A NETWORK DEA APPROACH TO MUTUAL FUNDS' TOURNAMENT

MOTIVATION

- Performance-chasing behaviour of investors
- Performance of mutual fund managers and their subsequent attitude towards risk
- Convex relationship between prior performance
- Managers concerns about their job, salary and status

=> Will losers gamble and winners index?
=> Are winners more likely to gamble?

METHODS

To analyse the tournament dynamics, we divide tournament into three stages (see graph and efficiency equation below and explanation on the right):

1. Tournament Reaction
2. Tournament Recompense
3. Tournament Reward

We employ Network Data Envelopment Analysis to assess the efficiency of each stage.

MAIN RESULTS

=> Efficiency of managers in improving their fund year-end ranks is strongly linked to how efficiently their change in rank will attract inflows.

=> Efficiently altering the beta, active sahre and equity exposure of a fund does not correlate with the reward obtained at the end of the tournament.

STAGE I

At the Reaction Stage, mutual fund j's manager reacts to its performance in month t-6, by altering the beta, active share and equity exposure of the fund in month t.

Funds with a poor prior relative performance in month t-6 and a significant increase in risk level will yield high DEA scores, Our model also tal¡kes into account winners that could possibly gamble more.

STAGE II

At the Recompense Stage, our model evaluates the impact of managers' risk management strategy on their year end relative rank, meaning rank at t+6.

This stage analyses whether there are changes in the fund year-end rank compared to the mid-year rank, as a result of the change in beta, active change and equity exposure.

STAGE III

At the Reward Stage, our model evaluates the success of this tournament behaviour in terms of money inflows to the fund in the first trimester subsequent to the tournament.

Funds that obtained significantly higher flows as a consequence of minor changes in the performance ranking after tournament will lead to the highest DEA scores at this satge.

Summary and References

Resumen y referencias

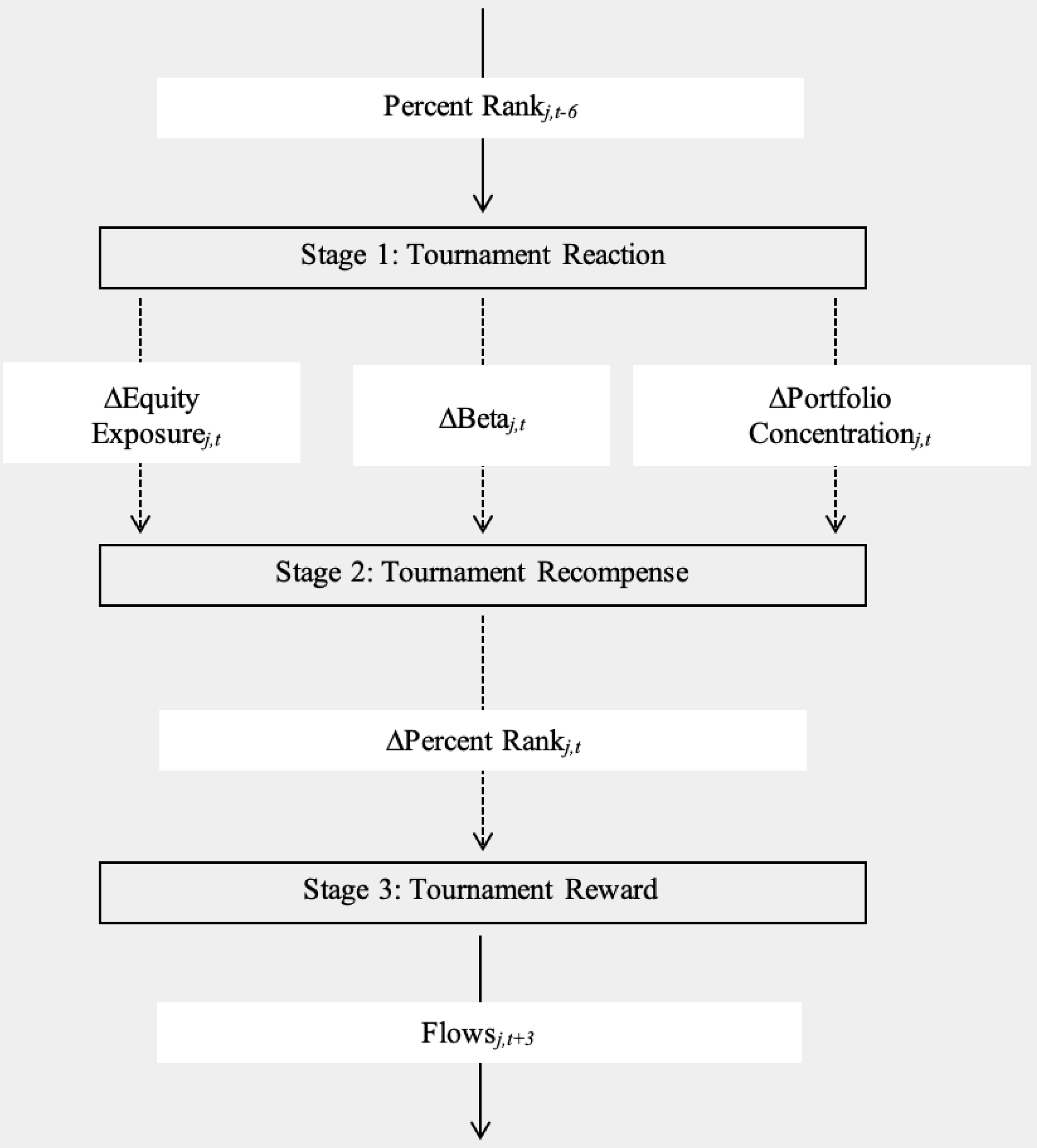

Figure 1. Three-stage network of mutual fund tournaments.

According to the non-oriented VRS approach of the SBM model, a target fund $\{x_o^k, y_o^k\}$ will be considered as efficient at stage k in terms of Pareto-Koopmans when it has no input excesses and no output shortfalls for any optimal solution, i.e., $\rho_o^{SBM_k}=1$.

$$\rho_o^{SBM_k}=\min_{\lambda^k,s^{k-},s^{k+}} \frac{1-\frac{1}{m_k}\left(\sum_{i=1}^{m_k}\frac{s_i^{k-}}{x_{io}^k}\right)}{1+\frac{1}{r_k}\left(\sum_{r=1}^{r_k}\frac{s_r^{k+}}{y_{ro}^k}\right)} \qquad [2]$$

subject to

$$X^k\lambda^k+s^{k-}=x_o^k$$
$$Y^k\lambda^k-s^{k+}=y_o^k$$
$$e\lambda^k=1$$
$$\lambda^k,s^{k-},s^{k+}\geq 0,$$

Where $X^k=(x_1^k,\cdots,x_n^k)\in R^{m_k\times n}$; $Y^k=(y_1^k,\cdots,y_n^k)\in R^{r_k\times n}$.

After setting exogenously the relative importance w^k of stage k in the overall efficiency measure, this NSBM approach evaluates the non-oriented overall efficiency of a target fund $\{x_o^k, y_o^k, z_o^{(k,h)}\}$ under the VRS assumption, including the slacks $s^{(f,k)-}$ of the intermediate input to stage k at link (f,k), and the slacks $s^{(k,h)+}$ of the intermediate output from stage k at link (k,h) as follows:

$$\rho_o^{NSBM}=\min_{\lambda^k,s^{k-},s^{k+},s^{(f,k)-},s^{(k,h)+}} \frac{\sum_{k=1}^{K} w^k\left[1-\frac{1}{m_k+\sum_{f\in P_k} t_{(f,k)}}\left(\sum_{i=1}^{m_k}\frac{s_i^{k-}}{x_{io}^k}+\sum_{f\in P_k}\frac{s_f^{(f,k)-}}{z_{fo}^{(f,k)}}\right)\right]}{\sum_{k=1}^{K} w^k\left[1+\frac{1}{r_k+\sum_{h\in F_k} t_{(k,h)}}\left(\sum_{r=1}^{r_k}\frac{s_r^{k+}}{y_{ro}^k}+\sum_{h\in F_k}\frac{s_h^{(k,h)+}}{z_{ho}^{(k,h)}}\right)\right]} \qquad [5]$$

subject to

$$X^k\lambda^k+s^{k-}=x_o^k \qquad Y^k\lambda^k-s^{k+}=y_o^k \qquad e\lambda^k=1 \qquad (k=1,2,\ldots,K)$$
$$Z^{(f,k)}\lambda^k+s^{(f,k)-}=z_o^{(f,k)} \qquad Z^{(f,k)}\lambda^f=Z^{(f,k)}\lambda^k \qquad \forall f,k$$
$$Z^{(k,h)}\lambda^k-s^{(k,h)+}=z_o^{(k,h)} \qquad Z^{(k,h)}\lambda^h=Z^{(k,h)}\lambda^k \qquad \forall k,h$$
$$\lambda^k,s^{k-},s^{k+},s^{(f,k)-},s^{(k,h)+}\geq 0 \qquad \forall f,k,h$$

Equations Variable Return to Scale Slacks-Based Measure and Netwrok models

Authors: Beatrice Boumda, Darren Duxbury, Cristina Ortiz and Luis A. Vicente

Facultad de Economía y Empresa
Universidad Zaragoza