Complementary cumulative distributions **QNGOptimizer** AdamOptimizer approx='block-diag',  $\lambda$ =0.5  $\beta_1$ =0.9,  $\beta_2$ =0.99,  $\varepsilon$ =10<sup>-8</sup> 1.0  $\eta = 0.01$  $-\eta = 0.01$ η=0.75 n=0.025-n=0.35n=0.025---- n=0.8 $\eta = 0.05$  $-\eta = 0.85$ Probability of occurrence  $\eta = 0.1$  $\eta = 0.45$  $\eta = 0.1$  $\eta = 0.9$ 0.8  $-\eta = 0.55$  $\eta = 0.25$ 0.6 n = 0.50.4 n = 0.65 $\eta = 1.45$  $\eta = 1.5$ 0.2 (b) (a) 0.0 MomentumQNGOptimizer MomentumOptimizer  $\rho$ =0.9, approx='block-diag',  $\lambda$ =0.5  $\rho = 0.9$ 1.0  $\eta = 0.025$  $\eta = 0.02$ Probability of occurrence  $\eta = 0.1$ 0.8  $\eta = 0.15$  $\eta = 0.06$ 0.6 0.4 0.2 (c) (d) 0.0 -0.2 0.0 0.4 0.6 0.8 1.0 0.0 0.2 0.4 0.6 0.8 1.0 quality ratio quality ratio