Protecting Your Portfolio From Unintended Currency Risk

Adnan Akant, PhD
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Agenda

- Currency in International Portfolios: Hedging and Active Alpha
- A Model of Alpha and Beta Returns From Currency Management
- The Currency Environment Today
- A Discretionary Approach to Currency Investing
Currency in International Portfolios: Hedging and Active Alpha
Currency is Critically Important in International Portfolios

- Unhedged international bond and equity returns can be dominated by currency moves
  - Examples:
    - 2014: European equities returned 2.8% in euro terms, but returned -9.6% in US dollar terms due to a weak euro
    - 2013: Japanese equities returned 27.7% in yen terms, but returned only 8.7% in US dollar terms due to a weak yen

- Yet international equity managers generally do not focus on currency management; International bond managers have shown mixed results

- Expected return from passively holding developed market currencies is near zero for US investors

- Correlation of developed market currency returns with equities and bonds is near zero

- Currency is a full-time specialist activity
Currency Exposure is an Uncompensated Risk

Currency Component of the MSCI EAFE

- Annualized Return: 0.29%
- Volatility: 7.74%
- Maximum Drawdown: -41.72%

Source: MSCI, Bloomberg, FFTW
Typical Objectives of Currency Management

1) **Risk Reduction** - Hedging of foreign currency to reduce absolute return volatility

2) **Return Enhancement** - Exploiting alpha opportunity
## Addressing the Currency Hedging Conundrum

<table>
<thead>
<tr>
<th>Investor Objective</th>
<th>Proposed Solution</th>
<th>Critical Aspects</th>
</tr>
</thead>
</table>
| Eliminate currency risk                         | 100% Hedge          | • Large negative cash flows when foreign currencies appreciate versus local currency  
                               |                     | • No alpha and diversification benefits from currency                              |
| Gain diversification from foreign currency exposure | 0% Hedge            | • Little diversification when most needed for U.S. investors                        
                               |                     | • Large uncompensated currency risk with no assurance risk will wash out over time  |
| Pick “best” hedge ratio to minimize overall portfolio volatility | Optimal Hedge Ratio | • Relies on historical data                                                       
                               |                     | • Potentially large drawdowns                                                      |
| Vary hedge ratio to limit currency risk while adding some return | Dynamic Hedging      | • Blends together risk reduction and alpha generation objectives, achieving neither very well  
                               |                     | • Relies on trend-following for base currency                                      |
## Addressing the Currency Hedging Conundrum - Preferred Solution

<table>
<thead>
<tr>
<th>Investor Objective</th>
<th>Proposed Solution</th>
<th>Critical Aspects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Separate risk from return objective and address each with most effective strategy</td>
<td>Static hedge ratio to reduce majority of currency risk, combined with an active currency alpha process to add value</td>
<td>Manager selection is critical: “True Alpha” generators should be preferred to “Beta grazers” in active currency</td>
</tr>
</tbody>
</table>
A hedged US investor can experience large and persistent negative cash flows during periods of USD weakness.
US dollar tends to rally in times of risk aversion.

An unhedged US investor will miss out on diversification benefits when they are most needed.
50% Hedge: A Good Balance

- A 50% hedge ratio has historically reduced 75% of the excess volatility caused by currencies.

- Relative to the 100% hedged index, negative cash flows are cut in half.

- A 50% hedge ratio gives an active manager a symmetric opportunity to add alpha – an important flexibility for return enhancement.

Source: MSCI, Bloomberg, FFTW.
Why Actively Manage Currencies for Alpha?

- Currency market serves as “release valve” of global macro imbalances and plays a large role in macro equilibrium adjustments.

- Currency inefficiencies exist because less than 10% of market participants have multi-week profit objectives.

- Active currency strategies seek to anticipate capital flows and policy changes that generate adjustments between the currency of one country versus another.
Major Factors Influencing Currency Markets

A global macro approach to anticipate capital flows

Drivers of Capital Flows

- Yield Spreads
- Terms of trade dynamics
- Monetary policy expectations
- Risk Aversion
- Tax/ regulatory policy changes
A Model of Alpha and Beta Returns From Currency Management
Currency Investment Styles Exhibit Beta Characteristics With Positive Returns for Bearing Risk

Historical Currency Beta Returns Adjusted to 5% Volatility

<table>
<thead>
<tr>
<th></th>
<th>Trend</th>
<th>Value</th>
<th>Carry</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Excess Returns</strong></td>
<td>1.48%</td>
<td>1.94%</td>
<td>3.47%</td>
</tr>
<tr>
<td><strong>Volatility</strong></td>
<td>5.0%</td>
<td>5.0%</td>
<td>5.0%</td>
</tr>
<tr>
<td><strong>Information Ratio</strong></td>
<td>0.30</td>
<td>0.38</td>
<td>0.69</td>
</tr>
</tbody>
</table>

Source: FFTW, Deutsche Bank, Bloomberg, as of December 31, 2015.
Most FX Managers Are Beta Grazers

Barclays Currency Traders Index (BCTI)
- Equally-weighted composite of currency manager programs
- 84 managers in 2014
- Annual return since Jan 1987 is 6.77% with a Sharpe Ratio of 0.30

After adjusting for exposure to currency Betas, True Alpha is negative and not significantly different from zero

<table>
<thead>
<tr>
<th>Index</th>
<th>True Alpha</th>
<th>Trend Beta</th>
<th>Carry Beta</th>
<th>Value Beta</th>
</tr>
</thead>
<tbody>
<tr>
<td>BCTI Universe</td>
<td>-8 bps</td>
<td>12 bps</td>
<td>9 bps</td>
<td>12 bps</td>
</tr>
<tr>
<td></td>
<td>(-0.84; 59%)</td>
<td>(3.41; 99%)</td>
<td>(2.55; 98%)</td>
<td>(3.01; 99%)</td>
</tr>
</tbody>
</table>

Monthly returns based on data from April 1995 through March 2014.
T-values and significance levels in parentheses

Source: FFTW, Deutsche Bank, BarclayHedge, March 2014
Alpha vs. Beta: Why It Matters?

- Alpha hunters deliver persistent performance regardless of market environment.
- Beta grazers have important limitations. In turbulent markets, Beta returns become highly correlated across different asset classes.
- Investors should not pay Alpha fees for exposure to style Betas that could be obtained more cheaply.
Alpha Hunters vs. Beta Grazers

Consider these two managers. Over 6 years:

- Both earned about 3% p.a. above LIBID

- Manager 2 returns were highly correlated with 3 factors (Beta grazer)

- Manager 28 returns were not correlated with the factors (Alpha hunter)

<table>
<thead>
<tr>
<th>Jan 01-Dec 06</th>
<th>Total Excess Return</th>
<th>True Alpha</th>
<th>Trend Beta</th>
<th>Carry Beta</th>
<th>Value Beta</th>
<th>Total Return IR</th>
<th>True Alpha IR</th>
</tr>
</thead>
<tbody>
<tr>
<td>Manager #2 R2 = 69%</td>
<td>3.70%</td>
<td>-2.48%</td>
<td>0.90</td>
<td>2.27</td>
<td>0.34</td>
<td>0.74</td>
<td>-0.52</td>
</tr>
<tr>
<td>(1.13; 87%)</td>
<td>(6.99; 99%)</td>
<td>(5.41; 99%)</td>
<td>(0.33; 63%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Manager #28 R2 = 3%</td>
<td>3.02%</td>
<td>3.51%</td>
<td>-0.00</td>
<td>-0.07</td>
<td>-0.19</td>
<td>0.78</td>
<td>0.93</td>
</tr>
<tr>
<td>(2.03; 98%)</td>
<td>(-0.06; 52%)</td>
<td>(-0.24; 59%)</td>
<td>(-0.23; 59%)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Monthly returns based on data from April 1995 through March 2014.

T-values and significance levels in parentheses

The Currency Environment Today
Central Banks are Very Active

- **US Quantitative Easing:** Start of US Federal Reserve QE (2008-2009)
- **Sovereign Debt Crisis in the Eurozone**
- **Japan Inflation Targeting** (post Abe’s election)
- **QE discussions in Europe begin** (2014)
- **Swiss National Bank Institutes a Floor for the Euro** (2011)
- **Taper Tantrum**
  - US Fed begins talk of ‘tapering’
  - QE causing sell-off in risky assets (2013)
- **Central Bank Surprise Actions:**
  - Swiss National Bank abandons the Euro floor (2015 - Present)
- **PBOC’s devaluation of the Yuan in August (and January 2016)**
Policy Intervention: US Fed and European Central Bank (ECB)

- The European Debt Crisis intensifies
- Lehman Crisis
- Fed brings rates to zero and starts QE with mortgage backed securities
- Fed increases QE by announcing Treasury purchases
- The European debt crisis starts with Germany leading a hard-line of austerity on peripheral country debt
- The Eurozone announces a bail-out program for Greece
- The Fed restarts QE and pre-announces it at the Jackson Hole Conference
- The ECB President Draghi says the ECB will do “Whatever it takes”
- The ECB President Draghi starts to talk about QE

Source: Bloomberg, January 2016
Policy Intervention: People’s Bank of China (PBOC)

- China allows measured appreciation of the CNY
- China stops the appreciation of the CNY in the wake of the Lehman crisis
- China resumes the gradual appreciation of the CNY as global economic conditions stabilize
- China allows the CNY to start to weaken due to a slowing Chinese economy
- China allows an accelerated depreciation of the CNY as Chinese equities fall sharply
- China starts 2016 with another accelerated drop in the CNY as the outlook for the Chinese economy continues to be poor

Source: Bloomberg, January 2016
We Expect Heavy Official Policy Intervention to Continue

► Systematic-only strategies will be challenged to generate consistent positive returns in periods of heavy central bank intervention and policy surprises

► Inflation and growth are too low worldwide and key central banks will actively try to target higher levels using currency as a tool

► It may take many years for global growth, inflation, interest rates, and currency misalignments to normalize, during which time official policy intervention will dominate currency markets

Source: FFTW, views as of April 30, 2016
A Discretionary Approach to Currency Investing

"A Discretionary Approach for Currency Investing" was written by Adnan Akant, PhD, Head of Currencies, at Fischer Francis Trees & Watts, Inc. (FFTW), and is a chapter in "The Role of Currency in Institutional Portfolios," edited by Momtchil Pojarliev and Richard M. Levich, London: Risk Books, 2014.
Important Principles of This Approach

► Separation of Alpha (manager skill) and Beta (market returns) is critical in building a long-term investment strategy

► Within currency, a blend of discretionary and systematic processes allows for the separation of Alpha and Smart Beta

► Models have not historically been appropriate in all market environments and the investment process should incorporate discretion to turn models off, at times, and rely on portfolio manager judgment solely

► A strong focus on drawdown in discretionary decisions and models limits downside risk
A Diversified Investment Process

**FX Alpha**
- Discretionary
  - Utilize a flexible approach to analyze global macro developments, with emphasis on turning points
    - Yield spreads
    - Terms of trade dynamics
    - Risk aversion
    - Monetary policy expectations
    - Tax/regulatory policy changes

**FX Beta**
- Systematic
  - Programmatically deploy empirically tested strategies based on key global macro factors to analyze future currency movements, with an emphasis on a diversity of investment styles and holding periods
  - Trend
    - Focus on momentum in major currency pairs
  - Carry
    - Focus on short term interest spreads levels
    - Terms of trade dynamics
    - Monetary policy expectations
  - Value
    - Focus on measure of valuation
    - Yield spreads
    - Volatility measures
    - PPP
    - Real effective exchange

**Market Timing of FX Beta**: Judgment, or discretion utilized to turn models off when market conditions are not conducive for systematic processes. Examples: Macro-driven event risk, geopolitical risk, high correlation between model performances.
Trade Example: EUR/CHF – January 2015

**Background Information**
- SNB introduced 1.20 EUR/CHF floor in September 2011 to stop appreciation of the CHF
- SNB Foreign Exchange Reserves reached above 80% of GDP in 2015
- Pressure on the floor intensified after expectations for QE by ECB in January

**Key Discretionary Decisions Made**
- Asymmetry to the downside for EUR/CHF since the introduction of the floor at 1.20 in 2011
- SNB was reaching limits of its willingness to defend EUR/CHF ahead of ECB decision on QE
- No standard FX beta model (e.g. trend, carry, value, etc.) would be long CHF and therefore surprises had potential for a large move

**Trade idea**
- Remove short CHF positions from all models and position long CHF for a break of the floor ahead of ECB meeting

**Post-Mortem**
- Single style approaches have large left tail risk: carry and value currency managers were hurt by a 25 standard deviation move – which occurs more frequently than expected in the real world
- Systematic-only approaches have limitations. Models look only at price history – difficult to anticipate event risk and abrupt monetary policy changes

*Past performance is not indicative of future results.*
A Representative Portfolio Attribution for a 5% Volatility Target

Judgment and models together provide diversification

Judgment has done well after policy interventions intensified overseas

Timing the models provides additional returns and lowers risk

Portfolio is driven mostly through Judgment

<table>
<thead>
<tr>
<th>Correlation</th>
<th>Discretionary</th>
<th>Systematic (Models)</th>
<th>Total Portfolio</th>
</tr>
</thead>
<tbody>
<tr>
<td>Discretionary</td>
<td>100%</td>
<td></td>
<td>85%</td>
</tr>
<tr>
<td>Systematic (Models)</td>
<td>17%</td>
<td>100%</td>
<td>66%</td>
</tr>
</tbody>
</table>

Source: FFTW, since inception October 1, 2006, as of March 31, 2016. Past performance is not a reliable indicator of future performance.

This information should be considered supplemental to the “Currency Alpha Translated USD (Unhedged)” composite which is included in the appendix. The composite at times may have contained accounts with varying risk objectives. Correlation and attribution information for the representative portfolio is provided for illustrative purposes only and relates solely to the representative portfolio for the relevant period. The past performance of the representative portfolio is shown for illustrative purposes only in connection with a consideration of the proposed strategy. It represents performance of a portfolio with a fundamental investment objective that is similar to the investment objective of the strategy under consideration. Please see Additional Disclosures for further information.
Focus on Drawdown Risk Management

Histogram of Monthly Returns of the Representative Portfolio Targeting 5% Volatility

- Distribution is skewed to the right

Source: FFTW, since inception October 1, 2006, as of March 31, 2016. Past performance is not a reliable indicator of future performance.

This information should be considered supplemental to the “Currency Alpha Translated USD (Unfunded)” composite which is included in the appendix of this presentation. The composite at times may have contained accounts with varying risk objectives. The past performance of the representative portfolio is shown for illustrative purposes only in connection with a consideration of the proposed strategy. It represents performance of a portfolio with a fundamental investment objective that is similar to the investment objective of the strategy under consideration. Please see Additional Disclosures for further information.
## Currency Alpha Correlations for this Approach

<table>
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</thead>
<tbody>
<tr>
<td>FX Alpha Composite</td>
<td>0.08</td>
<td>0.84</td>
<td>0.04</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US Treasuries¹</td>
<td>0.13</td>
<td>-0.31</td>
<td>-0.02</td>
<td>0.92</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>US Aggregate²</td>
<td>0.14</td>
<td>-0.35</td>
<td>-0.05</td>
<td>0.51</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>S&amp;P 500</td>
<td>0.15</td>
<td>0.65</td>
<td>0.48</td>
<td>0.39</td>
<td>0.51</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Russell 2000</td>
<td>0.14</td>
<td>-0.30</td>
<td>-0.05</td>
<td>0.51</td>
<td>0.45</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Commodities³</td>
<td>0.02</td>
<td>-0.28</td>
<td>0.03</td>
<td>0.73</td>
<td>0.67</td>
<td>0.62</td>
<td>0.50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Global Inflation-Linked Bonds⁴</td>
<td>0.20</td>
<td>-0.04</td>
<td>-0.15</td>
<td>-0.21</td>
<td>-0.12</td>
<td>-0.25</td>
<td>-0.25</td>
<td>-0.21</td>
<td>-0.49</td>
<td>-0.42</td>
</tr>
<tr>
<td>DB Carry⁵</td>
<td>-0.04</td>
<td>0.08</td>
<td>-0.13</td>
<td>-0.42</td>
<td>-0.38</td>
<td>-0.48</td>
<td>-0.49</td>
<td>-0.42</td>
<td>-0.04</td>
<td></td>
</tr>
</tbody>
</table>

¹ Barclays U.S. Treasury Bond Index  
² Barclays U.S. Aggregate Bond Index  
³ Goldman Sachs Commodities Index  
⁴ Barclays Global Inflation-Linked Bond Index  
⁵ Deutsche Bank Currency Carry Index  
⁶ Deutsche Bank Currency Momentum Index  
⁷ Deutsche Bank Currency Value Index  

*Source: Barclays, Goldman Sachs, Deutsche Bank, Bloomberg, FFTW, as of December 31, 2015.*
An Active Hedging Approach

- Plan is concerned with foreign currency exposure in international equity portfolio
- Current Currency Policy: 0% Hedged
- Conservative Board: Active positions should only reduce risk, i.e. hedge foreign currencies into the US dollar when appropriate
- Resulting positions from Currency Alpha can be translated into exposures for a defensive US dollar hedging mandate which can only go long the US dollar.

Hypothetical or simulated performance results are presented for illustrative purposes only and have many inherent limitations. Such results do not reflect actual portfolio returns or fees and are generally prepared with the benefit of hindsight. No representation is made that any portfolio will or is likely to achieve profits or losses similar to those shown. Please see Additional Disclosures for further information.
An Active Hedging Approach

Results for a 2% tracking error budget

- The hypothetical hedging portfolio acts as an insurance policy
  - Performs well in periods of USD strength
  - Little impact in periods of USD weakness

Hypothetical or simulated performance results are presented for illustrative purposes only and have many inherent limitations. Such results do not reflect actual portfolio returns or fees and are generally prepared with the benefit of hindsight. No representation is made that any portfolio will or is likely to achieve profits or losses similar to those shown. Please see Additional Disclosures for further information.

Source: FFTW, S&P Dow Jones Indices, Bloomberg
## Case Studies – Outcomes of Recent US Client Reviews

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<tr>
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</tr>
</thead>
<tbody>
<tr>
<td><strong>Context</strong></td>
<td>$750 million</td>
<td>$9 billion</td>
<td>$2.7 billion</td>
<td>Real assets portfolio of $3.25 billion</td>
</tr>
</tbody>
</table>
| **New investment policy adopted** | Selected 1 manager to actively manage hedge ratio between 0% and 100% for each DM currency in international equity exposure  
Asymmetry of exposure:  
- cannot short the US  
- cannot trade non-USD cross rates | Selected 2 active managers to manage $1 billion of an unhedged international equity exposure  
50% allocated to a dynamic hedging program  
50% allocated to an unconstrained currency alpha program | Selected 1 active manager to manage $1 billion of an unhedged international equity exposure  
$1 billion of the portfolio allocated to Currency Alpha  
10% of the portfolio allocated to Currency Alpha | Selected 1 active FX manager to diversify overall fund |
| **Size of active currency mandate** | Vol Target: 2.5%                                     | Vol Target: 3-5%                                     | Vol Target: 3-5%                                     | Vol Target: 5%                                   |

The client list provided does not list all FFTW clients. Please see Additional Disclosures for further information.
Conclusions

► International investing implies currency exposure: an uncompensated risk best managed by specialist currency managers

► Both FX Alpha and Active hedging mandates have a positive impact on institutional investor portfolios using FX managers with positive expected return

► There exist positive return FX Beta strategies such as trend, carry, and value that can be captured systematically

► Asset correlation and FX manager universe return data support allocating risk to active FX management

► Paying close attention to the return attribution (Alpha-Beta separation) of currency managers can be beneficial in selecting managers

► A discretionary approach to currencies has become more important in the current post-Lehman environment of active central bank and policy intervention worldwide
Appendix
## Currency Alpha Translated USD (Unfunded) Composite

<table>
<thead>
<tr>
<th></th>
<th>Gross Composite Return %</th>
<th>Dollar Weighted Benchmark Return %</th>
<th>Gross Return Increment</th>
<th>Portfolios at End of Period</th>
<th>Total Notional Assets at End of Period (USD millions)</th>
<th>Total Firm Assets (USD millions)</th>
<th>Past 3yrs Annualized Composite Standard Deviation</th>
<th>Past 3yrs Annualized Benchmark Standard Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>3Mths</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2015</td>
<td>3.42</td>
<td>0.00</td>
<td>3.42</td>
<td>6</td>
<td>818.4</td>
<td>38,972.5</td>
<td>4.90</td>
<td>0.00</td>
</tr>
<tr>
<td>2014</td>
<td>6.15</td>
<td>0.00</td>
<td>6.15</td>
<td>&lt;=5</td>
<td>735.1</td>
<td>40,239.9</td>
<td>3.90</td>
<td>0.00</td>
</tr>
<tr>
<td>2013</td>
<td>3.23</td>
<td>0.00</td>
<td>3.23</td>
<td>&lt;=5</td>
<td>41.8</td>
<td>39,188.3</td>
<td>3.63</td>
<td>0.00</td>
</tr>
<tr>
<td>2012</td>
<td>-0.05</td>
<td>0.00</td>
<td>-0.05</td>
<td>&lt;=5</td>
<td>41.8</td>
<td>45,334.2</td>
<td>3.72</td>
<td>0.00</td>
</tr>
<tr>
<td>2011</td>
<td>0.93</td>
<td>0.00</td>
<td>0.93</td>
<td>&lt;=5</td>
<td>56.8</td>
<td>40,876.6</td>
<td>4.11</td>
<td>0.00</td>
</tr>
<tr>
<td>2010</td>
<td>2.46</td>
<td>0.00</td>
<td>2.46</td>
<td>&lt;=5</td>
<td>20.4</td>
<td>17,397.9</td>
<td>8.06</td>
<td>0.00</td>
</tr>
<tr>
<td>2009</td>
<td>2.17</td>
<td>0.00</td>
<td>2.17</td>
<td>&lt;=5</td>
<td>8.7</td>
<td>22,027.6</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Notes:
1. As of November 2013, the Firm's definition due to a firm restructuring has been updated. The Firm's definition includes Fischer Francis Trees & Watts, Inc. ("FFTW") and its affiliates Fischer Francis Trees & Watts UK Ltd. Both entities are part of the global investment management group, Fischer Francis Trees & Watts (the "FFTW Group"), which is part of the BNP Paribas' asset management business. The FFTW Group specializes in managing U.S. and global fixed income portfolios for institutional clients. FFTW is wholly owned by BNP Paribas Investment Partners USA Holdings Inc. (formerly known as Charter Atlantic Corporation). As of January 1, 2011, due to Investment Team reorganization the Firm's definition changed to include Fischer Francis Trees & Watts, Inc. ("FFTW") and its affiliates Fischer Francis Trees & Watts UK Ltd. and Fischer Francis Trees & Watts Singapore, which is a registered business name (Business Reg. No. 5527544K) of BNP Paribas Investment Partners Singapore Limited Co. (Reg. No.19950847(D)). All were part of the global investment management group, Fischer Francis Trees & Watts (the "FFTW Group"). Additional details are available in each firm's ADV, which is available upon request.
2. A complete list and description of firm composites will be made available upon request.
3. FFTW does not include any portfolio whose net asset value ("NAV") or levered exposure, as applicable, is less than US $5 million in any composite.
4. Returns are expressed in USD currency.
5. Leverage: The strategy presented represents unfunded FX Allocations that rely on the use of derivatives, primarily FX Forward contracts. Leverage can be considered to be employed at a high degree given the nature of both the underlying strategy and instruments themselves.
6. The returns generated from FX activity are not based on a cash amount invested. The returns are based on a notional portfolio size which has no underlying earnings. The FX returns come from pure gains and losses should be measured against a baseline of zero which represents the alternative of not trading FX at all.
7. There can be no assurance that a targeted tracking error will be achieved. Please see Additional Disclosures for further information.
8. Effective January 1, 2011, the Firm has decided that accounts will no longer be removed when there is a significant policy was applied. The most recent threshold (effective since March 1, 2010) was 15%. Additional details are available as requested.
9. As a result of the functional integration on September 30, 2010, FFTW incorporated approx $16.8B (USD) of transfer account assets under (AUM). Of this total, approximately $13.7B (USD) was eligible for inclusion in FFTW's GIPS assets under management.
10. The FFTW basic fee schedules, listed below, are subject to negotiation between the parties at FFTW's discretion. The precise schedule of fees is dependent upon the size of the mandate as well as any client specific requirements.

### Representative Investment Management Fee Schedule
- 50bps on all assets; 20% performance share
## Currency Alpha Translated USD (Unfunded) Composite Additional Information

**March 31, 2016**

<table>
<thead>
<tr>
<th></th>
<th>Gross Composite Return %</th>
<th>Dollar Weighted Benchmark Return %</th>
<th>Gross Return Increment</th>
<th>Annualized Composite Standard Deviation</th>
<th>Annualized Benchmark Standard Deviation</th>
<th>Tracking Volatility</th>
<th>Information Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>March 2016</td>
<td>0.22</td>
<td>0.00</td>
<td>0.22</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Q-T-D</td>
<td>-0.39</td>
<td>0.00</td>
<td>-0.39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y-T-D</td>
<td>-0.39</td>
<td>0.00</td>
<td>-0.39</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Last 12 months</td>
<td>-3.49</td>
<td>0.00</td>
<td>-3.49</td>
<td>4.70</td>
<td>0.00</td>
<td>4.70</td>
<td>-0.74</td>
</tr>
<tr>
<td>Last 3 years</td>
<td>2.76</td>
<td>0.00</td>
<td>2.76</td>
<td>4.71</td>
<td>0.00</td>
<td>4.71</td>
<td>0.58</td>
</tr>
<tr>
<td>Last 5 years</td>
<td>2.02</td>
<td>0.00</td>
<td>2.02</td>
<td>4.52</td>
<td>0.00</td>
<td>4.52</td>
<td>0.45</td>
</tr>
</tbody>
</table>
Additional Disclosures

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This document is provided for your reference on a private and confidential basis to discuss an existing or potential advisory relationship. You are invited to meet with FFTW to discuss any of the information provided herein or otherwise, including any and all terms (including fees) that may apply to the relationship.

Past performance is not indicative of future results. The value of investments and the income derived from those investments may fluctuate over time such that the value of a portfolio at any given point in time may be more or less than its original value.

No warranty is provided as to the performance or profitability of any portfolio or any part thereof, nor is any guarantee made that the investment objectives, expectations or targets described in this presentation or anywhere else will be achieved, including without limitation any risk control, risk management or return objectives, expectations or targets. A portfolio may suffer loss of principal, and income, if any, may fluctuate. The value of investments may be affected by a variety of factors, including, but not limited to, economic and political developments, interest rates and issuer-specific events, market conditions, sector positioning, and other factors. Performance results presented reflect the reinvestment of earnings.

Performance results presented are gross of all fees, including management fees and, if applicable, performance fees. A portfolio’s returns will be reduced by all applicable fees and expenses. A description of management and performance fees is included in Part II of FFTW’s Form ADV.

Below is an illustration of the effect of management and performance fees (where applicable) on portfolio returns. The illustration assumes that (i) the portfolio had a steady excess return, gross of fees, of 1% per year (examples A & B), (ii) the portfolio was subject to a yearly management fee of 15 basis points of the market value of the portfolio (examples A & B), (iii) the portfolio was subject to an annual performance fee of 20% of the net excess return of the portfolio for the year (example B only), and (iv) there were no cash flows during the period (examples A & B). The illustration shows the compounding effect of management and performance fees (where applicable) on portfolio returns over time, assuming that other factors such as investment return and fees remain constant. The illustration below is simplified. The difference between gross-of-fees and net-of-fees performance return will in practice depend on a variety of factors. The illustration below is cumulative and not annualized.

Example A: Base Management Fee

<table>
<thead>
<tr>
<th>Period</th>
<th>Gross Cumulative Excess Return</th>
<th>Net Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>1.00%</td>
<td>0.85%</td>
</tr>
<tr>
<td>2 years</td>
<td>2.01%</td>
<td>1.71%</td>
</tr>
<tr>
<td>5 years</td>
<td>5.10%</td>
<td>4.32%</td>
</tr>
</tbody>
</table>

Example B: Base Management and Performance Fee

<table>
<thead>
<tr>
<th>Period</th>
<th>Gross Cumulative Excess Return</th>
<th>Net Return</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 year</td>
<td>1.00%</td>
<td>0.68%</td>
</tr>
<tr>
<td>2 years</td>
<td>2.01%</td>
<td>1.33%</td>
</tr>
<tr>
<td>5 years</td>
<td>5.10%</td>
<td>3.32%</td>
</tr>
</tbody>
</table>

These performance results may be presented by consultants to clients (or prospective clients) only in accordance with applicable law, including on a one-on-one basis and with required disclosures.

Target/expected returns represent results of statistical modeling of return ranges of asset classes. They are provided for informational purposes only as of a certain date. There is no assurance that the target/expected returns set forth in this presentation will be achieved. Target/expected returns are subject to high levels of uncertainty regarding future economic and market factors that may affect actual future performance. Accordingly, target/expected returns are hypothetical and should be viewed as merely representative of a broad range of possible returns. Target/expected returns should not be construed as providing any assurance or guarantee as to returns that may be realized in the future from investments in any asset or asset class described herein. Target/expected returns are based on a number of assumptions, they are subject to significant revision and may change materially with changes in underlying assumptions that may occur, among other things, as a result of changes in economic and market conditions. FFTW has no obligation to provide recipients hereof with updates or changes to this data as assumptions, economic and market conditions, models or other matters change.

The calculation of target/expected returns includes observations and/or assumptions and involves significant elements of subjective judgment and analysis. No representations are made as to the accuracy of such observations and/or assumptions and there can be no assurances that actual events will not differ materially from those assumed. In the event any of the assumptions used in this presentation do not prove to be true, results are likely to vary from those discussed herein.
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The past performance of the representative portfolio is shown for illustrative purposes only in connection with a consideration of the proposed strategy. It represents performance of a portfolio with a fundamental investment objective that is similar to the investment objective of the strategy under consideration. Past performance is not indicative of future performance, and, in addition, the past performance of the representative portfolio does not represent the past or future performance of any other portfolio. The performance of the portfolio under consideration may differ from the performance of the representative portfolio due to a number of factors including, without limitation, potentially differing rates of fees and expenses applicable to each such portfolio, cash levels, investment timing issues, and regulatory considerations that could impact the performance of each portfolio relative to the other.

Tracking volatility is one possible measurement of the dispersion of a portfolio’s returns from its stated benchmark. More specifically, it is the standard deviation of such excess returns. Tracking volatility is a figure that represents statistical expectations falling within a normal distribution of returns. Dependent on the measurement period, normal statistical distributions of returns suggest that approximately two thirds of the time the annual gross returns of the accounts will lie in a range equal to the benchmark return plus or minus the tracking volatility if the market behaves in a manner suggested by historical returns. Targeted tracking volatility therefore applies statistical probabilities (and the language of uncertainty) and so cannot be predictive of actual results. The returns that will actually be achieved may inherently lie outside of the range suggested by the historic tracking volatility. The actual tracking volatility is the result of many factors (including but not limited to market volatility, company specific anomalies, instability of correlation between benchmark holdings, timing differences between the calculation of the portfolio value and the valuation of the benchmark by the index provider). In addition, past tracking volatility is not indicative of future tracking volatility and there can be no assurance that the tracking volatility actually reflected in a portfolio will be at levels specified in the investment objectives.

Comparisons to a benchmark are provided for informational purposes only. While FFTW seeks to design a portfolio that reflects appropriate risk and return characteristics, including in respect of sector weights, credit quality and duration, it should be understood that such characteristics, as well as portfolio volatility, may deviate to varying degrees from those of the benchmark.

The risk management process described herein includes an effort to monitor and manage risk, but should not be confused with and does not imply low risk.

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Please note that FFTW utilizes pricing sources and methodologies which reflect market practice, including its own valuations if FFTW determines that valuation data from independent sources is not available or is unreliable. However, your custodian, who maintains the official books and records for your portfolio, may utilize different pricing sources resulting in deviations between FFTW’s and the custodian’s valuations. Further, from time to time financial markets may suffer periods of illiquidity caused by unusual volatility or extreme disturbances and prices realized could vary widely from recent valuations.

Hypothetical or simulated performance results have many inherent limitations. No representation is made that any portfolio will or is likely to achieve profits or losses similar to those shown. In fact, there are frequently sharp differences between hypothetical or simulated performance results and the actual results subsequently achieved by any particular strategy. One of the limitations of hypothetical or simulated performance results is that they are generally prepared with the benefit of hindsight. In addition, hypothetical or simulated trading does not involve financial risk and no hypothetical or simulated trading record can completely account for the impact of financial risk in actual trading. For example, the ability to withstand losses or to adhere to a particular strategy in spite of losses are material points which can also adversely affect actual results. There are numerous other factors related to the markets in general or to the implementation of any specific strategy which cannot be fully accounted for in the preparation of hypothetical or simulated performance results and all of which can adversely affect actual results.

This information should be considered supplemental to the “Currency Alpha Translated USD (Unfunded)” Composite information presented herein.

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