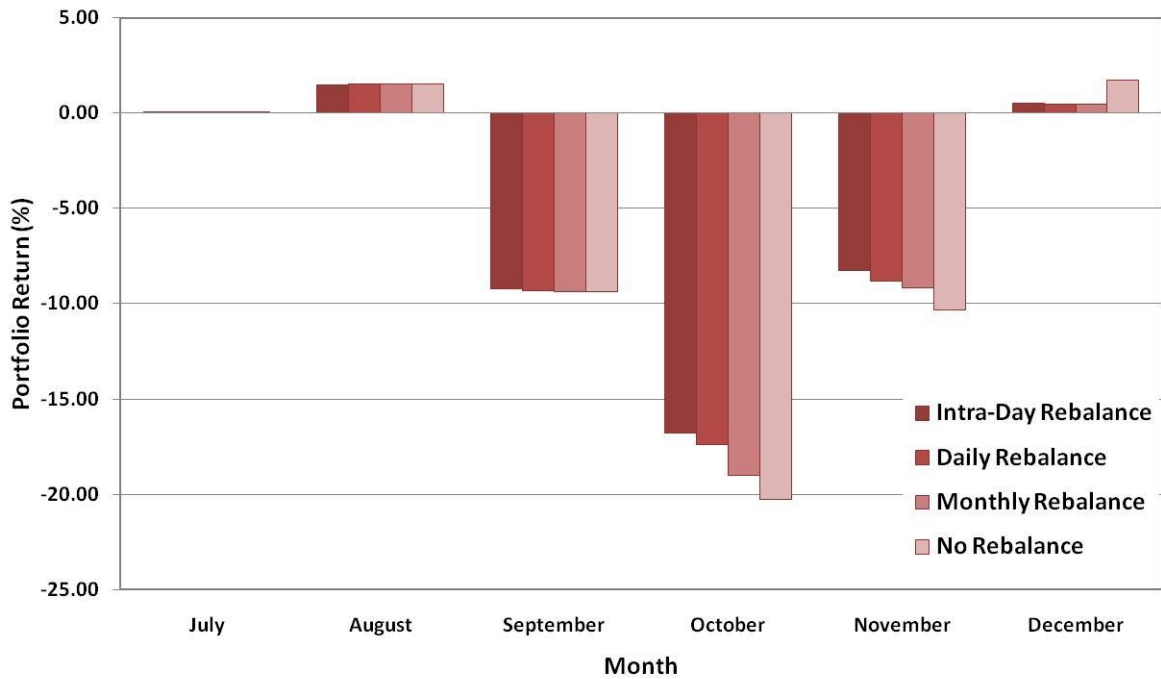


Figure 8 Monthly returns for different strategies

Hedging Using the SGGG Portfolio System

Real Time Exposure Measurement

The Portfolio System keeps track of currency exposure in real time. The screen below shows how the example position above would have appeared on the morning of October 3rd. The net FX exposure of the portfolio is -\$282,995 USD, and this is the amount of US currency which should be bought to rebalance the hedge.

Hedge Strategy Summary:

- NAV: 10,278,215
- Net: 102 %
- Gross: 102 %
- Day: 185 bp
- Month: -288 bp

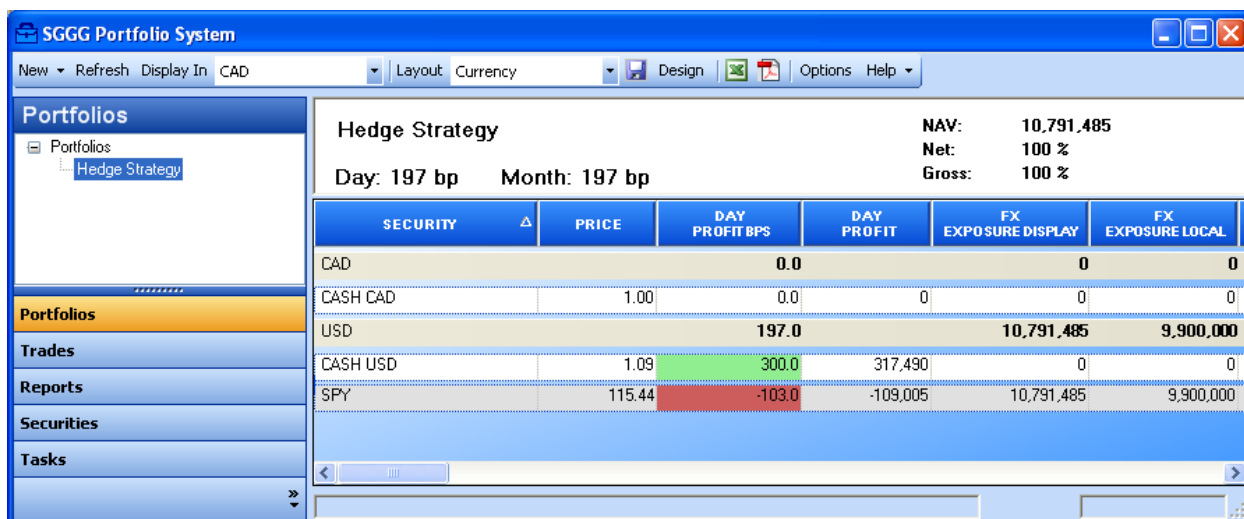
SECURITY	PRICE	FX EXPOSURE DISPLAY	FX EXPOSURE LOCAL	PROFIT	FX RATE
CAD		10,583,000	10,583,000	0	
CASH CAD	1.00	10,583,000	10,583,000	0	1.0000
USD		-304,785	-282,995	-304,785	
CASH USD	1.08	-10,770,000	-10,000,000	0	1.0770
SPY	113.31	10,465,215	9,717,006	-304,785	1.0770

Currency P/L Separated from Equity P/L

The system tracks FX profit or loss separately from the profit or loss on the foreign equity. This helps explain the results of hedging decisions more clearly, and separates the effects of asset selection from currency effects.

For example, if a foreign stock declined by 1% while that currency strengthened by 3%, simply looking at the change in value calculated in the portfolio currency would show the position's return as positive 2%. However the 3% currency gain could be misleading depending upon the FX hedging used. For example, if there was an offsetting short foreign currency position resulting from the stock purchase, that currency position would have lost 3% and there would be no FX gain. Alternatively the currency gain could be the result of a deliberate currency positioning which was likely not related to purchasing that stock. In either case attributing the 2% FX profit to the equity position is misleading.

A more useful representation would be to show the stock position as down 1%, and any related FX gain or loss separately in the foreign cash position. This is how it is done in the SGGG Portfolio System.



The screenshot shows the SGGG Portfolio System interface. The main window displays a 'Hedge Strategy' summary with the following details:

- NAV: 10,791,485
- Net: 100 %
- Gross: 100 %
- Day: 197 bp
- Month: 197 bp

Below the summary is a table with the following columns: SECURITY, PRICE, DAY PROFIT BPS, DAY PROFIT, FX EXPOSURE DISPLAY, and FX EXPOSURE LOCAL. The table contains the following data:

SECURITY	PRICE	DAY PROFIT BPS	DAY PROFIT	FX EXPOSURE DISPLAY	FX EXPOSURE LOCAL
CAD		0.0	0	0	0
CASH CAD	1.00	0.0	0	0	0
USD		197.0	10,791,485	9,900,000	
CASH USD	1.09	300.0	317,490	0	0
SPY	115.44	-103.0	-109,005	10,791,485	9,900,000

Here the SPY position is down USD \$109,005 and the net USD currency gain is \$317,490, giving a total portfolio profit of 197 basis points of NAV.

Conclusion

Using a US equity position held over October 2008 we can see that daily currency rebalancing is significantly more effective than monthly rebalancing. Portfolio returns are closer to the local currency returns when better currency hedging is used, although the actual currency effect depends upon several factors.

The SGGG Portfolio System measures currency exposure in real time, and clarifies the sources of P/L resulting from FX changes. This gives managers the option to reduce FX risk, and the ability to quantify the effects of their chosen hedging strategy.

Without a tool like the SGGG Portfolio System any manager with foreign currency denominated assets is not fully in control of their portfolio; their portfolio returns will always be subject to currency 'surprises'.

NOTES:

1. For daily and monthly hedging the hedge is rebalanced based on the opening prices of the equities using the FX rate at 9:30 am
2. Transaction cost are ignored – i.e. currency transactions are done at the interbank mid-price at the time the hedge is done.
3. The currency return is correctly calculated from the relationship:
$$(1 + \text{return in local currency}) \times (1 + \text{currency return}) = (1 + \text{return in portfolio currency})$$

For simplicity we have referred to the currency effect in the paper, where the currency effect is calculated as:

$$\text{Currency effect} = \text{return in portfolio currency} - \text{return in local currency}$$

The results are very much the same, but are simpler to explain.

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