

# Who Owns What?

## A Factor Model for Direct Stockholding

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August 2024

# Introduction

## Question:

Understand WHO owns WHAT

or

Which investor owns what characteristic?

## Characteristic clusters clienteles:

- ① Old, dividend payer, high turnover, and high volatility
- ② Lottery-like
- ③ Dividend payer, low beta, low turnover, and high past returns

## Investor preferences:

- ▶ Larger, older, and better diversified → Clusters 1 and 3
- ▶ Smaller, high turnover, less diversified → Cluster 2
- ▶ Single stock owners → Young, large stocks or mega-IPOs

# Summary Statistics

| Variable Name               | Mean  | Std. Dev. | P10   | P25   | Median | P75   | P90    |
|-----------------------------|-------|-----------|-------|-------|--------|-------|--------|
| <b>Account Attributes</b>   |       |           |       |       |        |       |        |
| Age                         | 61.30 | 36.89     | 16.00 | 39.00 | 52.00  | 84.00 | 124.00 |
| Size ('000s USD)            | 11.54 | 533.43    | 0.04  | 0.14  | 0.78   | 3.54  | 13.01  |
| Account Turnover            | 0.38  | 1.17      | 0.00  | 0.00  | 0.02   | 0.18  | 0.71   |
| No. Stocks                  | 8.45  | 16.48     | 1.00  | 1.00  | 4.00   | 9.00  | 20.00  |
| No. Stocks Traded           | 4.74  | 11.24     | 0.00  | 0.00  | 1.00   | 5.00  | 13.00  |
| <b>Characteristic Tilts</b> |       |           |       |       |        |       |        |
| Stock Age                   | -0.06 | 0.27      | -0.43 | -0.30 | -0.08  | 0.15  | 0.34   |
| Dividend Paying             | 0.68  | 0.38      | 0.00  | 0.44  | 0.86   | 1.00  | 1.00   |
| Share Price                 | 0.22  | 0.21      | -0.06 | 0.13  | 0.26   | 0.38  | 0.44   |
| Stock Turnover              | 0.08  | 0.19      | -0.14 | -0.02 | 0.07   | 0.22  | 0.33   |
| Realized Returns            | -0.02 | 0.20      | -0.28 | -0.16 | 0.00   | 0.10  | 0.22   |
| Market Beta                 | 0.11  | 0.18      | -0.12 | -0.02 | 0.12   | 0.23  | 0.34   |
| Realized Skewness           | -0.15 | 0.19      | -0.34 | -0.30 | -0.17  | -0.05 | 0.12   |
| Realized Volatility         | -0.17 | 0.18      | -0.35 | -0.30 | -0.21  | -0.09 | 0.09   |
| Book/Market                 | -0.14 | 0.18      | -0.33 | -0.25 | -0.19  | -0.07 | 0.08   |
| Market Capitalization       | 0.38  | 0.17      | 0.18  | 0.37  | 0.45   | 0.48  | 0.49   |

# Method

For each household, construct a N-vector of stock holdings,  $Q_h$   
 $[\text{Share in stock 1} \quad \text{Share in stock 2} \quad \dots \quad \text{Share in stock N}]^T$

For each characteristic, construct a N-vector of characteristic intensity,  $c_k$   
 $[\text{Char. of stock 1} \quad \text{Char. of stock 2} \quad \dots \quad \text{Char. of stock N}]^T$

$c_k^T Q_h$  is a scalar of characteristic  $k$  holdings for household  $h$  (or characteristic tilt)

Take the variance of  $c_k^T Q_h$  across households

As most retail investors have sparse stock holdings, high variance indicates clientele for that characteristic

# Characteristics Clientele Strength

| Characteristic                              | Orthogonalized |                |          |
|---------------------------------------------|----------------|----------------|----------|
|                                             | Variance       | % Off-diagonal | Std. Dev |
| Stock Age                                   | 0.074          | 11.77%         | 0.273    |
| <i>Dividend Paying</i>                      | 0.049          | 11.88%         | 0.384    |
| Share Price                                 | 0.045          | 12.85%         | 0.213    |
| Stock Turnover                              | 0.045          | 7.01%          | 0.211    |
| <i>Business Group: Any</i>                  | 0.042          | 5.93%          | 0.354    |
| Realized Returns                            | 0.040          | 7.36%          | 0.201    |
| <i>Zone: West</i>                           | 0.040          | 5.20%          | 0.344    |
| Beta                                        | 0.035          | 6.02%          | 0.186    |
| <i>Industry: Financial Services</i>         | 0.033          | 6.97%          | 0.313    |
| Realized Skew                               | 0.030          | 3.88%          | 0.173    |
| Realized Volatility                         | 0.030          | 5.45%          | 0.172    |
| <i>Industry: Manufacturing</i>              | 0.026          | 1.74%          | 0.279    |
| Book/Market                                 | 0.026          | 3.87%          | 0.161    |
| Market Capitalization                       | 0.025          | 6.89%          | 0.159    |
| <i>Industry: Oil &amp; Gas</i>              | 0.022          | 9.02%          | 0.256    |
| <i>Business Group: Reliance (ADAG)</i>      | 0.021          | 11.52%         | 0.250    |
| <i>Zone: South</i>                          | 0.018          | 3.03%          | 0.232    |
| <i>Industry: IT</i>                         | 0.013          | 1.39%          | 0.198    |
| <i>Industry: Construction</i>               | 0.012          | 9.09%          | 0.193    |
| <i>Public Sector Enterprise</i>             | 0.012          | 5.80%          | 0.193    |
| <i>Business Group: Reliance (DAG)</i>       | 0.012          | 6.67%          | 0.193    |
| <i>Industry: Food, Agro. &amp; Textiles</i> | 0.010          | 4.67%          | 0.177    |

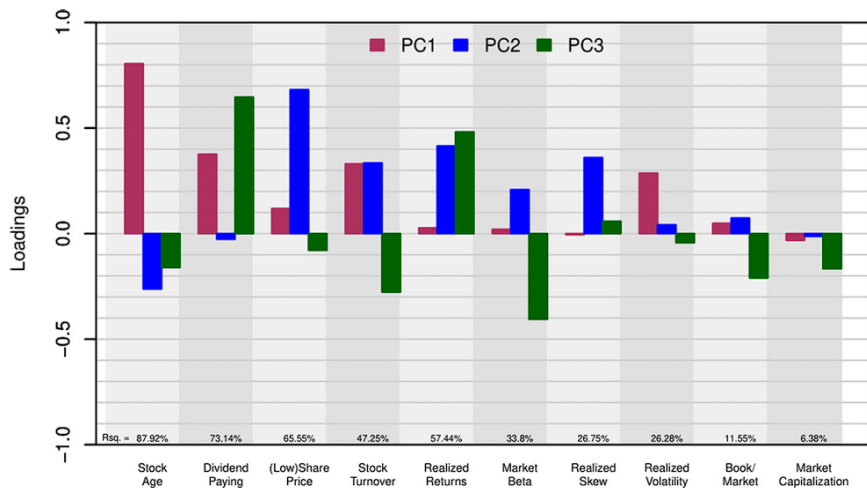
$Q_h^*$  := K-vector with characteristics tilts ( $c_k^T Q_h$ ) in each entry

$$\Omega := H^{-1} \sum_{h=1}^H Q_h^* Q_h^{*T}$$

Extract principal components of  $\Omega$

Regress characteristics tilts on the first 3 PCs

# Characteristics Clientele Clusters





# Who Owns What Characteristic

Univariate regression of characteristics tilts on investor characteristics

# Who Owns What Characteristic

|                    | Stock Age | Dividend<br>Paying | Share<br>Price | Turnover | Bus. Gp.<br>Any |
|--------------------|-----------|--------------------|----------------|----------|-----------------|
| Size               | 7.11      | 9.65               | 5.84           | 0.13     | -4.22           |
|                    | -(0.008)  | -(0.006)           | -(0.007)       | -(0.007) | -(0.006)        |
|                    | 6.78      | 18.89              | 7.53           | 0.00     | 4.28            |
| No.Stocks          | 3.36      | 3.08               | 1.17           | 0.09     | -1.21           |
|                    | -(0.009)  | -(0.007)           | -(0.007)       | -(0.007) | -(0.007)        |
|                    | 1.51      | 1.93               | 0.30           | 0.00     | 0.35            |
| Age                | 4.25      | 1.75               | 1.00           | -2.93    | -0.77           |
|                    | -(0.009)  | -(0.007)           | -(0.007)       | -(0.007) | -(0.007)        |
|                    | 2.43      | 0.62               | 0.22           | 1.93     | 0.14            |
| Turnover           | -1.26     | -1.93              | -3.75          | 2.36     | -0.14           |
|                    | -(0.009)  | -(0.007)           | -(0.007)       | -(0.007) | -(0.007)        |
|                    | 0.21      | 0.75               | 3.09           | 1.25     | 0.00            |
| Single Stock Dummy | -5.17     | -5.75              | -0.48          | -0.93    | 1.85            |
|                    | -(0.009)  | -(0.007)           | -(0.007)       | -(0.007) | -(0.007)        |
|                    | 3.59      | 6.70               | 0.05           | 0.19     | 0.82            |
| No. Stocks Traded  | 1.67      | 1.89               | -0.15          | 1.53     | -1.19           |
|                    | -(0.009)  | -(0.007)           | -(0.007)       | -(0.007) | -(0.007)        |

# Who Owns What Characteristic

|                    | Realized<br>Returns       | Market<br>Beta            | Realized<br>Skew          | Realized<br>Volatility    | Book<br>/Market           | Market<br>Cap.            |
|--------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|---------------------------|
| Size               | 2.89<br>-(0.006)<br>2.06  | -1.80<br>-(0.006)<br>0.94 | -0.64<br>-(0.006)<br>0.14 | 1.71<br>-(0.006)<br>0.98  | -1.79<br>-(0.005)<br>1.24 | -2.29<br>-(0.005)<br>2.06 |
| No.Stocks          | 1.45<br>-(0.006)<br>0.52  | -0.52<br>-(0.006)<br>0.08 | 0.48<br>-(0.006)<br>0.08  | 0.81<br>-(0.006)<br>0.22  | -0.47<br>-(0.005)<br>0.09 | -1.09<br>-(0.005)<br>0.47 |
| Age                | 2.57<br>-(0.006)<br>1.64  | -1.91<br>-(0.006)<br>1.05 | 0.92<br>-(0.006)<br>0.28  | 1.39<br>-(0.006)<br>0.65  | 0.63<br>-(0.005)<br>0.15  | -1.73<br>-(0.005)<br>1.19 |
| Turnover           | -1.13<br>-(0.006)<br>0.32 | 0.93<br>-(0.006)<br>0.25  | 1.08<br>-(0.006)<br>0.39  | 1.29<br>-(0.006)<br>0.56  | 0.95<br>-(0.005)<br>0.35  | 0.14<br>-(0.005)<br>0.01  |
| Single Stock Dummy | -2.17<br>-(0.006)<br>1.16 | 0.58<br>-(0.006)<br>0.10  | -0.12<br>-(0.006)<br>0.01 | -2.07<br>-(0.005)<br>1.45 | 0.65<br>-(0.005)<br>0.17  | 0.61<br>-(0.005)<br>0.15  |
| No. Stocks Traded  | 0.00<br>-(0.006)          | 0.39<br>-(0.006)          | 0.50<br>-(0.006)          | 1.10<br>-(0.006)          | -0.06<br>-(0.005)         | -0.86<br>-(0.005)         |

# Who Owns What Characteristic

|                    | PC1                        | PC2                        | PC3                        |
|--------------------|----------------------------|----------------------------|----------------------------|
| Size               | 0.0922<br>(0.000)<br>9.21  | -0.0549<br>(0.000)<br>5.00 | 0.0828<br>(0.000)<br>12.50 |
| No.Stocks          | 0.0402<br>(0.000)<br>1.75  | -0.0105<br>(0.000)<br>0.18 | 0.0270<br>(0.000)<br>1.33  |
| Age                | 0.0351<br>(0.000)<br>1.33  | -0.0169<br>(0.000)<br>0.47 | 0.0350<br>(0.000)<br>2.23  |
| Turnover           | -0.0012<br>(0.000)<br>0.00 | 0.0396<br>(0.000)<br>2.60  | -0.0313<br>(0.000)<br>1.79 |
| Single Stock Dummy | -0.0720<br>(0.000)<br>5.62 | 0.0066<br>(0.000)<br>0.07  | -0.0410<br>(0.000)<br>3.07 |
| No. Stocks Traded  | 0.0292<br>(0.000)<br>0.92  | 0.0044<br>(0.000)<br>0.03  | 0.0050<br>(0.000)<br>0.04  |

$$Q_{ih} = \alpha_i + \sum_{k=1}^K \beta_{ik} F_{kh} + \varepsilon_{ih}, h = 1, 2, \dots, H$$

Factors can be household attributes or household portfolio attributes

Focus on cross-sectional dispersion of loadings

Necessary condition for a factor to be a useful predictor of cross-sectional dispersion in stockholdings

# Factor Model

Panel A: Account Attributes

|                          | Std. Dev | 10%   | 50%   | 90%  | Avg.   <i>t</i> -stat | Sig.(5% level) |
|--------------------------|----------|-------|-------|------|-----------------------|----------------|
| Age                      | 3.53     | -0.40 | 0.05  | 0.63 | 13.70                 | 85.92          |
| Size                     | 14.85    | -0.77 | -0.01 | 0.96 | 18.12                 | 90.36          |
| Turnover                 | 5.90     | -0.10 | 0.01  | 0.34 | 6.41                  | 62.26          |
| No. Stocks               | 2.17     | -0.15 | 0.00  | 0.30 | 4.49                  | 57.20          |
| No. Stocks Traded        | 1.81     | -0.16 | 0.01  | 0.28 | 4.69                  | 54.46          |
| Single Stock Dummy       | 10.19    | -0.46 | -0.07 | 0.08 | 8.19                  | 80.89          |
| <i>Geographic Region</i> |          |       |       |      |                       |                |
| Southern                 | 2.89     | -0.27 | 0.00  | 0.31 | 6.20                  | 57.43          |
| Northern                 | 3.90     | -0.27 | -0.01 | 0.16 | 4.50                  | 50.66          |
| Western                  | 5.06     | -0.34 | 0.04  | 0.34 | 6.37                  | 71.16          |

# Factor Model

| Panel B: Portfolio Characteristic Tilts |          |       |       |       |              |                |
|-----------------------------------------|----------|-------|-------|-------|--------------|----------------|
|                                         | Std. Dev | 10%   | 50%   | 90%   | Avg.  t-stat | Sig.(5% level) |
| <i>Fama-French Factors</i>              |          |       |       |       |              |                |
| Book/Market                             | 1.17     | -0.02 | 0.07  | 0.30  | 6.38         | 84.85          |
| Market Capitalization                   | 2.17     | -0.44 | -0.14 | -0.02 | 10.06        | 94.55          |
| Market Beta                             | 1.66     | -0.22 | -0.02 | 0.20  | 5.39         | 63.81          |
| <i>Return-Based Factors</i>             |          |       |       |       |              |                |
| Realized Returns                        | 1.67     | -0.34 | 0.01  | 0.14  | 5.12         | 56.94          |
| Realized Volatility                     | 1.42     | -0.06 | 0.07  | 0.30  | 6.67         | 84.53          |
| Realized Skewness                       | 1.47     | -0.06 | 0.02  | 0.15  | 3.90         | 48.08          |
| <i>Behavioral Factors</i>               |          |       |       |       |              |                |
| Share Price                             | 1.89     | -0.77 | -0.16 | -0.02 | 12.21        | 95.55          |
| Stock Age                               | 2.61     | -0.34 | 0.05  | 0.38  | 9.09         | 82.02          |
| Turnover                                | 1.03     | -0.22 | -0.02 | 0.31  | 6.12         | 72.22          |
| Dividend Paying                         | 1.83     | -0.83 | -0.17 | 0.00  | 13.11        | 93.23          |
| <i>Business Group Holdings</i>          |          |       |       |       |              |                |
| Reliance (ADAG)                         | 12.64    | -0.14 | 0.00  | 0.18  | 4.96         | 49.69          |
| Tata                                    | 1.32     | -0.18 | 0.00  | 0.07  | 3.30         | 46.70          |
| Reliance (DAG)                          | 2.24     | -0.57 | -0.06 | 0.09  | 4.56         | 56.82          |
| Birla Aditya                            | 2.39     | -0.11 | -0.01 | 0.02  | 2.42         | 29.91          |
| Jaypee                                  | 2.35     | -0.23 | -0.01 | 0.04  | 3.41         | 49.47          |
| Jindal                                  | 1.22     | -0.15 | -0.01 | 0.02  | 2.70         | 38.58          |
| Mahindra                                | 0.81     | -0.18 | -0.01 | 0.03  | 2.62         | 35.48          |
| Suzlon                                  | 1.39     | -0.27 | -0.03 | 0.02  | 4.13         | 60.33          |
| Vedanta                                 | 0.78     | -0.12 | -0.01 | 0.04  | 2.40         | 34.87          |
| PSE                                     | 2.40     | -0.13 | 0.01  | 0.11  | 3.98         | 49.79          |

# Lack of Diversification

Authors noticed that: **Coheld stocks move together**

But **how inefficient is that?**

- ▶ Assume CAPM hold (market portfolio is efficient)
- ▶ Regress market portfolio returns on individual stock returns
- ▶ Adjust the LASSO regularization parameter to match the number of stocks
- ▶ Find the constrained optimization Sharpe



# Lack of Diversification

