Cross Fund Sectors Comparison: Role of Real Estate Mutual Funds

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PhD Research Agenda

- Cross Sectors Comparison: Role of REMFs in Sector Fund Industry ✓
- US Domestic REMF Performance: Skills or Luck?
- Global REMFs: Managerial Skills & Diversification Benefits?
Outline

1. Industry Overview ✔
2. Motivation, Objective & Contribution
3. Data
4. Methodology
5. Empirical Results
6. Conclusions
What is a *Sector Mutual Fund, Real Estate Mutual Fund*?

Stylised Fact: Real Estate as Largest Sector since 2005.
Fund Sector vs. Stock Market Return Rates
Motivation

- **Stylised Facts of Fund Industry:** REMFs as Largest Fund Sector.

- **Active Management Expenses:** 147 bp (Utilities) - 189 bp (Healthcare), Real Estate: 159 bp.

- **Gaps in Sector Fund Literature:**
  - Performance is Benchmark & Time-specific,
  - Expenses should be taken into Consideration,
  - Data Issues, like Survivor & Incubation Bias (Evans, 2010),
  - Performance Examination of Multiple Funds involves Significance Level - Type I Error or False Discoveries (Storey, 2002; Barras et al., 2010).
## US Mutual Funds Expense Ratios

<table>
<thead>
<tr>
<th>Investment style</th>
<th>10th pct.</th>
<th>Median</th>
<th>90th pct.</th>
<th>VW avg.</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>Equity funds</td>
<td>77</td>
<td>133</td>
<td>216</td>
<td>77</td>
<td>141</td>
</tr>
<tr>
<td>Aggressive growth</td>
<td>85</td>
<td>137</td>
<td>219</td>
<td>89</td>
<td>147</td>
</tr>
<tr>
<td>Growth</td>
<td>72</td>
<td>124</td>
<td>206</td>
<td>83</td>
<td>131</td>
</tr>
<tr>
<td><strong>Sector</strong></td>
<td>84</td>
<td>146</td>
<td>235</td>
<td>83</td>
<td><strong>153</strong></td>
</tr>
<tr>
<td>Growth &amp; income</td>
<td>52</td>
<td>112</td>
<td>191</td>
<td>47</td>
<td>118</td>
</tr>
<tr>
<td>Income</td>
<td>68</td>
<td>112</td>
<td>187</td>
<td>82</td>
<td>120</td>
</tr>
<tr>
<td>International</td>
<td>93</td>
<td>147</td>
<td>230</td>
<td>93</td>
<td>155</td>
</tr>
<tr>
<td><strong>Hybrid funds</strong></td>
<td>65</td>
<td>120</td>
<td>199</td>
<td>79</td>
<td><strong>127</strong></td>
</tr>
<tr>
<td>Bond funds</td>
<td>49</td>
<td>89</td>
<td>167</td>
<td>61</td>
<td>101</td>
</tr>
</tbody>
</table>
Three Types of Fund Managers
Objectives

Evaluate Truly Skilled Managers of Different Sectors, and How Real Estate Ranks compared with Others, at Industry & Individual Levels:

1. Can any Sector Beat the Market?
Objectives

Evaluate Truly Skilled Managers of Different Sectors, and How Real Estate Ranks compared with Others, at Industry & Individual Levels:

1. Can any Sector Beat the Market?

2. What is the Proportion of Truly Skilled Sector Managers?
Contributions

(i) Accommodate Benchmarks with Sector-specific Exposures, and Conduct Time-specific Analysis.
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(ii) Examine Performance both Before, and Net of Expenses.
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(iii) Survivor & Incubation Bias Controlled.
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(iv) Control False Discoveries (Lucky/Unlucky Managers) by Implementing FDR (Storey, 2002; Barras et al., 2010).
Data


- **Mutual Fund Data**
  - *Lipper Classification* on Sector Funds: 554 Active Funds with $\geq$ 5-year History
  - *Monthly Returns*: CRSP US Mutual Fund Database free from *Survivor Bias*, and *Incubation Bias* Controlled, for both *Net & Gross* Returns.
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- **Benchmark Data**
  - *Dow Jones US Sector Total Return Index* (Datastream), and *US Carhart Four-factor Model* (Kenneth French).
Performance Measurement - Alpha

\[ rrf_{i,t} = \alpha_i + E(rrf_{i,t}) + \varepsilon_{i,t} \]  

- Sector Index & Carhart Four-factor Models as Popular Choices for Benchmarks:  
  \[ E(rrf_{i,t}) = \beta_{sec, i sec_t}, \text{ or } \]  
  \[ E(rrf_{i,t}) = \beta_{M,i mkt_t} + \beta_{s,i smb_t} + \beta_{h,i hml_t} + \beta_{m,i mom_t}. \]

- Our Benchmark is Sector-customised, as Optimal Specification based on \( R^2, \text{ SIC, LM Tests.} \)

\[ E(rrf_{i,t}) = \beta_{M,i mkt_t} + \beta_{s,i smb_t} + \beta_{h,i hml_t} + \beta_{m,i mom_t} + \beta_{sec, i sec_t} \]  

Use \( t_\alpha \) instead of \( \alpha \): corrects outliers by standardising alpha using its Newy-West HAC s.d.

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Methodology: FDR

$H_0$ of Two-sided Test on N Funds at Significance Level $\gamma$:

\[
H_{0,1} : \alpha_1 = 0 , \ H_{A,1} : \alpha_1 \neq 0 , \\
\ldots, \ldots, \\
H_{0,N} : \alpha_N = 0 , \ H_{A,N} : \alpha_N \neq 0 .
\]

Estimate the Proportion of Zero-alpha Funds in Population of All Sector Funds - $\pi_0$. False discoveries\footnote{For instance, at 10% significance level, if the proportion of zero-alpha funds is 90% in 554 funds, the false discoveries of $E(F^{+}_\gamma)$ and $E(F^{-}_\gamma)$ are $4.5\% \times 554 = 25$ funds.} on either tails is:

\[
E(F^{+/-}_\gamma) = \pi_0 \cdot \gamma/2
\]  

(3)

\[
E(T^{+/-}_\gamma) = E(S^{+/-}_\gamma) - E(F^{+/-}_\gamma) = E(S^{+/-}_\gamma) - \pi_0 \cdot \gamma/2
\]  

(4)
Methodology: FDR

Estimation on $\pi_0$

P-values: $p \sim U[0, 1]$, Cut-off value $\lambda$ to Estimate $\pi_0$:

$$\hat{\pi}_0(\lambda) = \frac{\text{No. } \{p_i > \lambda\}}{N} \cdot \frac{1}{(1 - \lambda)}$$

(5)
## Sector Fund Industry Performance

<table>
<thead>
<tr>
<th></th>
<th>A</th>
<th>AU</th>
<th>C</th>
<th>F</th>
<th>G</th>
<th>H</th>
<th>I</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross $\hat{\alpha}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\hat{\alpha} \times 12$</td>
<td>2.03</td>
<td>4.05</td>
<td>-1.22</td>
<td>0.63</td>
<td>1.97</td>
<td>1.34</td>
<td>1.46</td>
</tr>
<tr>
<td>$t_{\hat{\alpha}}$</td>
<td>(1.02)</td>
<td>(1.30)</td>
<td>(-0.35)</td>
<td>(0.55)</td>
<td>(1.24)</td>
<td>(0.90)</td>
<td>(0.92)</td>
</tr>
<tr>
<td>Net $\hat{\alpha}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\hat{\alpha} \times 12$</td>
<td>0.66</td>
<td>2.38</td>
<td>-2.71</td>
<td>-1.07</td>
<td>0.49</td>
<td>-0.21</td>
<td>-0.23</td>
</tr>
<tr>
<td>$t_{\hat{\alpha}}$</td>
<td>(0.33)</td>
<td>(0.77)</td>
<td>(-0.78)</td>
<td>(-0.95)</td>
<td>(0.31)</td>
<td>(-0.14)</td>
<td>(-0.14)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>M</th>
<th>N</th>
<th>R</th>
<th>S</th>
<th>T</th>
<th>U</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gross $\hat{\alpha}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\hat{\alpha} \times 12$</td>
<td>2.44</td>
<td>-1.18</td>
<td>1.92</td>
<td>0.92</td>
<td>0.68</td>
<td>0.70</td>
</tr>
<tr>
<td>$t_{\hat{\alpha}}$</td>
<td><strong>2.24</strong></td>
<td>(-0.60)</td>
<td><strong>2.46</strong></td>
<td>(0.84)</td>
<td>(0.41)</td>
<td>(0.87)</td>
</tr>
<tr>
<td>Net $\hat{\alpha}$</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>$\hat{\alpha} \times 12$</td>
<td>0.82</td>
<td>-2.72</td>
<td>0.42</td>
<td>-0.56</td>
<td>-1.05</td>
<td>-0.57</td>
</tr>
<tr>
<td>$t_{\hat{\alpha}}$</td>
<td>(0.74)</td>
<td>(-1.36)</td>
<td>(0.54)</td>
<td>(-0.51)</td>
<td>(-0.62)</td>
<td>(-0.69)</td>
</tr>
</tbody>
</table>
Figure 1: Recursive alpha estimates of domestic sector funds industry relative to five-factor model: Recursive net alpha of equal-weighted portfolio (in (a)), and value-weighted portfolio (in (b)) of funds relative to combined markets, for the period 1992-2012.

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(a)
Empirical Results: Industry Performance Summary

- Basic Materials (M), Real Estate (R) oriented Sectors can Outperform before, but not after Costs. Technology (T) can not take Lead from Sector-tilted benchmark.
- Limited Outperformance during 1992-2002; but Superior Performance among certain Sectors during 2003-2012, such as Gold (AU), Basic Materials (M).
- Findings are Robust to EW/VW, Recursive Estimates.
Empirical Results: Cross-sectional T-statistic Distributions

Note: Blue-shaded tail - funds with t less than -1.65, Red-shaded tail - funds with t larger than 1.65
Histogram of sector funds bootstrapped P-values

Cut-off threshold point = 0.05, Estimated $\pi_0$ as 0.98.

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## FDR among Sector Funds

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Zero-Alpha $\hat{\pi}_0$</th>
<th>Skilled $\hat{\pi}_A^+$</th>
<th>Unskilled $\hat{\pi}_A^-$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Percentage</td>
<td>98.00%</td>
<td>0.62%</td>
<td>1.38%</td>
</tr>
<tr>
<td>No. of Funds</td>
<td>543</td>
<td>3</td>
<td>8</td>
</tr>
<tr>
<td>Significance Level $\lambda$</td>
<td>5%</td>
<td>10%</td>
<td>15%</td>
</tr>
<tr>
<td>FDR in Positive Alphas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant $\alpha \hat{S}^+$</td>
<td>3.07%</td>
<td>5.78%</td>
<td>8.66%</td>
</tr>
<tr>
<td>$FDR^+$</td>
<td>79.84%</td>
<td>84.83%</td>
<td>84.83%</td>
</tr>
<tr>
<td>Lucky Funds $\hat{F}^+$</td>
<td>2.45%</td>
<td>4.90%</td>
<td>7.35%</td>
</tr>
<tr>
<td>Skilled Funds $\hat{T}^+$</td>
<td>0.62%</td>
<td>0.88%</td>
<td>1.31%</td>
</tr>
<tr>
<td>FDR in Negative Alphas</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Significant $\alpha \hat{S}^-$</td>
<td>4.15%</td>
<td>5.60%</td>
<td>8.48%</td>
</tr>
<tr>
<td>$FDR^-$</td>
<td>59.01%</td>
<td>87.57%</td>
<td>86.64%</td>
</tr>
<tr>
<td>Unlucky Funds $\hat{F}^-$</td>
<td>2.45%</td>
<td>4.90%</td>
<td>7.35%</td>
</tr>
<tr>
<td>Unskilled Funds $\hat{T}^-$</td>
<td>1.70%</td>
<td>0.70%</td>
<td>1.13%</td>
</tr>
</tbody>
</table>
Empirical Results: Individual REMF
Summary

- Truly Skilled Sector Fund Managers are Limited, Most are Lucky.
- More Skilled Managers during 2003-2012 than 1992-2002: Proportion of Skilled Managers Increases from 3.61% to 4.41%.
- Findings are Robust to Benchmarks, Recursive Analysis.
Conclusions

- Examines:
  - Sector Skills Differentiation at Sector and Individual Levels.

Findings:
- No Sectors can Outperform, even Real Estate, after Expenses. Most Fund Managers Lucky.
- Varying Skill-levels in Sector Fund Market: More Skilled Managers during Recent Subperiod (opposite to (Barras et al., 2010)).
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References


