

$$??$$

$$r_{it}-r_{ft}=f_1(r_{mt}-r_f)+f_2(\beta_{ij}f_{jt})+\epsilon_{it}$$

$$\begin{matrix} i=\\ \overline{1,2},\dots,n\\ t=\\ \overline{1,2},\dots,T\\ j=\\ \overline{1,2},\dots,k\\ f_1(\cdot) \end{matrix}$$

$$\begin{matrix} f_2(\cdot)\\ (r_{mt}-\\ r_f)\\ r_{mt}\\ r_{ft}\\ r_{it}\\ f_{jt}\\ \beta_{ij}\\ \epsilon_{it}\\ \beta_{ij}\\ \alpha_j\\ \mathcal{Q}\\ k\times\\ k\\ \sum_k\\ f_1(a)\\ f_2(a)\\ {}_1(r_{mt}-r_f)=\\ a_i+\\ \beta_{im}(r_{mt}-\\ r_{ft})\\ f_2(\beta_{ij}f_{jt})=\\ \sum_{j=1}^k\beta_{ij}f_{ij}\\ r_{it}=a_i+\sum_{j=1}^{k+1}\beta_{ij}f_{ij}+\epsilon_{it} \end{matrix}$$

$$\begin{matrix} a_i\\ U[-0.5,0.5]\\ \beta_{ij}\\ f_{ij}\\ \alpha_j\\ r_{mi-r_f}\\ f_{i1}\\ \beta_{\mathbf{i}}=\\ (\beta_{i1},\beta_{i2}\cdots,\beta_{ik+1})\\ IIDU(\mu_{\beta}-\\ 0.2,\mu_{\beta}+\\ 0.2)\\ \mu_{\beta}\\ [n^{\alpha_j}]\\ \beta_{\mathbf{i}} \end{matrix}$$

$$r_{it}=a_i+\beta_{im}(r_{mt}-r_{ft})+\sum_{j=1}^k\beta_{ij}f_{jt}+\epsilon_{it}$$

$$\begin{matrix} r_{mt}-\\ r_{ft}\\ \alpha_m=\\ 1\\ \beta_m\\ T=\\ \{120,240,360\}\\ n=\\ \{100,300,500\}\\ \alpha_m=\\ 1\\ \alpha_x=\\ \{0.5,0.7,0.9,1\}\\ a_i\\ \beta_i\\ \alpha\\ bias=\\ |\alpha-\\ \hat{\alpha}|\\ MSE=\\ \frac{1}{n}\sum_{i=1}^n(bias_i)^2 \end{matrix}$$