Global Currency Hedging in Global Investment Portfolios

Finance 170 Term Paper

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December 12, 2015

CONTENTS

EXECUTIVE SUMMARY

The report that is included below discusses the impact that currency hedging has on US and international based investment portfolios. Three scholarly articles are described and reviewed within the report and then are compared and contrasted with each other. The main topics of the three articles are as follows.

- How do FX derivatives contracts used within a hedging strategy affect the standard deviation of a portfolio? How might that change for major currencies or currencies in the emerging markets? How might that change based on the type of investment fund that you are hedging?
- When investing in an emerging market, what is the best strategy for reducing the volatility of returns relating to the fluctuating and unstable emerging markets currency? How can the returns of an emerging markets investment be decomposed into different elements?
- When investing in both major and minor currencies, is it best to hedge constantly or hedge on occasion?

After the discussion of the article, the findings of these articles are compared and contrasted with each other in order to find the best overall solution for investment managers that are facing these decisions. The articles are decomposed and dissected to get the main recommendation from each of the authors and then present those recommendations.

After the articles demonstrate the power and effectiveness of currency hedging, I then find evidence to support the downsides and risks that are associated with hedging and investing in derivative investments. These facts were not highlighted in the articles that were reviewed and it is important to consider all of the factors that go into the hedging decision. Two important topics that need to be addressed include risks and costs associated with these contracts. A summary of the associated risks and costs are included below.

- Counterparty Risk – due to the over-the-counter nature of the derivative market, this risk is not diversifiable and is a significant risk that frequently overlooked.
- Opportunity cost of martin capital – for contracts that are traded on the exchange, margin requirements lock up funds that earn a very small return. This capital could instead be invested to get higher returns for the portfolio.
- Net asymmetric upside lost – this cost is related to any currency position that negates an overall net gain based on currency movement. If the investment has a 2% gain solely based on currency movement and is completely and effectively hedged, it will have a 2% loss on the corresponding derivative and a net zero gain.

I continue on by recommending a few questions that investment professionals should ask themselves before entering into a hedging strategy and providing a final recommendation. It is important that investors and money managers understand the impact of their decision making and understand all costs and risks. Through this recommendation, I hope to provide clarity to readers on the implications of hedging and how it can help and hurt their investments.

INTRODUCTION AND OVERVIEW

Investors today have a very difficult decision to make when selecting a mutual fund for their money as there are over 7,238 mutual funds on the market as of the end of 2012 (Silberblatt) and an even larger number of available ETFs. With such a large number of investment opportunities on the market, consumers have to be very smart and selective with their investment choices. Each of these mutual funds are offered by portfolio managers that expose the fund to different types of risks and return opportunities. All investors face market risks that are undiversifiable but each of the different investing strategies allows more specific risks to be assumed by the investors and the portfolio managers ("PM"). A very popular strategy these days is the investment in foreign assets and foreign markets which brings along a new type of risk that is not dealt with in domestic market investing; foreign currency risk.

Foreign exchange[i] ("FX") risk is "the risk of an investment's value changing due to changes in currency exchange rates (Investopedia)". When investors begin to invest in foreign assets, their returns are subject to changes in value relating to the market price as well as the change in foreign exchange rates which can either hurt of help the portfolio performance. For example, a US portfolio manager invests in 2 assets, one in the U.S. markets denominated in USD and one in a foreign market. Asset A is invested in within the PM's come country's currency and returns 6% while Asset B is invested in Great British Pound Sterling ("GBP") and it returns 7%. At first glance it would seem that Asset B is the better investment choice because of the higher return, however, the ultimate return of this asset is subject to the changes in FX rates. If the GBP appreciated against the USD, then the overall return of the foreign asset would be larger than the original 7% due to the change in FX rates. However, if the USD were to gain value against the GBP, then the 7% return in Asset B would actually decrease.

As indicated above, currency returns do play a large effect on foreign currency denominated investments over time. This fact can be seen in a chart that was provided in the research article called *To Hedge or Not to Hedge? Evaluating currency exposure in global equity portfolios* by a team of researchers at Vanguard. The authors take a look at annual returns for the MSCI World Price Index which is a highly diversified index that is comprised of 1,643 companies across 23 developed markets. From there, they highlight how the FX market has changed or impacted the reruns (Peterson, Thomas and Polanco 3).

Figure 1: Annual returns of MSCI World Price Index and the effect of currency returns [1]

[1] Figure derived from Vanguard Research Article- Peterson, Karin, et al. To hedge or not to hedge? Evaluating currency exposure in global equity portfolios. Research Document. Valley Forge, PA: Vanguard Research, 2014. Web - PDF.

Ranked annual returns of MSCI World Price Index in various currencies, 2004–2013

2004	2005	2006	2007	2008	2009	2010	2011	2012	2013
15.2%	27.5%	21.8%	9.6%	–17.4%	34.3%	20.1%	–1.8%	31.0%	54.8%
10.8%	26.8%	20.7%	7.7%	–24.9%	30.8%	15.9%	–2.7%	16.5%	47.8%
10.2%	26.7%	20.2%	2.7%	–25.4%	27.0%	12.3%	–4.3%	15.1%	35.9%
7.5%	23.0%	12.3%	1.6%	–37.2%	26.7%	6.5%	–4.7%	14.7%	27.4%
6.9%	17.6%	11.7%	–1.2%	–40.3%	16.4%	1.3%	–5.0%	14.1%	25.0%
6.9%	10.0%	7.9%	–1.6%	–43.9%	11.1%	–1.4%	–5.0%	14.0%	23.7%
6.0%	7.3%	5.8%	–7.1%	–51.6%	1.4%	–2.1%	–9.9%	11.4%	21.9%

U.S. dollar
Swiss franc
Japanese yen
British pound
Euro
Australian dollar
Canadian dollar

Sources: Vanguard calculations, using data from Thomson Reuters Datastream.

Figure 1 above demonstrates the risks and volatility investors face when investing in foreign demotivated assets. The index had a consistent return in 2013 for all investors but depending on which currency the investor was in, determined the net return realized. The Euro investor and the yen investor had a total return difference of 32.9% solely do to the FX market. Based on the new risks that investors face when investing in foreign currencies, PMs must make the choice whether or not they should attempt to mitigate their FX risks through hedging. Hedging is a strategy that produces a reduction of specific risk by purchasing a contract that will offset any drop or rise in value relating to that risk (Moffett, Stonehill and Eiteman G-9). This risk reduction is seen to be a positive thing for investors because traditional thinking indicates that risk is a bad thing and the less risk an investment is, the better the investment is. This overall idea that risk is bad is simply a myth of investing and it is up to portfolio managers to pick and choose what risks to be exposed to and which to mitigate based on the investment policy.

One major differences between investing preferences when dealing with foreign assets is whether or not to remain exposed to the foreign currency risk or just remain exposed to the market risks relating to the foreign asset. Also, when choosing to hedge, how frequently should this be done and what is the hedging strategy that is best for various types of investments? Also, there are certain currencies or markets that would require more complicated hedging strategies than others so which is the best technique for each of the given markets or currencies? Within this paper, we will discuss whether investment managers should remain exposed to foreign currency risks or if they should hedge this risk. If they do choose to hedge foreign currency risks, how frequently should it be done, what is the best way to do so, and which currencies should be hedge and which should be unhedged?

I have become interested in global investing and currency hedging ever since I started to learn about investing and when I started my most recent position at Principal. I currently am working on the Derivatives Accounting team where we handle all of the hedge accounting specifics for the entire company. I was rather interested on how the company handled their foreign currency exposure in their investments and liabilities so I wanted to do more research. I ended up choosing to look at foreign portfolios because there are so many more creative things that investment managers can do in order to reduce foreign exchange risks. Also, I wanted to learn about how the FX market can affect returns on investment portfolios especially relating to Emerging Markets.

I plan on addressing these questions and options in the paper below through an analysis of three different professional periodicals or articles that relate to hedging foreign currency risks. The three articles in the order they are "GLOBAL CURRENCY HEDGING" by John Campbell, Karine Serfaty- de Mederios, and Luis M. Viciera, "Decomposition of Emerging Market Currency Risk: A Hedging Application" by Gavin Francis, Erin Musli, Tom Cella, and "Currency Risks Hedging For Major And Minor Currencies: Constant Hedging Versus Speculative Hedging" by Myoung Shik Choi. After the review of these articles, I will then compare and contrast their theses and results and compare them to the decisions that foreign currency managers have to make.

One very important factor surrounding hedging and the use of financial derivatives are the additional costs and risks that are assumed when hedging. These risks and costs often go over looked because they are either less understood or not as tangible as the other risks and costs of doing business in the financial world. After the comparison and contrasting of the relatively consistent perspectives taken by the selected articles, I will take a deeper look at the risks and costs and ask some important questions that will guide international money managers in their decisions. I will conclude the report with a final recommendation for international portfolio managers and investors on the best way to handle the various hedging options that are available to them based on their real and perceived risks and rewards.

LITERATURE REVIEW

Global Currency Hedging[2]

This first article addresses the first question that I had added earlier which is should investors be exposed to major foreign currencies or should the investment professionals hedge all of their foreign exchange risk. The authors of Global Currency hedging are John Campbell, Karine Serfaty – De Mederios and Luis Viceiera and they try to find the answer to the popular questions regarding foreign currency hedging for both equity and fixed income investors. Through their tests, they find that risk reduction strategies are successful and useful in almost all cases. Once they test that hedging is an effective use of time and energy for investment professionals, they break down the best strategies based on the given investment position including investors in equally weighted portfolio denominated in only once foreign currency, investments denominated in five and seven different foreign currencies, and more.

Thesis of paper

The authors of this paper are focused on the role of foreign currency in diversified investment portfolio and how it can be used in order to protect against various market risks. How do foreign currencies affect portfolio risks and more particularly, how do foreign exchange risk hedging strategies benefit portfolio standard deviation? With hedging, risk management is the overall goal and the authors aim to find the ultimate foreign currency positions that minimize the total risk exposure and standard deviation of equity and fixed income portfolios. The goal of the research is to find the optimal hedging strategy for equity portfolio, bond portfolio, results of unconditional vs conditional currency hedging, effects of currency hedging on portfolio Sharpe ratios on the portfolios, and supporting such claims with the empirical results.

[2] Campbell, John, Karine Serfaty-De Mederios and Luis Viceria. "Global Currency Hedging." *Journal of Finance* (2010): 87-121. Web.

Research methodology and data

In order to find the overall success of using global currencies as a hedging strategy, the authors consider and test seven major global currencies including the US dollar, euro, Japanese yen, Swiss franc, Great Britain pound sterling, Canadian dollar, and the Australian dollar. In their research, the authors use a mean-variance analysis technique to find the foreign currency position or positions that decreases the overall risk exposure of the portfolio. The authors assume a one-quarter year investment horizon for their main testing but they subsequently tested one month and one year with other variables held constant. Tests were conducted for the time periods between July 1975 and December 2005 for all seven currency markets.

Data was collected on stock returns from Morgan Stanley Capital International, while exchange rates, short-term interest rates, and long-term bond yields from the International Monetary Fund's database, the International Financial Statistics database. Since the tests consisted of a one-quarter time horizon, the authors used monthly regressions of overlapping quarterly excess returns (Campbell, Serfaty-De Mederios and Viceria 92).

Since the euro had not been in existence until the late 1990's, the authors had to create a pseudo currency that consisted of a value-weighted basket of Germany, France, Italy, and Netherlands currencies over that time. These countries have been chosen by the authors because they have the longest record of total stock returns, interest rates, and exchange rates. The authors have called this currency and portfolio the "Euroland". This does cause some issue in regards of bias in the research that the authors do address. They state that they believe that market professionals in 1975 at the beginning of testing period that those countries would have reasonably predicted that they would have been the market leaders in the future. Additionally, the authors switched out euroland data points and switched them with specific country data points and the tests yielded very similar results. Therefore, they decided to continue with the testing with the euroland basket.

From this data, the authors log tests on the data ranging over the time horizon of the test and then analyzed the data points. The tests included an annualized mean calculation and standard deviation of short-term nominal interest rates, log stock returns, and bond returns in excess of the short-term local interest rates. Additional testing included cross-country return correlations for currency fluctuations, stock returns, and bond returns.

Findings and conclusion/implications.

Each of the individual currencies provide a different result based and they are not necessarily consistent across the board. Many of the currencies tested by the authors are positively correlated with the world stock markets including the AUD, CAD, JPY, and GBP. However, other currencies such as the EUR, CHF, and the US-CAD exchange are negatively correlated with the world equity market. These findings have many positive implications for portfolio investors as they can effectively reduce the overall risk exposure in a safe and effective manner through hedging. For US equity investors who are seeking ways to minimize the portfolio's overall risk, many of the portfolios that are denominated in a foreign and correlated should be fully hedged. Over the full sample period used by the authors, the application of these findings produced a 135 basis point drop in standard deviation or returns on the global portfolios and over 250 basis point drop on the US portfolio.

The bond portfolios, however, do not yield such positive results. Within the testing, excess returns of bonds over and above the short term local interest rates had very weak correlation with the

change in the foreign currency markets. Therefore little correlation implies that the current practices of fully hedging currency exposures is the optimal path for the bond investors.

The authors also conclude on the overall exposure required when investing in just one country's financial markets or in multiple. These strategies require different amounts of foreign currency protection, hedging and risk minimization. For example, if a country gives exposure in just one country, taking opposing positions in one corresponding currency can help decrease the overall risk of market declines. A At the same time using multiple currencies can effectively pose the same results and such techniques require opposing positions in other currencies to help protect against market declines. Since the USD and CAD are highly correlated, a long position in the USD position can be hedged with a short position in the CAD will be a highly effective hedge for market declines in the US.

Decomposition of Emerging Market Currency Risk: A Hedging Application[3]

Now that we have addressed hedging for major foreign currencies like the Euro, Australian Dollar, Japanese Yen, we shall now address questions around hedging currency risk in emerging markets. The authors of "Decomposition of Emerging Market Currency Risk: A Hedging Application" are Gavin Francis, Erin Misli, and Tom Cella and they are all employees of Pareto Investment Management Limited. The authors dive into the issues surrounding hedging and emerging markets through their research and calculations. One way in which they do this is by breaking down the emerging market risks that are specifically linked to the investments and those that are tied to the currency valuation.

Thesis of the paper

Within the article, the authors Gavin Francis, Erin Musli, and Tom Cella (further known as "FMC") go into detail surrounding hedging foreign currency risks specifically used within emerging market currencies. A common theme among finance professionals is that hedging always reduces risk and one type of hedging can be effective for most or all of the investing techniques on the market. This paper tends to pose certain arguments that have been published in the past and then effectively takes alternative or supportive stances on those positions based on their slightly different techniques or testing strategies.

The emerging markets are a very interesting yet difficult set of markets to work in because of their complexity, lack of liquidity, and high risk. For the average international investor who is not investing in emerging markets, her foreign currency risks will be substantially smaller because she would be able to hedge her position in the foreign currency to make sure she is not exposing herself to such risks. However, emerging markets often times have very illiquid currency forwards and hedging contracts which causes currency risk hedging to be a difficult task for investors. Returns from within an emerging market have to incorporate both foreign currency gains and losses as well as market gains and losses. FMC discuss the importance and tactics that can be taken in order to hedge these difficult situations and how breaking down the returns of an equity investment can be analyzed.

Research methodology and data

FMC utilize some very basic financial formulas in order to analyze the question at hand. These formulas include the Sharpe ratio, correlation, cumulative compounded annual return, volatility and more. However, their unique way of analyzing returns and risks includes splitting the returns and of the

[3] Francis, Gavin, Erin Musli and Tom Cella. "Decomposition of Emerging Market Currency Risk: A Hedging Application." *Journal of Perforamnce Measurement* (2013): 16-28. Web.

emerging markets into returns based on the equity asset as well as the currency. Additionally, for non-USD investors, they take this one step even further to include the return of the home currency to the USD in relation to the emerging market currency as well as the return of the security within the emerging market. By the end of their dissecting, and rearranging, the formula that they are able to use to analyze the components of emerging market returns is:

(EMeq – AUDcash) = (USDcash – AUDcash) + (EMcash – USDcash) + (EMeq – EMcash)[4]

They dissect the overall return of the equity asset in the emerging market from the perspective of an AUD investor into 3 main pieces:

- (USDcash – AUDcash) which represents the value change between the USD currency and the AUD currency,
- (EMcash – USDcash) which represents the change in value between the USD currency and the emerging market currency, and
- (EMeq – EMcash) which represents the overall return of just the equity asset without any other factors.

Findings and conclusion/implications.

Based on the studies and findings from these tests, the authors suggest that US based investors should take equity positions in emerging markets without taking corresponding positions to hedge their foreign currency exposure. The facts that the authors provide conclude that this exposed positions are more favorable because they provide a higher return and a higher risk premium. Figure 1 that is included within the article shows the return of a hedged, unhedged emerging markets equity including currency along with the return of the currency. Clearly, taking an unhedged position in the emerging market equity investment is favorable because it gives a higher return. Also, correlation and other relationships showed that a hedged position actually hurt the overall returns without really having an effect on the overall risk ratings.

For non-US asset managers, money managers should consider using foreign currency hedging for the US dollar component of the emerging market's currency risk. Since the US to emerging markets position provides favorable investing conditions, the authors effectively suggest that non-USD investors take a USD position by hedging currency risk to replicate exposure to that of the USD. This is a much simpler way to hedge foreign currencies because of the availability of the hedging instruments between major currencies and the USD. This form of hedging can easily be added to the investing strategy and it can be a simple add or fix. When hedging against the USD portion of the risk, any over effectiveness and over performance of the hedging strategy can be added to the risk premium and returns over the dollar which is helpful for the investors.

Currency risks hedging for major and minor currencies: constant hedging versus speculative hedging[5]

Our previously highlighted have answered the questions surrounding which types of currencies to hedge, how might you hedging change in your portfolio depending on your exposure to emerging

[4] Formula created by FMC as retrieved from Francis, Gavin, Erin Musli and Tom Cella. "Decomposition of Emerging Market Currency Risk: A Hedging Application." *Journal of Perforamnce Measurement* (2013): 16-28. Web.

[5] Choi, Myoung Shik. "Currency risks hedging for major and minor currencies: constant hedging versus speculative hedging." *Applied Economics Letters* (2010): 305-311. Web.

market currencies and how hedging effects bond and equity portfolios. Here, the author, Myoung Shik Choi, goes takes these assumptions to the next step by testing whether or not investors should constantly hedge or hedge on occasion, also known as speculative hedging. Choi tests this decision for both major currencies (as tested in the first article) and emerging market currencies (as tested in the second article). He also tests the effectiveness of hedging when hedging risk of a single currency of multiple.

Thesis of the paper

Within the article, the author, Myoung Shik Choi, goes into detail surrounding hedging foreign currency risk and how it is used by various traders. Choi goes analyzes two main types of hedging managers who use currency hedging at different rates. Constant hedgers are managers who are very risk averse to currency risk and they elect to hedge all FX risk. For any position that they take in a foreign financial asset, they immediately take a position in derivatives positions, such as currency futures or currency swaps that eliminate or substantially reduce the foreign currency risk of the investment. Other traders, however, are more open to foreign exchange risk so they choose whether or not to hedge the risk based on the given situation. Additionally Choi examines and addresses the effects of the type of currency that a trader is hedging including analysis involving currencies of major and minor countries throughout the world. Throughout the article, Choi describes how each of these strategies are beneficial and examines their weak points. Choi's goal is to find the optimal hedging strategy between speculative and constant for a variety of scenarios including the use of both major and minor currencies.

Research methodology and data

Choi has three factors that he tests in order to find the best result. Throughout the period he examines the information that is shown in the below.

Exhibit 1: Testing Strategies used[6]

Hedging Strategy	Constant Hedging	Speculative Hedging
Currency Type	Major Currency	Emerging Market Currencies
Number of currency hedged	Single	Multiple

The testing is conducted based on a formula that calculates the value of the total currency risk after hedging as a function of the spot rate changes, the hedge ratio, and the furors contact price. The main formula is as followed:

Minimize f (Zt+n) = Var (St+n _ HtFt, +n.)[7]

- Where $f(Zt+n)$ is the total currency risk, $St+n$ is the spot exchange rate, Ht is the calculated hedge ratio, and where $Ft,+n.$ is the futures contract price.

This formula is designed to calculate the total amount of foreign currency based on the function of the variables included. The total FX risk is a function of the variability between the current spot rates

[6] Testing strategies used by Choi in "Currency risks hedging for major and minor currencies: constant hedging versus speculative hedging."
[7] Referenced by Choi in "Currency risks hedging for major and minor currencies: constant hedging versus speculative hedging." As a as a part of testing and calculating total currency risk and the optimal minimization level.

minus the hedged currency ratio times the future contract rate. The hedge currency ratio is calculated by dividing the hedging currency amount and dividing that by the hedged currency amount, or in other terms, the notional amount of the hedging instrument over the notional amount of the unhedged position (Choi).

Choi begins his testing by examining how the different hedgers use the hedging assets. For example, constant hedgers will always use hedging instruments when exposed to a foreign currency so their hedging ratio will be 1. The more challenging technique to analyze is the speculative hedging because they can either be over or above 1 depending on the type of instrument, investment and type of situation. Choi briefly explains the types of positions that speculative hedgers take including what hedging position to take when hedging a liability and asset. Traditionally these traders take long positions in hedging instruments when hedging a liability and a short position when hedging an asset. These actions effectively counterbalance the FX gain or loss over the investment period.

During the study, Cho tests the different strategies and currencies over 5, 10, and 20 days. Choi selected to use the Australian Dollar and the Euro per USD for his testing of major currencies. The minor currencies that he selected were the Cyprus Euro (CYP), the Fiji dollar (FID) and Maltese lira (MAL). He reports the hedging ratios for the constant trader and the speculative over the respective periods. Additionally, Choi addresses the hedging effectiveness as an overall percentage figure. Another element to the test of minor currency included closely relating a currency in which it can be slightly linked to. For example, hedge effectiveness for the Malta and Fiji currencies were tested in conjunction with the Euro and Australian Dollar. This caused hedge effectiveness to increase.

Findings and conclusion/implications.

After testing and addressing the various variables that portfolio managers face, Choi concluded that speculative hedging is effective in reducing currency risk of an investment over all time periods that were tested. Additionally when looking at major currencies, speculative hedging was slightly more effective than the constant hedging. In the case of hedging minor currencies, both single and multiple currencies hedging strategies proved to be effective for most currencies but it did not work perfectly for all.

CRITICAL ANALYSIS

Within the three articles that were included in the paper above, we have dissected the different hedging strategies and their relative effectiveness for reducing currency risks. One of the common themes amongst the articles and papers that were included above was the fact that hedging does reduce the overall volatility and standard deviation of the portfolio. Each of the articles agrees that this strategy is effective in reaching its goal, risk and volatility reduction.

Comparing and contrasting the articles

Articles 1, 2 and 3 above all assert the fact that hedging of some kind is successful to reduce volatility and standard deviation, or risk, of the portfolio. In the first article, *Global Currency Hedging*, Campbell, Serfaty-De Mederios and Viceria go into great detail about how hedging global currencies can reduce volatility and it was proven in their empirical tests. In the tests, the standard deviation of their hedged portfolio was over 135 basis points lower for foreign currency denominated funds than the unhedged counterpart. The USD denominated international portfolios also noticed a 250 basis point decrease in standard deviation, a clear sign that hedging strategy is accomplishing its main goal (Campbell, Serfaty-De Mederios and Viceria).

The fact that the USD denominated funds are more effective with their hedging than the foreign currency denominated funds is also supported by the second and third article. In the article titled, *Decomposition of Emerging Market Currency Risk: A Hedging Application*, Francis, Musli, and Cella point out that hedging emerging market currencies as a non USD investor is not very effective. Instead, any investor that has a portfolio that is not denominated in USD should hedge any currency exposure against the USD instead of the emerging market currency itself (Francis, Musli and Cella). This conclusion is very similar to the conclusion that was made in *Global Currency Hedging* where they demonstrate that non USD investors have a hard time having effective currency hedges with emerging markets.

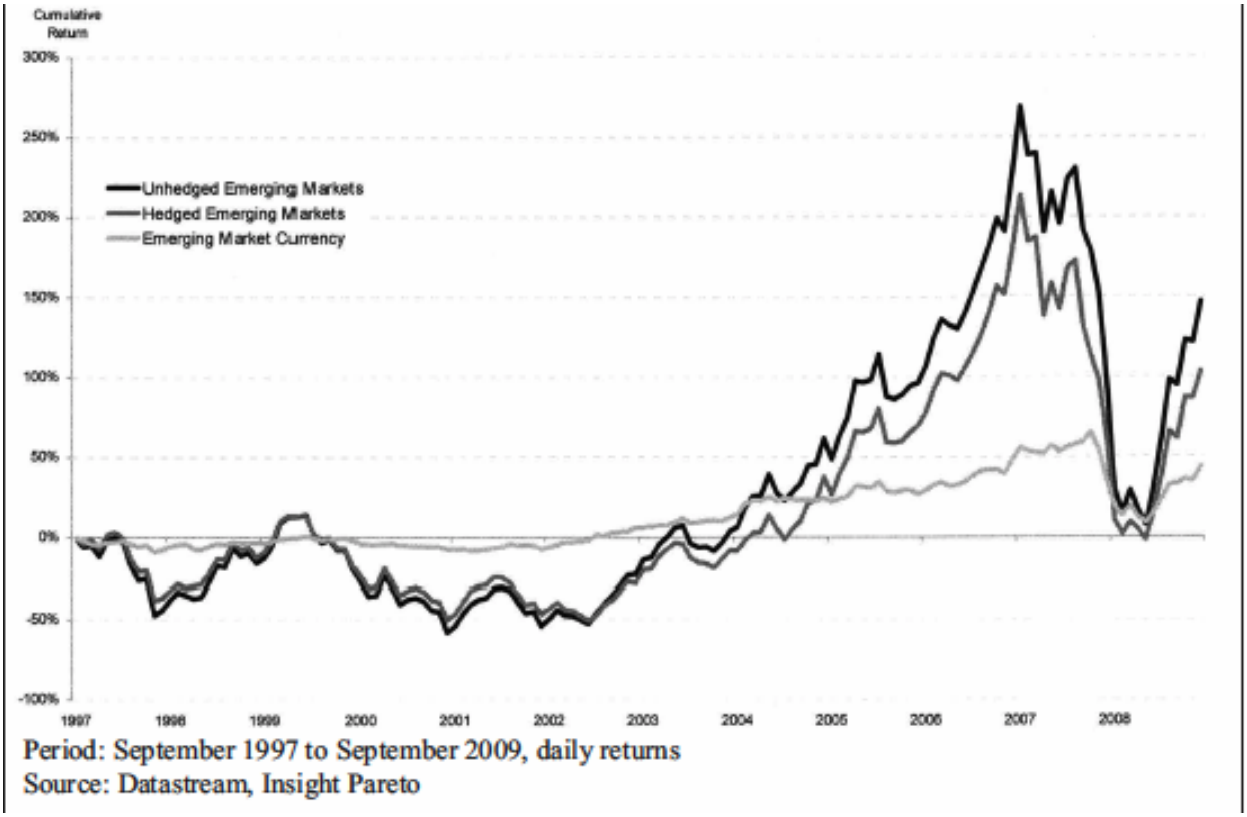
Additionally, they conclude that specific currency pairs prove to be more effective for market changes depending on the investment held. In *Global Currency Hedging,* the Campbell, Serfaty-De Mederios and Viceria state that investors who wish to reduce the unconditional variance of her equity based portfolio should "…hold currencies that are negatively correlated with equities (Campbell, Serfaty-De Mederios and Viceria 2)." This position, therefore would cause an offset of gains and losses in the equity positions with losses and gains in the hedging position. This assertion is confirmed in the testing that is performed in *Currency risks hedging for major and minor currencies: constant hedging versus speculative hedging* where Choi concludes that hedging is more effective in major and minor currencies which are correlated with each other (Choi). The available currencies that are correlated with each other allows investors to take opposing positions in the currency and in their investment. This is very similar because hedging based on shorting a positively correlated currency and return is identical to taking a long position in a negatively correlated currency. Both of these strategies that were highlighted by two different articles will effectively hedge the foreign investments in a very similar manner.

Within the third article by Mr. Choi, there is a theme that is brought up that contradicts the other two articles in relation to hedging frequency. One of the factors that Choi asserts is that it is best to conduct actions to hedge currency periodically or speculatively over time and not on a consistent basis. The other articles test the consistent hedging strategy which states that investment analysts should always be taking negating or hedging positions in foreign currency derivatives to help eliminate the FX risk. Choi, however, proposes that speculative hedging, only taking hedging when an analysts forecasts for FX rate will have an adverse effect on returns, actually is much more effective in the long run. The reason why this is more effective is because investment analysts are able to monitor the future FX rate movement and leave their investments exposed when there is a high probability of favorable FX rate movement and the portfolios therefore see a larger return on their investment.

This strategy can however come with some complications including increased subjectivity, possibilities of lower returns, and increased resources devoted to this cause. The FX market is one of the hardest to predict because there are so many factors that are causing the movements on a daily basis and it is hard to control or forecast them all. Of all the markets that are able to be invested in around the world the most unstable and unpredictable is in fact the FX market. The more unpredictable and subjective a choice is, the higher chance of being wrong in your investment decision which would lead to a decreased return. Also, speculative hedging would require investment professionals to devote more time and resources to analyzing the foreign exchange market instead of looking for good investments. Therefore, this would distract the investment professionals and cause their focus to deviate from the main goal. I would recommend that if managers do choose to have a hedging strategy for FX risks, that they consider doing a complete or continuous hedging because of the reduction of complexity and reduced opportunity costs for the investment professionals.

One fatal difference that is proposed throughout these articles is in *Decomposition of Emerging Market* Currency risk by FMC. The authors suggest that USD investors should not hedge foreign currency risk because they believe that the increased exposure to emerging market currencies will add to the overall returns of the portfolio and it will increase the market risk premium associated with the portfolio. Figure 2 below represents the emerging market risk premiums for USD investors for both hedged and unhedged currencies (Francis, Musli and Cella 19). This graph demonstrates the returns that a USD based investor will see in the emerging markets and as the graph shows, the unhedged position shows a significantly higher market risk premium. A higher market risk premium indicates that the market does compensate investors for taking the additional risk in that market. Various risks within the market can be broken down into separate categories and this graph clearly shows the portion of the market risk premium that is given to the foreign exchange risk in the market. FMC suggest that investors should remain exposed to the currency market because there is an increased return potential and they are getting more highly compensated for risk as well. Figure 2 also shows the effect and movement of the emerging market currency which is demonstrated by the lightest grey line on the graph. As you can see, comparative to the market risk premiums, the actually returns of the currency is quite low and insignificant. Relative to the other factors, the currency movement is a very small factor. This graph clearly demonstrates that USD investors should remain exposed to foreign currency.

Figure 2: Emerging Market Risk Premium for US Investors[8]



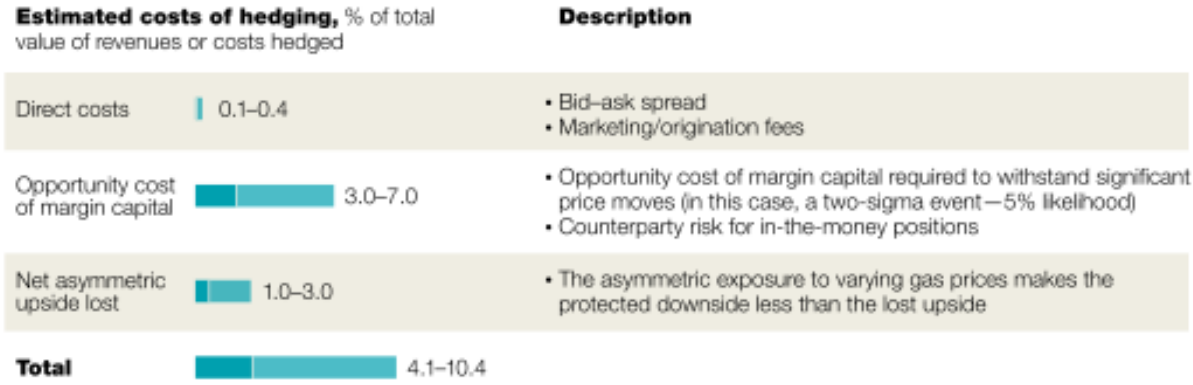
[8] Graph taken from Francis, Gavin, Erin Musli and Tom Cella. "Decomposition of Emerging Market Currency Risk: A Hedging Application." *Journal of Perforamnce Measurement* (2013): 16-28. Web.

"To hedge or not to hedge…"

Based on the facts discussed above, it is clear that international portfolio managers have many choices when it comes to its hedging strategy but one implication remains clearly dominate throughout the articles; hedging reduces volatility and risk of a global portfolio. It seems that the entire business world has a consensus that foreign currency hedging should be done in order to decrease risk of a portfolio and increase returns. Hedging, however, may not be the answer for all portfolios as derivatives come with many faults and downsides.

Empirical evidence has shown us that when used correctly and fairly, derivatives can be effective in reducing risk but there are many other factors that need to be considered like costs of hedging and making sure that hedging does not consume your focus. For each hedging decision, financial managers should determine the actual cost and realized benefit from the hedging instruments and they must make sure that they are doing it for the right reason. As demonstrated in Figure 3 below, derivative contracts have inherently low costs because the mostly have very little initial costs, but there are many other costs that managers often overlook such as opportunity cost of margin capital, and asymmetric upside loss (Fisher and Kumar).

Figure 3: Estimated Cost of Hedging[9]



Two main costs that are frequently overlooked are opportunity cost of margin capital and net asymmetric upside lost (Fisher and Kumar). These are additional costs that are incurred as an investor in derivatives that are not traditionally considered. With most derivative contracts that are traded on an exchange require a margin account to be kept up to date and depending on the position that you hold, you may be forced to post additional margin on a daily basis. Therefore, there is an opportunity cost associated with having to tie up your money in the margin account as opposed to being able to invest that money elsewhere. To give an example, Fisher and Kumar state that a natural gas producer that hedges their entire position on $3 billion in sales would need to post and hold around $1 billion in margin capital (Fisher and Kumar). This would greatly affect the operations of the firm and cause it to be impacted negatively. This theory can also be applied to investment portfolios as large portfolios that have large currency exposure would have to devote large amounts of cash towards these margin requirements and it would then reduce the potential for higher returns for its clients.

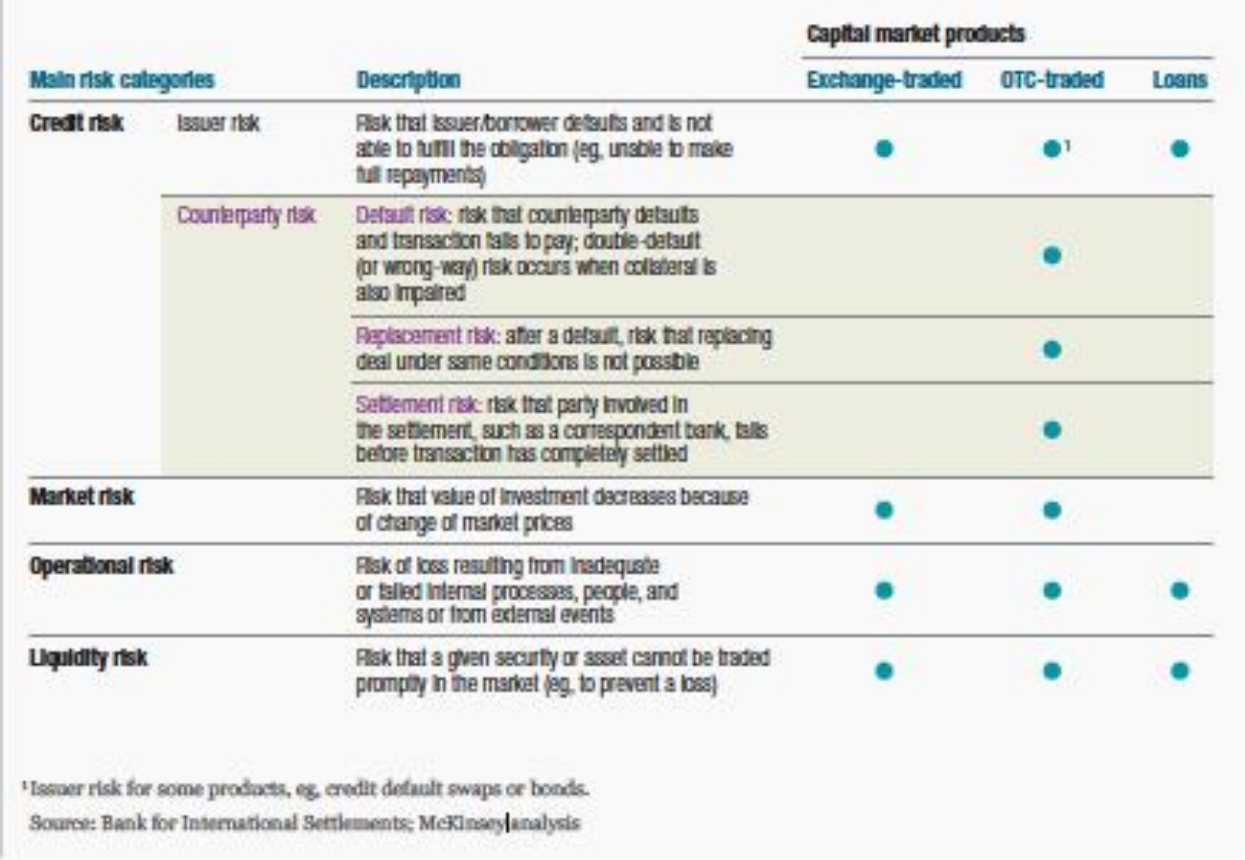
[9] Fisher, Bryan and Ankush Kumar. *Mckinsey and Company - Insights and Publications*. 1 July 2010. 7 December 2015. <http://www.mckinsey.com/insights/corporate_finance/the_right_way_to_hedge>.

Another main cost that Fisher and Kumar describe are asymmetric upside lost which is related to the currency moving in a favorable direction for your investments but you did not recognize any of the upside because you hedged away your risk. An USD investor that takes invests in an emerging market currency might be weary of the future movements of that currency against the USD so they take a hedging position to reduce volatility and loss. However, in the next few months, the investments in the emerging markets rise and the USD appreciates against the foreign currency, causing the unhedged returns to be greater for the USD investor. However, since the investor has hedged away her currency exposure, she has given up the potential for additional returns relating to currency and actually has destroyed return potential in her portfolio. Yes hedging can reduce volatility and reduce risk of loss relating to currencies, but it also reduces the upside potential of your foreign position which can have an effect on portfolio returns.

One of the main goals of currency hedging is to reduce the overall risk of the portfolio with derivatives. However, when investment professionals use derivatives, are they really reducing the risk, or are they just moving their risk exposure from one type of risk to another? The new risk that is brought upon by derivatives contracts, more importantly over the counter ("OTC") derivatives, is called counterparty risk. Counterparty is the risk that when the future event stated in the derivative contract occurs, the party on the other side of the derivative position is unable to fulfill their end of the agreement (Beier, Harreis and Poppensiker). Are investment professionals aware of this counterparty risk when they enter into these contracts and are there procedures that are being put into place to eliminate or at least mitigate these risks? The answer to these questions is yes, but the results and solutions must carefully be understood by the investor because it would be quite bad to have a repeat of the financial crisis in the late 2000's.

Counterparty risk was one of the largest factors that triggered the financial crisis in 2007 and 2008 as many derivative dealers began defaulting on their positions and were unable to post the large amounts of losses that they had incurred. The companies that entered into these contracts began to lose money from their positions and also were unable to get their money back form their counterparties, increasing their losses and worsening their current portfolio performance. For companies and investors during the financial crisis, counterparty risk became just as big of a risk as the more common risks such as liquidity and market risk (Beier, Harreis and Poppensiker). So begs the question, is it worth assuming counterparty risk for reduction of currency risk?

Figure 4: Risks associated with investing[10]



Main risk categories		Description	Capital market products: Exchange-traded	OTC-traded	Loans
Credit risk	Issuer risk	Risk that issuer/borrower defaults and is not able to fulfill the obligation (eg, unable to make full repayments)	●	●[1]	●
	Counterparty risk	Default risk: risk that counterparty defaults and transaction fails to pay; double-default (or wrong-way) risk occurs when collateral is also impaired		●	
		Replacement risk: after a default, risk that replacing deal under same conditions is not possible		●	
		Settlement risk: risk that party involved in the settlement, such as a correspondent bank, fails before transaction has completely settled		●	
Market risk		Risk that value of investment decreases because of change of market prices	●	●	
Operational risk		Risk of loss resulting from inadequate or failed internal processes, people, and systems or from external events	●	●	●
Liquidity risk		Risk that a given security or asset cannot be traded promptly in the market (eg, to prevent a loss)	●	●	●

[1] Issuer risk for some products, eg, credit default swaps or bonds.

Source: Bank for International Settlements; McKinsey analysis

Figure 4 above shows the main risks that are associated with investing in today's global markets and how they are assumed by investors. For example, Credit Risk can be assumed as either issuer risk or counterparty risk. Issuer-based credit risk is the risk that a company is unable to repay their debt and therefore defaults on the investment. It can either be assumed via the exchange (buying and selling corporate debt instruments via the open market), OTC (conducting private placement with certain companies as an investment), and loans. Because of increased regulations, exchange traded are inherently less risky and are less likely to go bad. Notice that for the above graph, all of the other risks on the table other than counterparty risk can be assumed in the exchange. This is significant because counterparty risk, the main risk associated with derivative contracts and hedging, is not being regulated by the exchange governing bodies. This requires increased time and energy invested into researching the counterparties and assessing the counterparty risk on investments.

Recommendation

Many tests and articles show how beneficial and useful derivative contracts can be, however, each investment firm and company in general must decide for themselves if FX hedging is right for them. As we stated, there are many risks and costs that are associated with hedging that often go overlooked and it is the duty of a firm or fund's management to make sure that the benefits outweigh the cost.

[10] Beier, Nils, et al. "Getting to grips with counterparty risk." *McKinsey Working Papers on Risk, Number 20* (2010): 1-16. Document.

One very important theme that needs to be communicated throughout the derivative and hedging functions of the fund is the hedging strategy, limitations, and goals. Without this, it is very easy for funds to get carried away and over hedge or overexpose themselves to too much risk. Cheryl Francis, Treasurer of FMC Corporation based in Chicago explained the importance of communication in regards to hedging and derivative usage in a Harvard Business Review article. She stated "Once a company decides to manage certain risks in the derivatives markets, senior management and the board should establish specific guidelines for how managers using derivatives should operate (Weinberger, Tufano and Francis)." Another very important factor to a successful hedging strategy is communication with the managers and those in charge of hedging in general. Ms. Francis stated this in relation to her firm and stated that "…we spend a lot of time training managers all over the world about hedging practices and the objectives of our risk-management program. These managers work not only in finance but also in sales, marketing, and purchasing (Weinberger, Tufano and Francis)." Note that the costs of training not only apply to those who are actually in control of the investing decisions, but also those managers who are impacted by the decisions. Everyone in the firm needs to be on the same page in order for there to be a successful hedging strategy which costs more money.

As stated earlier in this paper, there are hidden costs and risks that are associated with derivatives and hedging that go beyond the initial cost required to enter into the contract and that transform the risk profile of the investments. These hidden costs and risks may cause managers to reconsider their hedging strategy if they prove to be too high for them. Some investors and managers may choose to avoid using hedging and derivatives all together because of their adverse risks and opportunity costs. One example of someone who has sworn off these tools is Warren Buffet. In a 2002 letter to the Berkshire-Hathaway shareholders, he stated that derivative instruments are "time bombs, for both the parties that deal in them and the economic system (Buffett and Cunningham 150)." His analysis in 2002 was very prophetic in relation to the financial market crash of the late 2000's which was magnified by derivatives. As a manager and decision maker, you must be comfortable with these choices and it is important that all risk are understood.

It is my recommendation that managers of investment funds carefully consider the pros and cons of their foreign exchange currency hedging strategy because the costs are more than just what appears on the surface. I would recommend that fund managers ask themselves three main questions in order to truly analyze their decision to make

1. For my investment strategy, do my investors want to be exposed to foreign currency as an investment? Or is that an adverse side effect that my investors do not want to have?

Many investors invest in globally exposed funds in order to gain exposure to foreign markets and potentially foreign exchange markets. If the goal of the fund is to just gain exposure to foreign markets and reduce the effects of the FX movement, this should be clearly and expressly communicated with current and future investors in the fund. If the fund is designed to take currency risk, then FX hedging should not be used. Therefore, the decision to hedge is on a firm to firm or fund to fund basis.

2. If hedging currency exposure is desired, are the benefits of the upside worth the potential downside associated with the derivatives?

As mentioned in the analysis section of this paper, there are many costs and risk that are associated with hedging that may not be apparent to the everyday investor. These costs can quickly add up and effect the returns of the portfolio. One of the largest costs is opportunity cost of margin capital amount. For items traded on the exchange, there is money that is earning very minimal returns that could be

earning much more were it not tied up. Are the risks that you are hedging worth the investment potential that you are foregoing?

3. If the benefits out weight the risk, is the fund protected against significant counterparty risk and large scale downturn of the market?

This question stems from the issues surrounding derivatives in the most recent financial crisis where many firms where many large firms were unable to maintain their liquidity and financial position when the derivatives went sour. If your financial positions become extremely out of the money, will you be able to pay off the liabilities with the investments that you currently have? Perhaps even a more important question would be is a fund able to pay off these losses with the cash on hand or would the firm need to sell off securities in order to cover the position? If the firm is forced to sell to meet the obligations, the overall performance of the portfolio is greatly hindered and the risks greatly outweigh the potential rewards. All in all, it is important for fund managers to clearly understand all costs and benefits to the decision whether or not to use financial derivatives.

CONCLUSION

Empirical evidence that was put forth in the articles that were highlighted throughout this paper show that currency hedging is effective in reducing the volatility of returns in global portfolios. Hedging strategies that for major currency investments or emerging market investments vary but there is a multitude of evidence in the financial research field to support these claims. The three articles that were reviewed state that investors in major currencies should take opposing positions in positively correlated currencies or take a long position in negatively correlated positions in order to have effective hedging, when hedging emerging market currencies, investors should take an non hedged position between the USD and the emerging market currencies but should hedge any FX risk with the USD, and speculative hedging is more effective than constant hedging. All of these claims support hedging as a way to reduce volatility and add value to the portfolio.

These strategies often overlook significant risks and costs that PMs take on when hedging. Such costs and risks can ultimately reduce the overall return of the portfolio even if it does reduce the volatility of returns. Every investment decision comes with its own set of risks and rewards and it is important to consider all of the factors of hedging and not just focus on its ability to reduce volatility. Significant risks assumed through hedging such as counterparty risk can drastically destroy value, decrease upside potential, and actually increase volatility of returns. Additionally, hedging takes investment of capital, time, and resources that could elsewise be used other places to get higher returns or increase understanding of the markets in which you are investing. Opportunity costs for these factors must be considered as well.

It is very important that investment managers, as well as investors themselves, to understand the complexities that arise with foreign currency hedging. Although the empirical evidence that we reviewed showed that hedging can be an effective way to reduce volatility in the portfolio, it also comes with some unintended consequences and risks. I recommend that investment professionals look at all option, risks, costs, and benefits before a deciding that foreign currency hedging is for them.

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