MBA Student Investment Management Fund

Semi-Annual Presentation
December 2, 2016
Introductions

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Overview

- Objective
- Strategy
- Implementation
- Portfolio
  - Construction
  - Snapshot
  - Composition
- Next Steps
Objective

• Maximize the learning experience.

• Practical application of academic theories.

• Comprehension of tradeoffs in implementing a quantitative strategy.
Strategy - Research

“Decoding Inside Information” – Journal of Finance 2010
Cohen, Malloy & Pomorski

• Types of inside trades
  • Routine: buying and selling in the same calendar month for past 3 years
  • Opportunistic: buying and selling in no discernable pattern

• Predicative power of opportunistic trades
  • Average monthly returns from a portfolio of opportunistic buys:
    • Value-weighted: 72bp
    • Equal-weighted: 158bp
### Strategy – Insider Trading

#### December 2013

<table>
<thead>
<tr>
<th>Su</th>
<th>M</th>
<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>Sa</th>
</tr>
</thead>
<tbody>
<tr>
<td>X</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Y</td>
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#### December 2014

<table>
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<th>W</th>
<th>Th</th>
<th>F</th>
<th>Sa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
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<td></td>
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<td>Y</td>
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</table>

#### December 2015

<table>
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<th>T</th>
<th>W</th>
<th>Th</th>
<th>F</th>
<th>Sa</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Y</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*X = Routine Trader  
Y = Opportunistic Trader*
Implementation - Process

**Phase 1:**
Establish Routine/Opportunistic Trading Data Set

- **Universe**
  - 1114 Companies

- **SEC Form 4 Data**
  - Scrape for 3 years

- **Historical Data SQL**

**Phase 2:**
Weekly Dataset

- **Universe**
  - 1114 Companies

- **SEC Form 4 Data**
  - Scrape for 1 week

- **Weekly Data SQL**

**Opportunistic Trades**
Implementation - Universe

Screening Criteria

Active U.S. Equities
Common Stock, No ETF’s, & No ADR’s
Remove Utilities & S&P 500
Market cap ≥ $1.2 Billion
30 Day Average Volume > 50,000

Number of Securities

16,931

1,114
Implementation - Technical

Scraper Code

EDGAR Form 4

Output Excel

EDGAR | Company Filings
Free access to more than 21 million filings
Implementation - Technical

```python
def pullXMLTrade(url_str, StockSpecificTradeList, tickerPulled):
    # FootnoteText = []
    #
    xml_str = urllib.request.urlopen(url_str).read()
    xmlstr = minidom.parseString(xml_str)
    # Trader
    obs_values = xmlstr.getElementsByTagName('rptOwnerName')
    test = obs_values[0].nodeValue
    # prints report owner name
    TraderName = obs_values[0].firstChild.nodeValue
    #print(\n"Trader Name: " + str(TraderName))
    #print("Trader Name: " + str(TraderName))
    
    # Trader CIK
    obs_values = xmlstr.getElementsByTagName('rptOwnerIdCik')
    test = obs_values[0].nodeValue
    # prints CIK
    TraderCIK = obs_values[0].firstChild.nodeValue
    #print("Trader CIK: " + str(TraderCIK))
```

<table>
<thead>
<tr>
<th>Trader Name</th>
<th>Trader CIK</th>
<th>Company Name</th>
<th>Ticker</th>
<th>Company CIK</th>
<th>Transaction Date</th>
<th>Filing Date</th>
<th>Transaction Type</th>
<th>Shares</th>
<th>Price</th>
<th>Buy</th>
<th>Shares</th>
<th>Footnotes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Musslewhite Ro</td>
<td>1390194</td>
<td>ADVISORY BOA</td>
<td>ABCO</td>
<td>1157377</td>
<td>11/14/2016</td>
<td>11/15/2016</td>
<td>Common Stock</td>
<td>5500</td>
<td>16.6A</td>
<td>3E+05</td>
<td>This transaction was not successful.</td>
<td></td>
</tr>
<tr>
<td>SCAGLIONE DIE</td>
<td>1539527</td>
<td>ABM INDUSTRIE</td>
<td>ABM</td>
<td>771497</td>
<td>11/14/2016</td>
<td>11/15/2016</td>
<td>Common Stock</td>
<td>700</td>
<td>42.5D</td>
<td>26827</td>
<td>All sales represent the sale of shares in the company.</td>
<td></td>
</tr>
<tr>
<td>Baity Glenn</td>
<td>1487100</td>
<td>ACADIA PHARM</td>
<td>ACAD</td>
<td>1070494</td>
<td>11/10/2016</td>
<td>11/14/2016</td>
<td>Common Stock</td>
<td>10200</td>
<td>1.55A</td>
<td>73121</td>
<td>The sale represents the sale of shares in the company.</td>
<td></td>
</tr>
<tr>
<td>Murphy Francis</td>
<td>1657233</td>
<td>Acacia Commun</td>
<td>ACIA</td>
<td>1651235</td>
<td>11/15/2016</td>
<td>11/17/2016</td>
<td>Common Stock</td>
<td>1582</td>
<td>69.2D</td>
<td>53917</td>
<td>Represents the sale of shares in the company.</td>
<td></td>
</tr>
</tbody>
</table>

CSV Output
Implementation - Technical

Database tools

Challenges

• Lack of coding experience
• Internet interruptions
• Data quality
• Footnotes
• Compensation based transactions

SQL Code

```sql
27 and footnotes not like '%500%'
28 and footnotes not like '%50%'
29 and footnotes not like '%50%'
30 and footnotes not like '%50%'
31 and footnotes not like '%50%'
32 and footnotes not like '%50%'
33 and footnotes not like '%50%'
34 and footnotes not like '%50%'
35 and footnotes not like '%50%'
36 and footnotes not like '%50%'
37 and footnotes not like '%50%'
38 and footnotes not like '%50%'
39 and footnotes not like '%50%'
40 and footnotes not like '%50%'
41 and footnotes not like '%50%'
42 and footnotes not like '%50%'
43 and footnotes not like '%50%'
44
45 and price != @
46 and buy_or_sell like "A"
47 and Primary_key not in
48
49 SELECT DISTINCT A.Primary_key
50 FROM new_table A, new_table B, new_table C, new_table D
51 WHERE year(A.transaction_date) = '2016'
52 and year(B.transaction_date) = '2014'
53 and year(C.transaction_date) = '2015'
54 and year(D.transaction_date) = '2013'
55 and month(A.transaction_date) = '11'
56 and month(B.transaction_date) = '11'
57 and month(C.transaction_date) = '11'
58 and month(D.transaction_date) = '11'
59 and A.trader_CIK = B.trader_CIK
60 and A.trader_CIK = C.trader_CIK
61 and A.trader_CIK = D.trader_CIK
62 GROUP BY transaction_date;
```
Implementation - Seeding

Data Collection Time Period

##Opportunistic Trades by 
#Days Preceding Designated Trade Day

<table>
<thead>
<tr>
<th></th>
<th>t-1</th>
<th>t-2</th>
<th>t-3</th>
<th>t-4</th>
<th>t-5</th>
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<tbody>
<tr>
<td>Avg</td>
<td>3</td>
<td>6</td>
<td>9</td>
<td>11</td>
<td>14</td>
</tr>
<tr>
<td>Stdev</td>
<td>2</td>
<td>3</td>
<td>5</td>
<td>6</td>
<td>7</td>
</tr>
<tr>
<td>Max</td>
<td>9</td>
<td>16</td>
<td>21</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>Min</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
</tbody>
</table>

Day of Week Effect

<table>
<thead>
<tr>
<th>Day</th>
<th>Average</th>
</tr>
</thead>
<tbody>
<tr>
<td>Monday</td>
<td>19%</td>
</tr>
<tr>
<td>Tuesday</td>
<td>13%</td>
</tr>
<tr>
<td>Wednesday</td>
<td>22%</td>
</tr>
<tr>
<td>Thursday</td>
<td>16%</td>
</tr>
<tr>
<td>Friday</td>
<td>27%</td>
</tr>
<tr>
<td>Saturday</td>
<td>2%</td>
</tr>
<tr>
<td>Sunday</td>
<td>1%</td>
</tr>
</tbody>
</table>
### Portfolio Construction

**5 Tranches with approximately 2.5% per position**

<table>
<thead>
<tr>
<th>Tranche</th>
<th>Nov 21</th>
<th>Nov 28</th>
<th>Dec 5</th>
<th>Dec 12</th>
<th>Dec 19</th>
<th>Dec 26</th>
<th>Jan 2</th>
<th>Jan 9</th>
<th>Jan 16</th>
<th>Jan 23</th>
<th>Jan 30</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>3</td>
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<td>4</td>
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<td>5</td>
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</tr>
</tbody>
</table>

1 2
## Portfolio Snapshot

### Tranche 1 – November 21

<table>
<thead>
<tr>
<th>Company</th>
<th>Ticker</th>
<th>Initial Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>Applied Industrial Technologies</td>
<td>AIT</td>
<td>2.5%</td>
</tr>
<tr>
<td>Community Bank System, Inc.</td>
<td>CBU</td>
<td>2.5%</td>
</tr>
<tr>
<td>Donaldson Company, Inc.</td>
<td>DCI</td>
<td>2.5%</td>
</tr>
<tr>
<td>Innospec, Inc.</td>
<td>IOSP</td>
<td>2.5%</td>
</tr>
<tr>
<td>Mercury General Corp.</td>
<td>MCY</td>
<td>2.5%</td>
</tr>
<tr>
<td>Renasant Corp.</td>
<td>RNST</td>
<td>2.5%</td>
</tr>
<tr>
<td>Square Inc.</td>
<td>SQ</td>
<td>2.5%</td>
</tr>
</tbody>
</table>

### Tranche 2 – November 28

<table>
<thead>
<tr>
<th>Company</th>
<th>Ticker</th>
<th>Initial Weight</th>
</tr>
</thead>
<tbody>
<tr>
<td>First Hawaiian Inc.</td>
<td>FHB</td>
<td>2.5%</td>
</tr>
<tr>
<td>Avon Products Inc.</td>
<td>AVP</td>
<td>2.5%</td>
</tr>
<tr>
<td>Canadian Pacific Railway Limited</td>
<td>CP</td>
<td>2.5%</td>
</tr>
<tr>
<td>Healthcare Services Group, Inc.</td>
<td>HCSG</td>
<td>2.5%</td>
</tr>
</tbody>
</table>
Portfolio Composition - Sector

SIM Fund*

- Cash: 71%
- IWV: 3%
- Energy: 10%
- Information Technology: 10%
- Utilities: 2%

IWM

- Consumer Discretionary: 17%
- Energy: 5%
- Financials: 13%
- Health Care: 4%
- Materials: 7%
- Real Estate: 3%
- Consumer Staples: 3%
- Industrials: 13%
- Information Technology: 1%
- Utilities: 19%
- Telecommunications: 3%
- Real Estate: 1%

IWV

- Consumer Discretionary: 20%
- Energy: 11%
- Financials: 14%
- Health Care: 13%
- Materials: 8%
- Real Estate: 7%
- Consumer Staples: 3%
- Industrials: 15%
- Information Technology: 1%
- Utilities: 13%
- Telecommunications: 4%

*As of 28th November
Next Steps

1. Continue to seed portfolio
2. Rebalancing the portfolio
3. Holding & attribution analysis
4. Refine and improve trade signal
### Table IV: Portfolio Returns to Routine and Opportunistic Trades

<table>
<thead>
<tr>
<th></th>
<th>Opportunistic Buys</th>
<th>Routine Buys</th>
<th>L/S Buys</th>
<th>Opportunistic Sells</th>
<th>Routine Sells</th>
<th>L/S Sells</th>
<th>Opportunistic (Buys–Sells)</th>
<th>Routine (Buys–Sells)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Panel A: Equal-Weighted</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average returns</td>
<td>2.33</td>
<td>1.65</td>
<td>0.68</td>
<td>0.77</td>
<td>1.41</td>
<td>−0.63</td>
<td>1.55</td>
<td>0.25</td>
</tr>
<tr>
<td>Standard dev.</td>
<td>4.95</td>
<td>4.06</td>
<td>3.09</td>
<td>5.97</td>
<td>6.01</td>
<td>2.64</td>
<td>4.91</td>
<td>4.67</td>
</tr>
<tr>
<td>CAPM alpha</td>
<td>1.51***</td>
<td>0.92***</td>
<td>0.59***</td>
<td>−0.30</td>
<td>0.32</td>
<td>−0.61***</td>
<td>1.81***</td>
<td>0.63**</td>
</tr>
<tr>
<td></td>
<td>(5.89)</td>
<td>(4.34)</td>
<td>(2.98)</td>
<td>(−1.31)</td>
<td>(1.44)</td>
<td>(−3.47)</td>
<td>(5.86)</td>
<td>(2.25)</td>
</tr>
<tr>
<td>Fama-French alpha</td>
<td>1.20***</td>
<td>0.64***</td>
<td>0.56***</td>
<td>−0.21</td>
<td>0.43***</td>
<td>−0.65***</td>
<td>1.41***</td>
<td>0.20</td>
</tr>
<tr>
<td></td>
<td>(5.49)</td>
<td>(3.78)</td>
<td>(2.74)</td>
<td>(−1.34)</td>
<td>(2.72)</td>
<td>(−3.60)</td>
<td>(5.04)</td>
<td>(0.87)</td>
</tr>
<tr>
<td>Carhart alpha</td>
<td>1.45***</td>
<td>0.82***</td>
<td>0.63***</td>
<td>−0.19</td>
<td>0.58***</td>
<td>−0.57***</td>
<td>1.64***</td>
<td>0.44*</td>
</tr>
<tr>
<td></td>
<td>(6.82)</td>
<td>(4.92)</td>
<td>(3.03)</td>
<td>(−1.18)</td>
<td>(2.32)</td>
<td>(−3.11)</td>
<td>(5.86)</td>
<td>(1.89)</td>
</tr>
<tr>
<td>DGTW Char Adj</td>
<td>1.24***</td>
<td>0.40**</td>
<td>0.83***</td>
<td>−0.27**</td>
<td>0.42***</td>
<td>−0.89***</td>
<td>1.51***</td>
<td>−0.02</td>
</tr>
<tr>
<td></td>
<td>(4.99)</td>
<td>(2.00)</td>
<td>(3.39)</td>
<td>(−2.09)</td>
<td>(2.75)</td>
<td>(−4.52)</td>
<td>(4.98)</td>
<td>(−0.06)</td>
</tr>
<tr>
<td>5-Factor alpha</td>
<td>1.58***</td>
<td>0.87***</td>
<td>0.70***</td>
<td>−0.23</td>
<td>0.45***</td>
<td>−0.87***</td>
<td>1.80***</td>
<td>0.43*</td>
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<tr>
<td></td>
<td>(7.03)</td>
<td>(5.00)</td>
<td>(3.18)</td>
<td>(−1.30)</td>
<td>(2.59)</td>
<td>(−3.48)</td>
<td>(6.07)</td>
<td>(1.73)</td>
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<tr>
<td><strong>Panel B: Value-Weighted</strong></td>
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<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Average returns</td>
<td>1.79</td>
<td>1.27</td>
<td>0.52</td>
<td>0.72</td>
<td>1.00</td>
<td>−0.29</td>
<td>1.03</td>
<td>0.27</td>
</tr>
<tr>
<td>Standard dev.</td>
<td>5.96</td>
<td>5.02</td>
<td>5.27</td>
<td>5.70</td>
<td>6.16</td>
<td>2.92</td>
<td>5.88</td>
<td>5.97</td>
</tr>
<tr>
<td>CAPM alpha</td>
<td>0.87***</td>
<td>0.45*</td>
<td>0.42</td>
<td>−0.34*</td>
<td>−0.09</td>
<td>−0.25</td>
<td>1.22***</td>
<td>0.55</td>
</tr>
<tr>
<td></td>
<td>(2.88)</td>
<td>(1.73)</td>
<td>(1.20)</td>
<td>(−1.73)</td>
<td>(−0.39)</td>
<td>(−1.29)</td>
<td>(3.14)</td>
<td>(1.44)</td>
</tr>
<tr>
<td>Fama-French alpha</td>
<td>0.64**</td>
<td>0.18</td>
<td>0.46</td>
<td>−0.08</td>
<td>0.28</td>
<td>−0.36</td>
<td>0.72**</td>
<td>−0.09</td>
</tr>
<tr>
<td></td>
<td>(2.16)</td>
<td>(0.75)</td>
<td>(1.27)</td>
<td>(−0.46)</td>
<td>(1.35)</td>
<td>(−1.83)</td>
<td>(2.06)</td>
<td>(−0.29)</td>
</tr>
<tr>
<td>Carhart alpha</td>
<td>0.52*</td>
<td>0.09</td>
<td>0.43</td>
<td>−0.09</td>
<td>0.17</td>
<td>−0.26</td>
<td>0.62*</td>
<td>−0.07</td>
</tr>
<tr>
<td></td>
<td>(1.73)</td>
<td>(0.37)</td>
<td>(1.16)</td>
<td>(−0.50)</td>
<td>(0.80)</td>
<td>(−1.29)</td>
<td>(1.71)</td>
<td>(−0.22)</td>
</tr>
<tr>
<td>DGTW Char Adj</td>
<td>0.57**</td>
<td>0.26</td>
<td>0.31</td>
<td>−0.18</td>
<td>0.66</td>
<td>−0.24</td>
<td>0.75**</td>
<td>0.21</td>
</tr>
<tr>
<td></td>
<td>(2.35)</td>
<td>(1.26)</td>
<td>(1.04)</td>
<td>(−1.29)</td>
<td>(0.31)</td>
<td>(−1.46)</td>
<td>(2.48)</td>
<td>(0.72)</td>
</tr>
<tr>
<td>5-Factor alpha</td>
<td>0.72**</td>
<td>0.09</td>
<td>0.63</td>
<td>−0.10</td>
<td>0.29</td>
<td>−0.39*</td>
<td>0.82**</td>
<td>−0.20</td>
</tr>
<tr>
<td></td>
<td>(2.27)</td>
<td>(0.34)</td>
<td>(1.61)</td>
<td>(−0.49)</td>
<td>(1.32)</td>
<td>(−1.84)</td>
<td>(2.15)</td>
<td>(−0.57)</td>
</tr>
</tbody>
</table>

*Source: Decoding Inside Information
Appendix B: Portfolio Composition - Weight

SIM Fund*
- 71% IWM
- 19% IWV
- 2% Cash
- 5% Large
- 47% Mid Cap
- 1% Small Cap
- 18% Large
- 5% Mid Cap
- 5% Small Cap

*As of 28th November