A FORWARD-LOOKING APPROACH TO STRATEGIC CURRENCY HEDGING

A Canadian-Based Investor Perspective

By John Osborn, CFA®, and Kendra Kaske, ACIA, ASA, FRM

Canadian-based investors who believe that the Canadian dollar will continue to exhibit pro-cyclical behavior can reduce equity volatility by retaining foreign currency exposure, especially to the U.S. dollar. In addition, investors who believe that currencies mean-revert to purchasing-power parity over the long term can follow a simple dynamic rule to enhance return.

We explore three ideas to better inform strategic currency-hedging policy: (1) consider multiple pair-wise currency relationships rather than a single foreign currency basket; (2) base policy on forward-looking beliefs rather than historical data; and (3) adopt a market-aware dynamic strategy based on purchasing-power parity to enhance return.

This article addresses the starting point of a strategic currency policy—what the default static exposure should be (e.g., unhedged, partially hedged, fully hedged), and examines whether a simple dynamic rule can enhance this static policy.

Consider Currency Pairs

A common approach to strategic currency hedging is to analyze a single-currency basket representing the investor’s foreign equity or bond portfolio. This approach may mask relationships that exist for individual currency pairs that may not be obvious in an aggregate basket. Of particular interest to Canadian-based investors is the distinction between commodity and reserve currencies. We will show that commodity currencies such as the Canadian and Australian dollars tend to show pro-cyclical behavior as they tend to appreciate and depreciate in line with commodity prices and equity markets. For Canadian and Australian investors, it therefore follows that exposure to foreign currencies is anti-cyclical and risk-reducing. Furthermore, reserve currencies tend to show anti-cyclical behavior, particularly when they benefit from a flight to quality during times of economic and financial stress.

Data and Methodology

To explore these and other currency relationships, we analyze seven developed-market currencies and a portfolio representing six foreign equity markets. To simplify the analysis, our portfolio uses static weights proportional to market-cap weights as of December 31, 2012. Note that we are not attempting to replicate the performance of market indexes such as the Russell Global Index or MSCI ACWI Index; rather, we are attempting to compare how this statically weighted portfolio comprising only the largest developed equity markets would have performed historically using different hedging strategies. This weighting scheme may in fact be a better representation of future market weights than historical market weights. For example, Japan currently has a weight of about 7 percent in world indexes compared to more than 40 percent in the late 1980s, so Japan and the yen influenced historical returns of broad indexes in ways that are unlikely to reoccur in the future.

Most of our analysis covers the period 1999 to 2013, with selective analysis back to 1970. The euro came into existence in 1999, the Canadian dollar became a floating currency in 1970, and the U.S. dollar came off the gold standard in 1971.

Domestic investors who hedge the currency exposure of their foreign investments earn hedged returns rather than local currency returns. Therefore we need to calculate the return of hedged assets and “currency surprise,” rather than local currency returns and the change in spot exchange rates. Currency surprise can be calculated as the difference between hedged and unhedged returns, by using spot and forward exchange rates, or from spot rates and interest rate differentials. All three methods...
are used depending on the available data. The appendix provides details of the formulas and relationships.

We focus on the relationship between hedged equity returns and currency surprise. A short discussion of how this framework would apply to other foreign assets such as bonds and infrastructure is provided in the sidebar on the previous page.

Commodity and Reserve Currencies

Earlier we introduced the idea of commodity and reserve currencies. If this idea has any validity, what would we expect to see in the data? Our first premise is that the Canadian and Australian dollars are pro-cyclical. This means that their currencies should rise and fall in line with the economy and equity markets. So we expect to see positive correlations between equities and these two currencies. Or equivalently, we expect to see a negative correlation between equities and a Canadian-based investor’s foreign currency exposure. Our second premise is that reserve currencies are anti-cyclical. We therefore expect to see the following:

- Negative correlations between equities and currency surprise exposures to the U.S. dollar, euro, yen, pound, and Swiss franc—based on the pro-cyclical commodity currency argument
- An especially high negative correlation between equities and currency surprise exposure to the U.S. dollar—based on the pro-cyclical Canadian dollar and anti-cyclical U.S. dollar reserve currency
- Lesser, but still negative, correlations between equities and currency surprise exposures to the pound and yen
- A positive or zero correlation between equities and currency surprise exposure to the Australian dollar—given that the Australian dollar and our base Canadian dollar are both commodity currencies

Table 1 shows the correlation of hedged equities to each of our six currency pairs and a reserve currency basket. Figure 1 shows rolling correlations for reserve (USD, EUR, CHF) and commodity (AUD) currencies. All of our expectations are met. The negative correlations range from −0.57 for the U.S. dollar to −0.24 for the euro. The correlation for the Australian dollar is +0.26. The size and persistence of the negative correlations between equities and reserve currencies is notable. The strong implication is that exposure to foreign currencies, except the Australian dollar, helps dampen equity market volatility.

Table 2 confirms this result by comparing equity portfolio volatility for three hedging policies: unhedged, 50-percent hedged, and 100-percent hedged. The unhedged portfolio has the lowest volatility as predicted, and its volatility of 12.5 percent is below that of the S&P/TSX Composite Index of 15.4 percent for the same period. This was true for the full period, the pre-2008 crash period, and the period since 2008. Currency exposure dampens equity market volatility for Canadian-based investors.

Our analysis is based on the period since the euro came into existence, namely since 1999. We extend the analysis back to 1970 for the largest currency, the U.S. dollar, to further verify our findings. Figure 2 shows 24-month rolling correlations between the S&P/TSX Composite Index (as a proxy for equities) and U.S. dollar currency surprise. Except for the early 1970s, the correlation has remained negative for most of the period. The 1970s is a particularly interesting...
**Table 2: Results Table–Foreign Equity Portfolio**

<table>
<thead>
<tr>
<th>Policy Hedge Ratio:</th>
<th>6-Country Static Unhedged</th>
<th>6-Country Static 50% Hedged</th>
<th>6-Country Static 100% Hedged</th>
<th>6-Country Static Dynamic PPP</th>
</tr>
</thead>
<tbody>
<tr>
<td>Risk (Standard Deviation)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Period (1999–2012)</td>
<td>12.5</td>
<td>13.3</td>
<td>15.2</td>
<td>13.2</td>
</tr>
<tr>
<td>Pre-Crash (1999–2007)</td>
<td>11.9</td>
<td>12.0</td>
<td>13.0</td>
<td>12.7</td>
</tr>
<tr>
<td>Crash to date (2008–2012)</td>
<td>13.5</td>
<td>15.5</td>
<td>18.6</td>
<td>14.1</td>
</tr>
<tr>
<td>Returns</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Full Period (1999–2012)</td>
<td>0.6%</td>
<td>1.6%</td>
<td>2.5%</td>
<td>3.0%</td>
</tr>
<tr>
<td>Pre-Crash (1999–2007)</td>
<td>0.3%</td>
<td>2.2%</td>
<td>4.1%</td>
<td>3.4%</td>
</tr>
<tr>
<td>Crash to date (2008–2012)</td>
<td>1.2%</td>
<td>0.6%</td>
<td>-0.3%</td>
<td>2.2%</td>
</tr>
<tr>
<td>Crash (11/07–3/09)</td>
<td>-29.2%</td>
<td>-35.9%</td>
<td>-42.4%</td>
<td>-31.6%</td>
</tr>
<tr>
<td>Tech Bubble (4/00–9/02)</td>
<td>-18.0%</td>
<td>-19.4%</td>
<td>-20.9%</td>
<td>-20.5%</td>
</tr>
<tr>
<td>Since 1/1/2006</td>
<td>2.2%</td>
<td>2.4%</td>
<td>2.4%</td>
<td>3.8%</td>
</tr>
</tbody>
</table>

*Source: BNY Mellon; OECD (http://stats.oecd.org/)*

**Figure 2: 24-Month Rolling Correlation of S&P/TSX Composite Index with U.S. Dollar Currency Surprise, 1970–2013**

... but the euro crisis intensified in 2010, undermining the euro’s role as a reserve currency.

“[I]nvestors view the CHF and the USD as safe haven or reserve currencies to which they turn during periods of market turbulence...” (Pyramis Global Advisors 2010)

... but the Swiss franc (CHF) was pegged to the euro in September 2011.

“[I]f an exchange rate appears constantly overvalued in the OECD statistics (like, say, JPY) ...” (Record 2003)

... yet the yen (JPY) reached parity against the Canadian dollar in 2007, and against the U.S. dollar in 1972, 1982, and 1985.

Russell and others traditionally have evaluated the currency hedging decision by examining historical relationships. But as figure 3 shows, currency relationships change. The yen had a positive correlation with equities in the early part of the 2000 decade, but this became significantly negative in the later part of the decade. The euro seems to have shifted from a negative correlation to a zero correlation. Gardner (1994a,b) recognized this instability of currency relationships, leading him to suggest...

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period: The Canadian dollar became a floating currency in 1970, the U.S. dollar went off the gold standard in 1971, and the oil crisis hit in 1973. The oil crisis led to inflation and recession, so our thesis of a pro-cyclical currency linkage transmitted through commodity prices is questionable in this type of environment. And indeed we see near-zero or positive correlation until 1976, but for the decade as a whole the correlation is −0.13 on average. However, should a commodity-led inflationary period cause recession at some future date, the implication may be to hedge at least part of foreign currency exposures.

**Caution: History May Not Be a Good Guide**

With apologies to the respective and respectable authors, consider the following statements from prior currency work:

“[O]ur finding ... suggests that the euro has partially replaced the dollar as a reserve currency ...” (Campbell et al. 2010)
A 50-percent hedge ratio to minimize regret when historically observed relationships are uncertain.

As an alternative to observed historical relationships, Toner (2010) suggested using currency factors such as value, carry, and trend. We explore the use of purchasing-power parity (PPP) as a value factor in our dynamic strategy in a later section. In the preceding sections, we have analyzed the behavior of currencies using historical data. However, we advocate basing policy on forward-looking beliefs rather than these historical observations. In particular, if a Canadian-based investor believes that the Canadian dollar will continue to be procyclical, an unhedged default hedge ratio is consistent with this belief. If this forward-looking belief changes or becomes uncertain, we advocate changing policy.

Purchasing-Power Parity
PPP has extensive support both in theory and practice. It is based on the “law of one price” stating that exchange rates between currencies are in equilibrium when their purchasing power is the same. Many other factors impact exchange rates in the short and medium term, including carry, trend, productivity, and capital flows. This makes PPP a poor choice as an active management tool. However, its long-term nature may be helpful in selectively adjusting strategic policy in a dynamic market-aware way.

Figure 4 shows the ratio of PPP to market exchange rates for our six currencies relative to the Canadian dollar since 1970.

Note that every currency was undervalued at some point, every currency was overvalued at some point, and every currency returned to parity eventually. That is a 100-percent success rate. The cycles can be lengthy: more than 10 years in the case of the U.S. dollar in the 1990s, and about 20 years for the Japanese yen ending in 2007. But return to parity they all did, eventually. Research has shown PPP to be the most dependable value factor in currency markets. Also worth noting are the periods 1983 to 1995, and 1995 to 2008. In the first period, every currency rose relative to the Canadian dollar, benefiting an unhedged default policy. In the second period the reverse occurred, causing losses for an unhedged policy. This illustrates the challenge of adopting any static hedge ratio. An optimal policy that seeks to minimize volatility does produce undesirable returns for long periods of time. Even a 50-percent hedge ratio that seeks to minimize regret will still incur actual losses or opportunity costs over extended periods.

A Dynamic PPP Strategy
Can we use the characteristics of exchange-rate movements relative to PPP to improve the performance of a static hedge ratio? We created a simple rule to test this idea: Hedge exposure to currencies that are 20 percent or more overvalued; remain fully exposed to currencies that are more than 20 percent undervalued; return to the default hedge policy only when the currencies get back within a ±5-percent band around parity. We designed this rule with its purpose in mind, namely a slow-twitch process to occasionally adjust a static strategic policy. We are not attempting to create...
an active management process. In addition to being easy to explain to an investment committee, this rule is also easy to implement. Our simulation from 1999 (inception of the euro) to 2013 resulted in 15 trades over this 14-year period, in addition to the five trades at the start of the period. That’s one trade per year on average after inception. Relative to a default 50-percent hedge policy, it provided 1.4-percent annualized additional return with similar portfolio volatility. An unhedged policy had the lowest volatility over the period, but it also had the lowest return compared to a 50-percent policy and a fully hedged policy. This dynamic strategy matched to a 50-percent default hedge ratio exceeded the return of all three static strategies. Table 2 and figure 5 show the results of the simulation.

The dynamic PPP strategy has the intuitive appeal of being equilibrium-based, forward-looking because it does not rely on historical patterns or anomalies, and market-aware in that it considers the prevailing level of spot exchange rates. More complex rules could be designed and other signals such as carry could be added, but we have purposely kept this process simple. The strategy does not force trades. If currencies are well-behaved and remain near parity, no trades take place. This is a good thing because it implies low currency volatility. The payoff pattern in figure 2 shows periods of flat excess return or no payoff followed by periods of strong payoff when exchange rates rapidly move toward parity. It only trades when currencies are significantly out of line with PPP, when the risks and opportunities are greatest.

No More Regret
Intuition may suggest that currency exposure should increase a portfolio’s volatility because currencies are volatile. This turns out not to be the case for Canadian-based equity investors. The diversification effect on equity portfolios of foreign currency exposure is strong enough and persistent enough to more than offset the volatility of currencies. This is because the Canadian dollar is pro-cyclical and therefore foreign currency exposure is anti-cyclical. The implication is that investors should remain unhedged, except perhaps to the Australian dollar.

An optimal hedge ratio may be successful in reducing volatility but is susceptible to adverse currency movements over long periods of time. For this reason, some investors have adopted a 50-percent hedge ratio to minimize regret (Curwood et al. 2005). A dynamic PPP strategy reduces or eliminates this regret, allowing the investor to adopt the optimal policy with greater confidence. Market exchange rates deviate significantly from PPP levels in the short- and medium-term, but they mean-revert to PPP levels over the long term. This makes PPP a poor active management tool but an excellent tool to occasionally adjust a static hedge ratio.

Combining an unhedged static hedge ratio with a dynamic PPP adjustment provides an opportunity to both reduce risk and enhance return.

John Osborn was until his retirement in April 2013, director, consulting, Americas Institutional. The author wishes to thank Russell consulting clients for their challenging questions over the past 21 years. Their questions have been the catalyst for some of Russell’s best research, and the key to the author’s enjoyable and rewarding career.

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Appendix
OECD PPP Calculation
(Extracted from OECD “Purchasing Power Parities for GDP”)
“The basket of goods and services priced for the PPP exercise is a sample of all goods and services covered by GDP. The final product list covers around 3,000 consumer goods and services, 30 occupations in government, 200 types of equipment goods and about 15 construction projects.

PPPs are calculated for all OECD countries every three years for the benchmark years. The results are published at the end of year t +2 for year t. Last calculated results are for 2008. Between benchmark years, PPPs for European countries are annual results calculated by Eurostat and PPPs for non-European countries are estimated by the OECD using implicit price deflators.

PPPs are revised twice a year in June and in December. In June, only the last year is updated. In December, a new year is added and historical series are revised. PPPs for benchmark years are not revised.”

Feature | A Forward-Looking Approach to Strategic Currency Hedging

Figure 5: Purchasing Power Parity/Foreign Exchange Ratio

Currency Cheat Sheet

- U.S. investor
  - CAD depreciates, i.e., USD/CAD rate declines, CAD/USD rate rises
  - U.S. investor suffers currency loss on unhedged CAD asset
  - If USD/CAD and equity markets are positively correlated, U.S. investor loses twice in an equity bear market; e.g., in period 4/08–2/09:
    - USD/CAD rate declined from 0.99 to 0.79 (CAD/USD rate rose from 1.01 to 1.27)
    - currency surprise impact was −14% (unhedged exposure exacerbated equity market decline)
  - In this case, U.S. investor should hedge CAD
- Canadian investor
  - CAD depreciates, i.e., USD/CAD rate declines
  - CAD/USD rises, i.e., USD appreciates
  - Canadian investor earns currency gain on unhedged USD asset
  - If USD/CAD and equity markets are positively correlated, then Canadian investor’s exposure to CAD/USD rate is negatively correlated and any loss on USD asset is mitigated by currency exposure
  - In this case, Canadian investor should not hedge USD

Currency Formulas

- UR = HR + CS
- LR = UR + SR
- SR = CS + FP
- s(t) / s(t–1) – 1
- FP = f(t–1) / s(t–1) – 1
- Int(base) – Int(foreign)
- CS = s(t) / s(t–1) – f(t–1) / s(t–1)

Where:

- UR = unhedged return
- HR = hedged return
- LR = local return
- CS = currency surprise
- SR = currency spot return (change in spot fx rate)
- FP = forward premium (spread between forward and spot rates)

Endnotes

1. Toner (2010) is the basis for many of the ideas contained in this paper, including considering currency factors rather than historical data, and using dynamic rules and focusing on currency pairs rather than a single currency basket. The analysis and framework could be extended to include other conscious currency elements, including using a currency-weighting scheme not tied to equity market weights, and incorporating carry and trend in the dynamic process.

2. This does not hold for some emerging markets whose currency rates are perpetually above PPP.


4. For example, the trading rules embedded in Russell’s EAA and VRAA strategies.

Table A1: Sample Correlations Required to Equalize Hedged and Unhedged Equity

<table>
<thead>
<tr>
<th>Volatility of Hedged Asset</th>
<th>Volatility of Currency Surprise</th>
</tr>
</thead>
<tbody>
<tr>
<td>5</td>
<td>−0.50</td>
</tr>
<tr>
<td>10</td>
<td>−0.25</td>
</tr>
<tr>
<td>15</td>
<td>−0.17</td>
</tr>
<tr>
<td>20</td>
<td>−0.13</td>
</tr>
<tr>
<td>5</td>
<td>−0.80</td>
</tr>
<tr>
<td>10</td>
<td>−0.40</td>
</tr>
<tr>
<td>15</td>
<td>−0.27</td>
</tr>
<tr>
<td>20</td>
<td>−0.20</td>
</tr>
<tr>
<td>10</td>
<td>−0.50</td>
</tr>
<tr>
<td>15</td>
<td>−0.33</td>
</tr>
<tr>
<td>20</td>
<td>−0.25</td>
</tr>
</tbody>
</table>

References


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