FIRST QUADRANT

Optimal Currency Hedge Ratios – Redux

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FQ Perspective

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As an asset manager, we're often in the position of trying to argue for the inclusion of active management in a fund. However, we thought we would cast our eyes in a different direction, and look at a strategic question rather than a tactical one.

We are not consultants, and so writing about a strategic topic in this Partner's Message might seem a bit out of place. Yet, we had an idea about a possibly overlooked aspect of this discussion, which comes out of our views on active risk. As an active manager, we sometimes have a different perspective on risk, and so it occurred to us that we might be able to bring that perspective to light in a discussion about currency hedging.

So, let's turn on that light, and see what we can shine it on…

Lights on

Managing a pension fund is not easy. You have to study your liabilities (both today's as well as the future stream of liabilities). You have to decide on a strategic asset mix. Then, decide if you're going to include active management in the fund. Then go through the exercise of deciding which managers to hire and in which asset classes. Then, once the fund is "up and running", you have to deal with all the day-to-day aspects, including managing the cash flows to and from the various assets, as well as making all the benefit payouts.

If, as part of the strategic asset mix, you've decided to include any foreign content in your strategic asset mix (either because you have foreign liabilities or you believe that foreign equities and/or bonds are useful for diversification purposes), you have an additional question to answer.[1]

"What do I do with the currency exposure embedded in my foreign asset holdings?"

That question is also known as:

The Search For The Optimal [Currency] Hedge Ratio

There is a good-sized body of literature[2] (both academic and practitioner) that tries to help answer how to manage the currency content of your foreign portfolios. The problem is that the studies disagree enough that the most commonly accepted Optimal Hedge Ratio is 50%, largely chosen as the "Hedge Ratio of Least Regret". But is that the best way to select it?

Simpler is…simpler

We could start the discussion of the optimal hedge ratio along the simplest line, which is the "immunize your fund" approach. In other words,

> **Hypothesis #1**: Unless you have foreign liabilities, your optimal hedge ratio is 100% (i.e. fully hedged, no foreign currency content).

That appears to be a good starting place, but that line of reasoning also would require you to completely immunize your portfolio against your liabilities in all asset classes. While that does deal with the issue at hand, we would agree with many funds and consultants that, while immunizing your portfolio does make sense, perhaps we can do a bit better?

If, instead, you chose a strategic asset mix that does *not* match your liabilities[3] (i.e. if you didn't "immunize" your portfolio completely), you've tried to optimize your policy mix in the hope that you can preserve some of your corpus in the long run. We'd simply include the hedge ratio as one more item to consider optimizing.

Next stop...diversification?

If, therefore, you're willing to consider other hedge ratios, then you might believe that foreign currency exposures can help meet your liabilities, even if those liabilities are not denominated in foreign currencies.

They could, for example, provide diversification to your overall fund, allowing you to allocate risk more effectively (for example, by raising the overall amount of active risk you can take which will increase your overall return).

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Many of the studies that seek to answer the optimal hedge ratio question, do so by looking at it in just that way. In other words, "what is the hedge ratio of the Minimum Variance portfolio?"

Hypothesis #2: Your optimal hedge ratio is the hedge ratio that produces the lowest Variance foreign portfolio.

We've studied this previously[4], but we've updated the study with a few more years' data, and we've added a few more countries to the list. When we look at foreign Equity and Bond portfolios (MSCI World ex-base country and Citi WGBI ex-base country) from January 1980 through April 2004 to see what hedge ratio (to the nearest 10%) has the Minimum Variance, we see:

	Bond	Equity
AUS	100%	80%
CAN	100%	50%
FRA	80%	100%
GER	80%	100%
ITA	90%	100%
JPN	100%	100%
SWD	90%	100%
SWI	80%	100%
UK	90%	100%
USA	100%	90%
Average	91%	92%
Average2[5]	93%	90%

Note that, on average, the Minimum Variance Optimal Hedge Ratio is not 100%! Some foreign currency, even for foreign bond portfolios, is useful as a diversifier.

From Minimum Variance to Maximum Sharpe Ratio

We argued in that previous study that the Minimum Variance rule may not be the best one to use, as using the Maximum Sharpe Ratio as the measure of success makes more sense.[6]

Hypothesis #3: Your optimal hedge ratio is the hedge ratio that produces the Highest Sharpe Ratio foreign portfolio.

	Bond		Equity	
	Minimum Variance	Maximum Sharpe Ratio	Minimum Variance	Maximum Sharpe Ratio
AUS	100%	100%	80%	70%
CAN	100%	100%	50%	50%
FRA	80%	80%	100%	100%
GER	80%	80%	100%	100%
ITA	90%	90%	100%	100%
JPN	100%	100%	100%	100%
SWD	90%	90%	100%	70%
SWI	80%	70%	100%	90%
UK	90%	100%	100%	100%
USA	100%	100%	90%	60%
Average	91%	91%	92%	84%
Average2[5]	93%	93%	90%	80%

You can always create a more "optimal portfolio" (i.e. one with the same risk and more return) by finding the portfolio with the Maximum Sharpe Ratio, then scaling back (by holding cash) to the Minimum Variance risk level.

For Bonds, the Optimal Hedge Ratios are nearly identical, while for Equities, the Maximum Sharpe Ratio Optimal Hedge Ratio is a bit lower than the Minimum Variance one. We saw that conclusion in the previous study as well.

But is that enough?

More importantly, in most cases, the studies are nearly inconclusive, because we simply lack enough data (or a good enough model) to understand the interplay between currency returns and the returns of the underlying asset exposures, as well as the rest of the portfolio.[7] Had we selected a different date range, we would get slightly different results (particularly for the Maximum Sharpe Ratio study).

Even Fischer Blacks' seminal paper[8] contains a result that depends on measuring the average return of equities as well as the average variance of equities and currencies. Depending on the values used, a different result (different than the paper's conclusion of 77%) can be obtained, largely because the difference in Sharpe Ratio between a portfolio with a 0% hedge ratio and a 100% hedge ratio are, when measured over these periods, relatively small. It takes only slight changes to the initial assumptions to result in recommended hedge ratios anywhere from 0% to 100%.

If that's too sensitive...

What happens, though, when we use different measure of risk to select the optimal hedge ratio? We looked at the effect of "higher moments" on the choice of optimal hedge ratio, focusing our analysis on one additional measure. We calculated the largest cumulative downdraft for the same set of data. The Optimal Hedge ratio would be the one with the shallowest downdraft in the portfolio.

How does the analysis look if we look at the Maximum Cumulative Downdraft metric?

	Bond			Equity		
	Minimum Variance	Maximum Sharpe Ratio	Downdraft	Minimum Variance	Maximum Sharpe Ratio	Downdraft
AUS	100%	100%	100%	80%	70%	80%
CAN	100%	100%	100%	50%	50%	0%
FRA	80%	80%	80%	100%	100%	100%
GER	80%	80%	90%	100%	100%	100%
ITA	90%	90%	70%	100%	100%	100%
JPN	100%	100%	100%	100%	100%	20%
SWD	90%	90%	70%	100%	70%	90%
SWI	80%	70%	70%	100%	90%	100%
UK	90%	100%	100%	100%	100%	100%
USA	100%	100%	90%	90%	60%	0%
Average	91%	91%	87%	92%	84%	69%
Average2[5]	93%	93%	89%	90%	80%	61%

Here we see that, if you wish to avoid the worst downdrafts in your foreign Bond portfolio, a hedge ratio of around 90% still seems optimal, which is fairly consistent across the broad market list, and regardless of criteria. For your foreign Equity portfolio, however, the story is rather a bit more mixed. Optimal hedge ratios vary from 0% to 100%, with an average around 60%.

We can also look over rolling 1-, 3-, and 12-month periods, and see which has the smallest downdrafts over those horizons. The detailed picture there is a bit more mixed, as average values are between 76% and 92% for bonds and 64% and 91% for equities, depending on the horizon.

We do see that, as the performance window shrinks, hedge ratios tend to fall, particularly for equities.

When you need it most...

It is interesting also to note that, even for the Bond portfolios, the optimal hedge ratio that performs best in terms of cumulative downdraft is almost always a lower hedge ratio (i.e. more foreign currency content) that either the Minimum Variance or the Maximum Sharpe Ratio hedge ratios. For the worst single period performance rule (over 1-, 3-, or 12-month periods), we see a similar situation, with hedge ratios generally lower than either the Minimum Variance or Maximum Sharpe Ratio hedge ratios. Why is that?

> Your foreign currency content is a modest diversifier of foreign Bonds and Equities *on average*, but is particularly useful when you foreign portfolio (particularly your foreign Equity portfolio) hits a really rough patch. In other words, just when you need the most help, foreign currency helps the most!

Simply put, your foreign currency content is a modest diversifier of foreign Bonds and Equities *on average*, but is particularly useful when you foreign portfolio (particularly your foreign Equity portfolio) hits a really rough patch. In other words, just when you need the most help, foreign currency helps the most!

So, what are you worried about more? Explaining the average return of your portfolio, or protecting against the worst periods of performance?

	Bond			Equity		
	Worst month	Worst 3 month	Worst 12 month	Worst month	Worst 3 month	Worst 12 month
AUS	100%	100%	100%	10%	70%	100%
CAN	100%	100%	80%	0%	0%	100%
FRA	80%	60%	100%	100%	100%	100%
GER	50%	60%	100%	100%	100%	100%
ITA	60%	60%	70%	100%	100%	90%
JPN	80%	60%	90%	100%	100%	100%
SWD	40%	30%	100%	100%	100%	100%
SWI	70%	70%	90%	100%	100%	100%
UK	80%	100%	100%	100%	100%	100%
USA	100%	90%	80%	0%	0%	30%
Average	76%	73%	91%	71%	77%	92%
Average2[5]	79%	76%	91%	64%	71%	91%

Still Sensitive?

We'd also mentioned that the choice based on Maximum Sharpe Ratio was more sensitive to the inputs (more true for Equity portfolios than Bond portfolios, where the case is relatively strong for a fairly high hedge ratio—though not necessarily 100%), what about the Cumulative Downdraft metric?

When you look at the difference between the optimal and least-optimal metrics, we see that the difference for Equity portfolios breaks down as:

Maximum Sharpe Ratio	Minimum Cumulative Downdraft
0.12 annualized IR	6.10%

So, for the Maximum Sharpe Ratio study, the difference between the Best and Worst portfolios IR was a scant 0.12 annualized on average. For the Cumulative Downdraft metric, however, the difference in cumulative downdraft is an average of over 6%. Quite a measurable difference!

Perhaps we can quiet the debate a bit?

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Endnotes

1 *You did remember to ask, "do fully hedged foreign equities and/or bonds diversify?" If you didn't, then it's not the equities or bonds that may be the diversifier, but the currency content in the unhedged foreign equities and/or bonds that is the diversifier!*

2 *Which we've contributed to as well. FQ Research Briefing, "Currency Hedging: What is an Investor to Do?", Feb 2001.*

3 *If you're a foundation or endowment, then your liability is likely related to either inflation or the mandatory payout necessary to retain your tax status.*

4 *FQ Research Briefing, "Currency Hedging: What is an Investor to Do?", Feb 2001.*

5 *Average2 is the Average across all markets except FRA, GER and ITA have been replaced with the single EMU country, which is simply the average of those three markets.*

6 *Simply put, you can always create a more "optimal portfolio" (i.e. one with the same risk and more return) by finding the portfolio with the Maximum Sharpe Ratio, then scaling back (by holding cash) to the Minimum Variance risk level.*

7 *If we were to look over different date ranges (either shorter or simply different), we would expect to see different results (generally with lower hedge ratios as the time horizon shrinks).*

8 *Fischer Black, "Universal Hedging: Optimizing Currency Risk and Reward in International Equity Portfolios", Financial Analysts Journal, July-August 1989, pp 16-22.*

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