2018 Absolute Return Strategies (ARS) Asset Class Review

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September 27–28, 2018
Agenda

I. ARS Program: A Year in Review
II. ARS Portfolio & Performance
III. Market Review: Absolute Return
IV. Conclusions
Section I

ARS PROGRAM : A YEAR IN REVIEW
Comprehensive Annual Review Process

Why do we conduct annual reviews?

Per the TMRS IPS, comprehensive reviews are to be conducted and documented at least annually.

The Review Process Includes:

- Annual due diligence questionnaire, ADV and compliance, as appropriate, are reviewed
- Includes firm changes, personnel, investment strategy, style, process, and philosophy
- Compliance, operations, risk management, and performance
- Both quantitative and qualitative factors
- The review includes an onsite due diligence visit to the Manager’s office

The Annual Review process holds TMRS Staff accountable for its portfolio management process in order to preempt manager specific, strategic, or other potential problems.
ARS Program Review – Accountability in Action

What did we say we were going to do?

**Absolute Return Initiatives Accomplished: Annual Review**

- **Develop a blueprint to implement a Direct Absolute Return Investment Program**
  
  Managerial prioritization, Staff experience and partner resources enabled TMRS to develop a path to ensure this outcome was accomplished

- **Establish a due-diligence process to identify “best in class” manager opportunities**
  
  Sourcing, investment and operational due diligence, and leveraging Staff and partner relationships were key factors enabling the identification of opportunities

- **Initiate & execute on manager selection, negotiation, and funding while maintaining consideration of portfolio construction and diversification looking forward 2 years**
  
  Recommendations and approval of selected manager investments and funding are executed on a dynamic timeline taking into account anticipated portfolio diversification and market regimes

- **Progress Direct Absolute Return Portfolio towards a state of “fully invested” while managing redemption timing, rebalancing challenges, and capacity constraints**
  
  Active decisions to weight managers and rebalance based on constraints are made in real time (Nov. 2016 Internal Memo)

- **Construct and maintain the ARS Direct portfolio to accomplish TMRS’ investment objectives**
  
  $2.3 billion of ARS Direct capital deployed since Jan. 1, 2016. The risk/return profile of the Direct portfolio achieves TMRS investment objectives

- **Monitor existing portfolio. Source, research, and pursue new strategies and co-invest opportunities**
  
  Additional strategies, including fund style co-invests, may be used to further optimize the portfolio as well as blend down fees with existing funds

- **Finalize transition from BAAM Treaty Oak to Direct Portfolio**

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ARS Program Review – Accountability in Action

ARS Direct Funding Timeline

1. Graticule (Macro)
2. Southpoint (LSE)
3. Roystone (ED)
4. Varde (Credit)
5. Alyeska (RV)
6. Myriad (MS)
7. East Lodge (Credit)
8. Field Street (RV)
9. AHL Hydrogen (CTA)
10. DSAM (LSE)
11. PDT (RV)
12. Pharo (Macro)
13. River Birch (Credit)
14. Redmile (LSE)
15. DE Shaw (RV)
16. Red Cliff (RV)
17. BG (MS)
18. H20 (Macro)
19. Varde Asia (Credit)
20. Stone Oak (MS)
21. TBA

2016

Total Direct Initial Subscriptions: $990 million
Total Additional Subscriptions: $215 million
$1,205 billion

January February May June December January May

2017

Total Direct Initial Subs: $353 million
Total Additional Subs: $330 million
$683 million

May

2018

Total Direct Initial Subs: $400 million
Total Additional Subs: No addl. subs
$400 million

Q4

January

February

May

June

December

August

Q4
### Funds & Capital Approved & Funded:

<table>
<thead>
<tr>
<th>Year</th>
<th>Direct Mandates Approved</th>
<th>Capital Approved</th>
<th>Additional Subscriptions</th>
</tr>
</thead>
<tbody>
<tr>
<td>2015</td>
<td>6</td>
<td>$405 mm</td>
<td></td>
</tr>
<tr>
<td>2016</td>
<td>9</td>
<td>$658 mm</td>
<td>$215 mm (5 managers)</td>
</tr>
<tr>
<td>2017</td>
<td>3</td>
<td>$280 mm</td>
<td>$330 mm (8 managers)</td>
</tr>
<tr>
<td>2018</td>
<td>2</td>
<td>$400M</td>
<td>none</td>
</tr>
</tbody>
</table>

**Total Direct Investment Vehicles:**
- **20**

**Total Direct Capital Invested:**
- **$2.3 billion**

*Stone Oak approved, with funding to begin Q4’18
ARS Program Review – Accountability in Action
ARS Staff Resources

ARS Team Experience
Marc Leavitt
22 years experience
Consultant, Hedge Fund, Family Office, Endowment
MBA, Charter Alternative Investment Analyst Designation

Kevin Notaro
14 years experience
Investment Management (Fund of Hedge Funds)
Finance Major
ARS Program Review – Accountability in Action
Annual Review Highlights

Manager & Consultant Scorecard Summary:
All 19 manager relationships and 1 consultant relationship assessed are in satisfactory standing.

Contractual Compliance:
All managers, as appropriate, have certified compliance with relationship governing documents, including:
- Valuation policies
- Fees paid summary
- Regulatory actions
- Code of Ethics compliance

Monitoring and Review Summary:
Monthly, quarterly, and annual reviews (including annual onsite, due-diligence)

Manager Reporting: DDQ, Risk Reports, Commentary, Prime Broker & Administrator reports, Team and Portfolio Overviews, Monthly/Quarterly calls

Albourne Reports: Investment Due Diligence, Operational Due Diligence, Risk Management, Quantitative Due Diligence Summaries, Direct Portfolio level reporting and Risk Management Overviews

BAAM Reports: Monthly Strategy Summary, Quarterly Risk Reports, Monthly/Quarterly calls, Hedge Hog

IPS Compliance and Monitoring at the Portfolio Level
ARS Program Review – Accountability in Action

Additional Information

ARS Team Activities
2015 Total Manager Meetings: 312
2016 Total Manager Meetings: 276
2017 Total Manager Meetings: 240
2018 Total Manager Meetings: 161 YTD *

ARS Total Manager Meetings: 989

Credit: 180
Macro/CTA: 156
L/S Equity: 135
Relative Value: 118
Multi-Strategy: 66
Event Driven: 62
Fund of Fund: 91
Consultant: 65
Economists: 21
Other: 95

* As of August 27, 2018
IPS Compliance Review

Strategy Concentration Guideline – TMRS is within guideline limits that no more than 35% of the total net assets of the absolute return portfolio may be invested in any one Strategy.

Closed or Open-end Vehicle Concentration Limit – TMRS is within guideline limits that no more than 20% of total ARS assets may be invested in a single private investment Vehicle.

Commingled Open-End Concentration Limit – TMRS is within guideline limits that TMRS can not represent more than 25% of total net assets of a commingled investment vehicle.

Percentage of Manager AUM Limit – TMRS does not account for more than 25% of total AUM of any contracted manager’s total AUM.
Section II

ARS PORTFOLIO & PERFORMANCE
IPS Stated Objective for the Absolute Return Portfolio:

“The Absolute Return portfolio is used to provide both favorable stand-alone, risk-adjusted returns as well as diversification for the overall plan.”

A primary goal of the annual review presentation is to discuss the Absolute Return portfolio and its construction relative to IPS stated performance goals & implementation objectives:

Benchmark Performance Goals:

- Long-term performance objective is a rate of return of 3-month LIBOR + 5%, net of investment management fees.

- The current (periods less than 5 years) strategic benchmark is the HFRI Fund of Fund Diversified Index, net of investment management fees, with similar risk relative to the benchmark.

- Additionally, as documented in the IPS, the absolute return portfolio is expected to generate returns net of all fees and expenses, in excess of their respective indices, over rolling five year investment time horizons.
Absolute Return Asset Class Objectives

The Direct Portfolio is designed to accomplish the following primary goals:

- Decrease total portfolio risk
- Potentially increase portfolio returns (as a Fixed Income substitute)
- Provide performance with low correlation to traditional asset classes
- Attractive risk-adjusted returns over the long-term
- Seek to generate positive returns regardless of traditional market benchmark returns
- Seek to capture Alpha: a manager’s rate of return in excess of that which can be explained by its systematic risk (represented by Beta)
Average returns (3 year rolling) have compressed post crisis when considering prevailing Libor rates.
Returns, on a risk-adjusted basis are in line with pre-crisis profiles. Volatility remains low while stocks and bonds are near highs.
## Absolute Return Performance
### Period Ending June, 2018 (Net All)

<table>
<thead>
<tr>
<th>Fund Name (Short)</th>
<th>MKT VAL</th>
<th>% of plan</th>
<th>1 Month</th>
<th>3 Months</th>
<th>YTD</th>
<th>1 Yr.</th>
<th>ITD</th>
<th>Incept Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>TMRS - TOTAL ABSOLUTE RETURN</td>
<td>2,778</td>
<td>9.6</td>
<td>-0.31</td>
<td>0.39</td>
<td>2.07</td>
<td>6.52</td>
<td>4.49</td>
<td>08-01-14</td>
</tr>
<tr>
<td>HFRI FOF DIVERSIFIED INDEX</td>
<td>-0.30</td>
<td>0.62</td>
<td>1.59</td>
<td>5.21</td>
<td>2.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess</td>
<td>-0.02</td>
<td>-0.23</td>
<td>0.48</td>
<td>1.31</td>
<td>2.22</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMRS - BLACKSTONE</td>
<td>620</td>
<td>2.2</td>
<td>-0.06</td>
<td>1.41</td>
<td>2.53</td>
<td>5.87</td>
<td>3.87</td>
<td>08-01-14</td>
</tr>
<tr>
<td>HFRI FOF DIVERSIFIED INDEX</td>
<td>-0.30</td>
<td>0.62</td>
<td>1.59</td>
<td>5.21</td>
<td>2.27</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess</td>
<td>0.24</td>
<td>0.78</td>
<td>0.94</td>
<td>0.66</td>
<td>1.60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TMRS - ABSOLUTE RETURN DIRECT</td>
<td>2,157</td>
<td>7.5</td>
<td>-0.39</td>
<td>0.10</td>
<td>1.94</td>
<td>6.71</td>
<td>5.62</td>
<td>01-01-16</td>
</tr>
<tr>
<td>HFRI FOF DIVERSIFIED INDEX</td>
<td>-0.30</td>
<td>0.62</td>
<td>1.59</td>
<td>5.21</td>
<td>2.79</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excess</td>
<td>-0.09</td>
<td>-0.52</td>
<td>0.35</td>
<td>1.49</td>
<td>2.84</td>
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Performance

ARS Direct: Albourne Pro Forma Review

Portfolio Objectives

<table>
<thead>
<tr>
<th>Objective</th>
<th>Target</th>
<th>Actual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Return</td>
<td>Libor + 5.00%</td>
<td>8.26%</td>
</tr>
<tr>
<td>Volatility</td>
<td>3% - 6%</td>
<td>4.34%</td>
</tr>
<tr>
<td>Historical Sharpe Ratio</td>
<td>1</td>
<td>1.81</td>
</tr>
</tbody>
</table>

Portfolio Objectives evaluated over Dec 2012-Jun 2018

Portfolio returns are Proforma from Dec 2012 thru Dec 2015, at which point TMRS ARS direct portfolio begins.

Source: Albourne Risk Report
Implementation Risk Ranges Implied by IPS Asset Class Guidelines

March 2018

1. Real Return range includes 0-30% limit on Inflation Linked Bonds to align with the IPS's Asset Class Goal of CPI+4%
Sizing of managers is based on both qualitative and quantitative factors along with risk/reward profiles.

*To be funded beginning Q4 2018
ARS portfolio has been built to be well diversified from a geographical standpoint.
120 total combined off-site days for manager due diligence and sourcing since last update.
As of June 2018

ARS’ diversification remains balanced across strategies.
As of June 2018

*Prospective portfolio exposure with full allocation to Varde Asia and Stone Oak

Source: BAAM; State Street
ARS Direct portfolio had a very strong 2017, outpacing other public pensions and further investor channels.
Performance

Up/Down Capture

Fund Performance Across S&P Up & Down Markets

<table>
<thead>
<tr>
<th>S&amp;P Up Months</th>
<th>S&amp;P Down Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.23%</td>
<td>-2.41%</td>
</tr>
<tr>
<td>0.74%</td>
<td>-0.18%</td>
</tr>
</tbody>
</table>

Source: S&P 500  ARS Direct Portfolio Pro Forma

Fund Performance Across Hedge Fund Up & Down Markets

<table>
<thead>
<tr>
<th>HF Up Months</th>
<th>HF Down Months</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.88%</td>
<td>-0.95%</td>
</tr>
<tr>
<td>0.81%</td>
<td>-0.20%</td>
</tr>
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</table>

Source: HFRI FW Composite  ARS Direct Portfolio Pro Forma

August 2014 – June 2018
The Importance of Limiting Losses


ARS’ priority on downside protection in market pullbacks.

Source: JP Morgan
Difference Between Good and Bad

Performance spread between top and bottom-decile manager

Not all managers are created equal. Strong manager due diligence is a critical factor.

Source: Morningstar, Lipper TASS database
ARS’ diversification remains balanced across strategies.

Source: Boomerang Capital, Credit Suisse Hedge Indices
Portfolio Management Initiatives
Becoming a Strategic Partner

More Expensive

Direct Investor
Asset Managers
Sophisticated Institutions

Strategic Capital
Sophisticated Institutions
Separate Accounts, Co-Invest, etc.

Direct Fund
Sophisticated Institutions
Resourced Institutions

Fund of Funds
Resourced Institutions
Resource Constrained Institutions

More Specialized Expertise
ARS team is looking across a multitude of investment strategies to build out the portfolio.
Deceptively High Correlations to Equity Markets

ARS has built a diversified portfolio, targeting more RV opportunities.

Source: Bloomberg, HFR
Portfolio Line Items and Volatility

Source: Aksia, data as of May 31, 2018

ARS portfolio is diversified, yet maintains adequate levels of risk.
Manager selection is a key component of hedging against bear markets.
Section III

MARKET REVIEW: ABSOLUTE RETURN
Many investors define the economic cycle by reference to the two pillars of the macroeconomic environment: GDP and Inflation.
Where are we now?

The Output Gap is a measure of how far the economy is away from a theoretical full capacity. It has recently moved above zero which usually signals we have moved into an economic stage that contains inflationary pressures.

Inflation is one of the items closely monitored by the Fed, they aim to keep inflation under control by raising the cost of credit to the system whilst not taking away from growth.

Unfortunately the underlying market doesn’t provide us with a nicely shaped curve to tell us where we are in the cycle. Participants must look to a number of indicators to try and gauge overall conditions.

SOURCE: Bloomberg, St Louis Federal Reserve
Effect on Absolute Return

The building blocks of the TMRS Absolute Return portfolio are less susceptible to the economic cycle and will overall benefit from aspects such as rising short term rates. Managers will also look forward to an increase in the baseline volatility of financial markets as aspects of QE continue to roll back.
Long Short Equity strategies have dominated YTD performance especially those with a focus on Healthcare and Technology.

Trend following CTAs have struggled after early exposure to equity market volatility. Global Macro performance has been quite diverse depending on whether managers captured the small number of large market moves.

Relative Value strategies have been steady but not spectacular YTD, going forward they should benefit from rising rates and increased volatility.

Within Event Driven, credit strategies have performed well despite a limited opportunity set. Risk Arbitrage has seen increased opportunities with a surging merger market but it has come with idiosyncratic risk.

Past performance is not necessarily indicative of or a guarantee of future returns.
## Premia Performance

<table>
<thead>
<tr>
<th></th>
<th>Equity</th>
<th>Fixed Income</th>
<th>Credit</th>
<th>Comodities</th>
<th>FX</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Beta</strong></td>
<td>3.9%</td>
<td>-1.2%</td>
<td>1.2%</td>
<td>-3.1%</td>
<td>2.6%</td>
</tr>
<tr>
<td><strong>Carry</strong></td>
<td>-1.7%</td>
<td>-0.4%</td>
<td>1.7%</td>
<td>-0.3%</td>
<td></td>
</tr>
<tr>
<td><strong>Trend</strong></td>
<td>-1.4%</td>
<td>-1.5%</td>
<td>-5.2%</td>
<td>-1.2%</td>
<td>-2.2%</td>
</tr>
<tr>
<td><strong>Value</strong></td>
<td>-6.0%</td>
<td>1.2%</td>
<td>-1.0%</td>
<td>1.7%</td>
<td></td>
</tr>
<tr>
<td><strong>Volatility Carry</strong></td>
<td>-2.2%</td>
<td>-1.1%</td>
<td>0.0%</td>
<td>-2.4%</td>
<td>0.8%</td>
</tr>
</tbody>
</table>

*Past performance is not necessarily indicative of or a guarantee of future returns.*

Equity beta has reverted strongly after a weak start, setting up a similar tone to previous years. Within equity premia, value has been particular hurt carrying on what has been a multi year trend, equity performance has mainly been driven by growth and momentum characteristics.

Rate rises have see negative fixed income performance but fixed income value, which relies on reversion to fundamental values, has performed well. Credit markets have ended positive year to date but the whipsawing nature of returns has left credit trend negative.

Commodity strategies are yet to benefit from potential inflationary pressures and FX returns this year have been dominated by dollar strength.
Outlook for Hedge Fund Strategies

- Directional (Macro) strategies remain attractive over the next 12 months, particularly given the increased Negative Case probability. After a difficult start to the year, CTA net equity exposure is closer to neutral, putting the strategy in a better position to act defensively going forward. Global Macro managers appear to be positioned well for the months ahead, when monetary and fiscal policy changes should provide a rich opportunity set.

- Relative Value expectations have marginally increased as volatility has entered the markets. Market Neutral strategies had previously faced a lack of opportunities within sectors. This may no longer be the case. Fixed Income Arbitrage was relatively insulated from the negative impact of the volatility spike.

- Equity Long/Short managers remain stable despite the change in dynamic of the equity environment. On average, industry exposure is high and concentrated in the healthcare and technology sectors as their high growth and low risk characteristics continue to dominate. While geopolitical uncertainty remains elevated, the influence of politics and regulation is mixed.

- Event Driven strategies continue to gather towards the bottom half of the forecast. Albourne continues to be cautious on Distressed/Restructuring given current valuation levels.

*Past performance is not necessarily indicative of or a guarantee of future returns.*
Additional Information

VIX

Output Gap vs Inverse 10–2Yr Spread

- Spread
- Output Gap

Inflation Surprise
Inflation 1.5% to 2.5%
Inflation 0% to 2.5%
Deflation Probability
Section IV

CONCLUSIONS
Conclusions

• In the past two and a half years, TMRS Staff has focused on the implementation and execution of the strategic decision to build out a Direct Absolute Return Program.

• Despite some challenges, the Direct Portfolio is achieving return objectives, as defined in the IPS, both from a relative and absolute perspective.

• The Portfolio is constructed to seek attractive risk-adjusted returns over the long-term while providing performance that has low correlation to traditional asset classes.

• Global markets tend to be cyclical and diverse, with bouts of volatility disruptions. This poses both opportunities and risks for ARS’ overall investment portfolio and prospects going forward.
DISCLOSURES

TMRS periodically discloses public information that is not excepted from disclosure under Section 552.0225(b) of the Texas Public Information Act. Information provided by a manager, a Managing General Partner (GP), any of its Associates or other data provider to TMRS or a TMRS service provider, and contained in these materials (i) may have been independently produced or modified by TMRS or the TMRS service provider; (ii) has not been reviewed or approved by the manager, Managing GP or any of its Associates; and (iii) may not reflect the historical performance or asset value reflected in the manager’s, Managing GP’s or any of its Associates’ records and, therefore, should not be used for comparative purposes.