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MGMT 525 Problem Set #2

Github Site: https://github.com/azdrojew/MGMT525

## Part 1—No Skilled Funds:

For this section, fund returns were generated following a market model with true alpha equal to zero for each fund.

Table 1 shows the average T-statistic within each rank of estimated alphas across 100 boot-strapped time-series. Table 2 shows the average $95^{th}$ and $5^{th}$ percentile T-statistics of estimated alphas, again across 100 boot-strapped time-series.

Figure 1 depicts the CDF of the average bootstrap cumulative distribution against that of the actual estimated T-statistics on alpha. Figure 2 shows the distribution (across boot strap samples) of the estimated $95^{th}$ and $5^{th}$ percentile T-statistics.

In Figure 1, the two CDFs overlap almost perfectly, which is to be expected given that the actual data generating process has alpha equal to zero and the bootstrap sample is forced to have an alpha equal to zero.

## Part 2—Some Skilled Funds:

For this section, fund returns were generated following a market model with true alpha equal to 1%, 2.5%, or 5% for a fraction $\lambda$ of the funds. In successive analyses, $\lambda$ was set equal to .1, .25, .5, and .75. Figures 3 ($\lambda$ =.1) through 6 ($\lambda$ =.75) show the same CDFs as in the previous section, but now with true alpha varying as described. Each figure corresponds to a given $\lambda$, and for each $\lambda$ three separate panels correspond to the cases where alpha =1%, 2.5%, or 5%.

Figures 7-10 again each correspond to a particular value of $\lambda$, but now show the distribution of $95^{th}$ and $5^{th}$ percentile T-statistics across bootstrap runs.

**Part 1 - No Skilled Funds**

**Table 1 :** The table depicts the average alpha T-statistic at each rank (1-15 and 985-100) across 100 boot-stapped time series, constructed so that the true alpha is equal to 0 for all funds.

Table 1: Average T-statistic across bootstrap runs, by rank

| Rank | Tstat |
|---|---|
| 1 | -3.12 |
| 2 | -2.88 |
| 3 | -2.74 |
| 4 | -2.64 |
| 5 | -2.57 |
| 6 | -2.51 |
| 7 | -2.45 |
| 8 | -2.40 |
| 9 | -2.35 |
| 10 | -2.31 |
| 11 | -2.27 |
| 12 | -2.24 |
| 13 | -2.21 |
| 14 | -2.18 |
| 15 | -2.16 |
| 985 | 2.13 |
| 986 | 2.16 |
| 987 | 2.18 |
| 988 | 2.22 |
| 989 | 2.24 |
| 990 | 2.28 |
| 991 | 2.31 |
| 992 | 2.36 |
| 993 | 2.40 |
| 994 | 2.46 |
| 995 | 2.51 |
| 996 | 2.58 |
| 997 | 2.66 |
| 998 | 2.75 |
| 999 | 2.91 |
| 1000 | 3.15 |

**Table 2 :** The table depicts the average 95th and 5th alpha T-statistic across 100 boot-stapped time series, constructed so that the true alpha is equal to 0 for all funds.

Table 2: Average 95th and 5th percentile T-statistic across bootstrap runs

| 95th Percentile | 5th Percentile |
|---|---|
| 1.61 | -1.63 |

**Figure 1 :** Data are generated such that there are no truly skilled funds. The figure shows the CDF of alpha T-statistics, estimated using bootstrapped (orange) and actual (blue) data. 95th and 5th bootsrap percentiles are given by the green and red dashed lines, respectively.

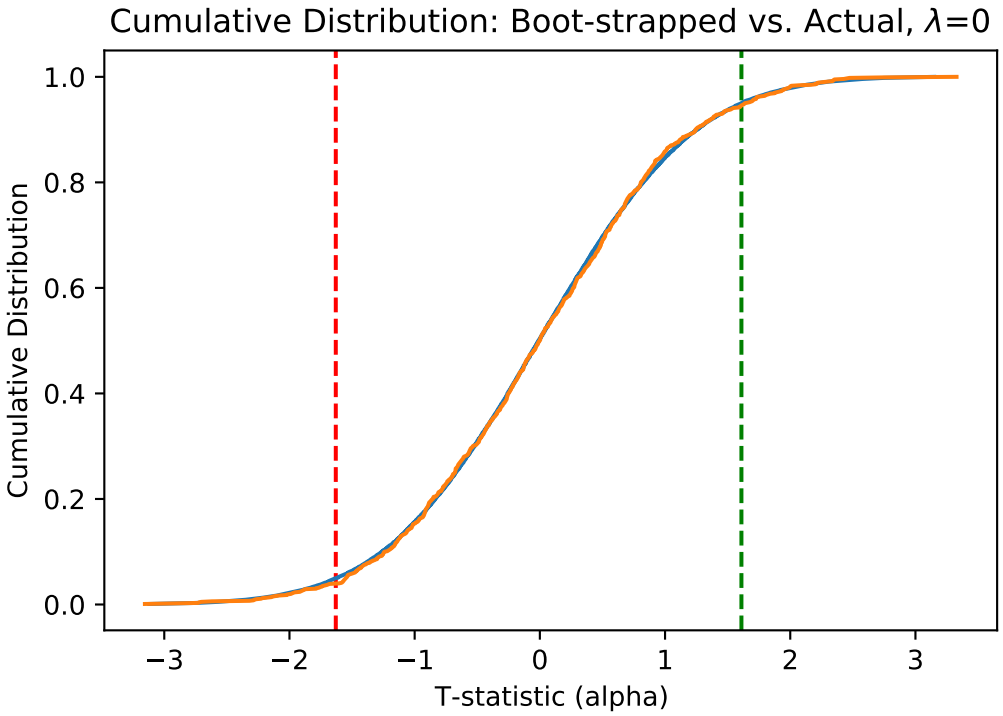
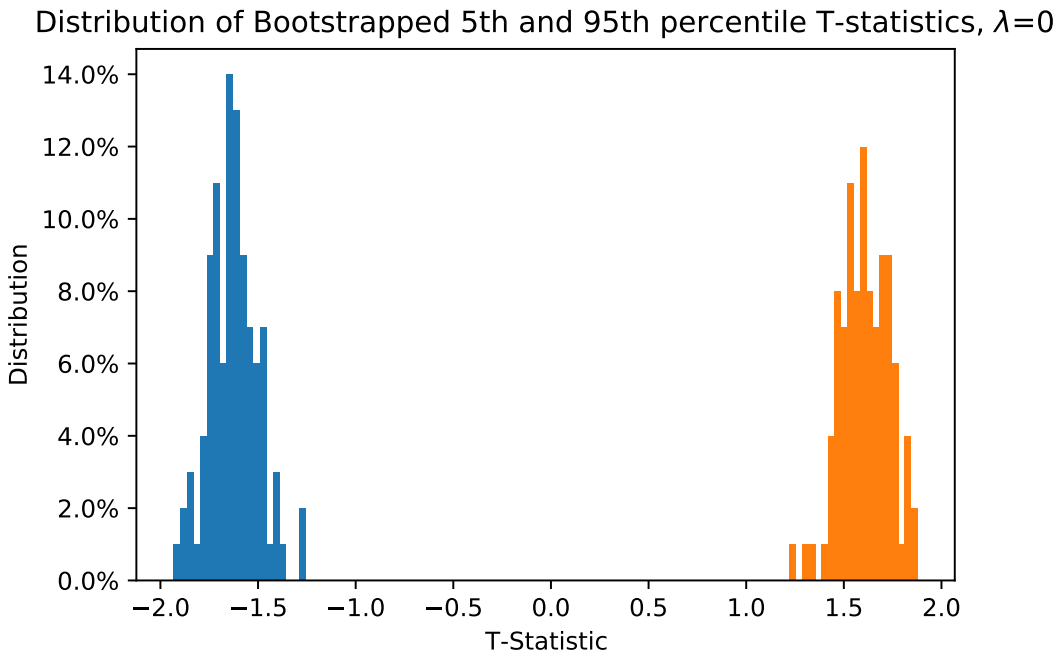


**Figure 2 :** Data are generated such that there are no truly skilled funds. The second figure shows the distributions of estimated 95th (orange) and 5th (blue) percentile alpha T-statistics across bootstrap samples.



**Part 2 - Some Skilled Funds**

**Figure 3 :** Figures 3-6 show the cumulative distributions of estimated alpha T-statistics at each of four levels of lambda (.1, .25, .5, .75), the fraction of truly skilled funds. In each figure, lambda is given in the title. For each lambda, the first panel conducts the procedure so that the true alpha of the underlying distribution is 1%. The second and third use alpha =2.5% and 5%, respectively. 95th and 5th bootsrap percentiles are given by the green and red dashed lines, respectively. The CDF of alpha T-statistics is estimated using bootstrapped (orange) and actual (blue) data. In the below, $\lambda = .1$.

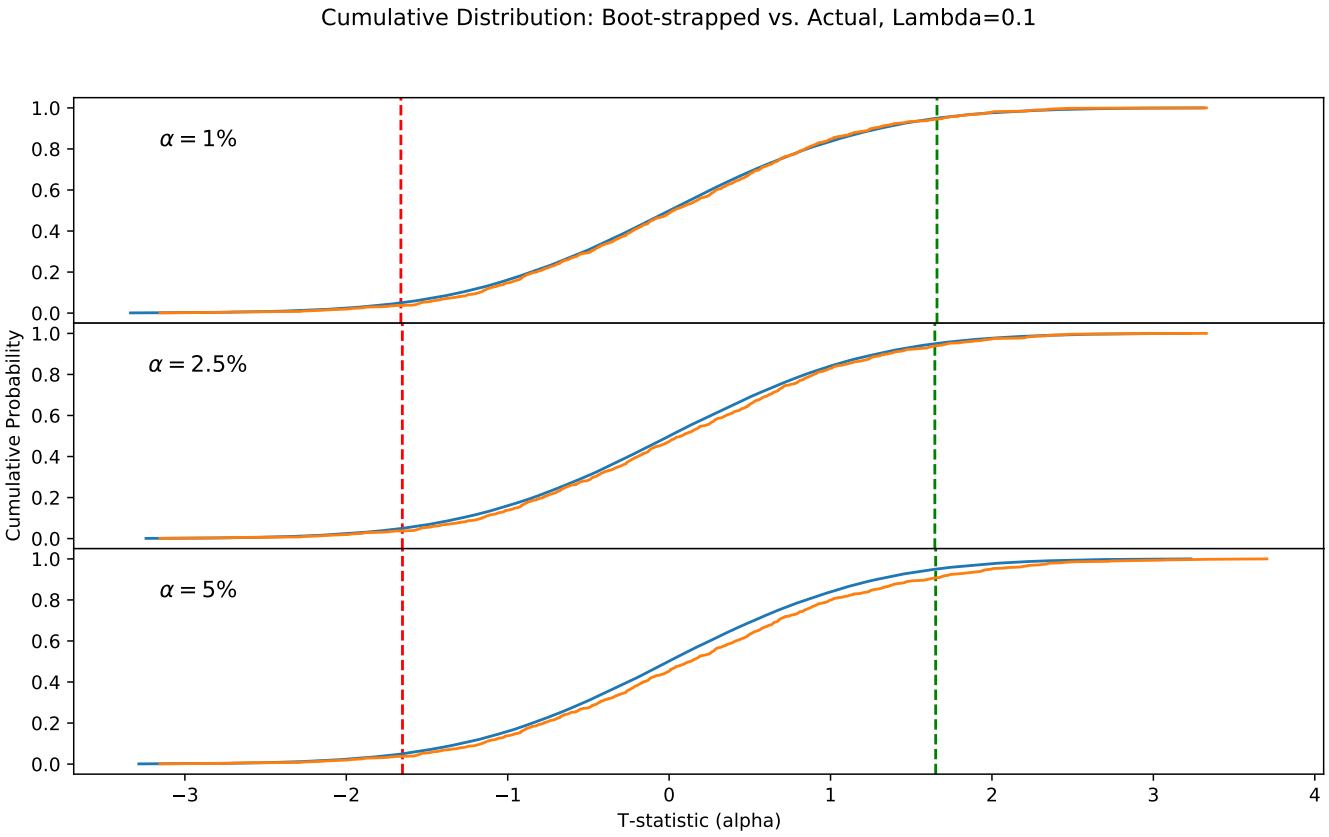


**Figure 4 :** Figures 3-6 show the cumulative distributions of estimated alpha T-statistics at each of four levels of lambda (.1, .25, .5, .75), the fraction of truly skilled funds. In each figure, lambda is given in the title. For each lambda, the first panel conducts the procedure so that the true alpha of the underlying distribution is 1%. The second and third use alpha =2.5% and 5%, respectively. 95th and 5th bootsrap percentiles are given by the green and red dashed lines, respectively. The CDF of alpha T-statistics is estimated using bootstrapped (orange) and actual (blue) data. In the below, $\lambda = .25$.

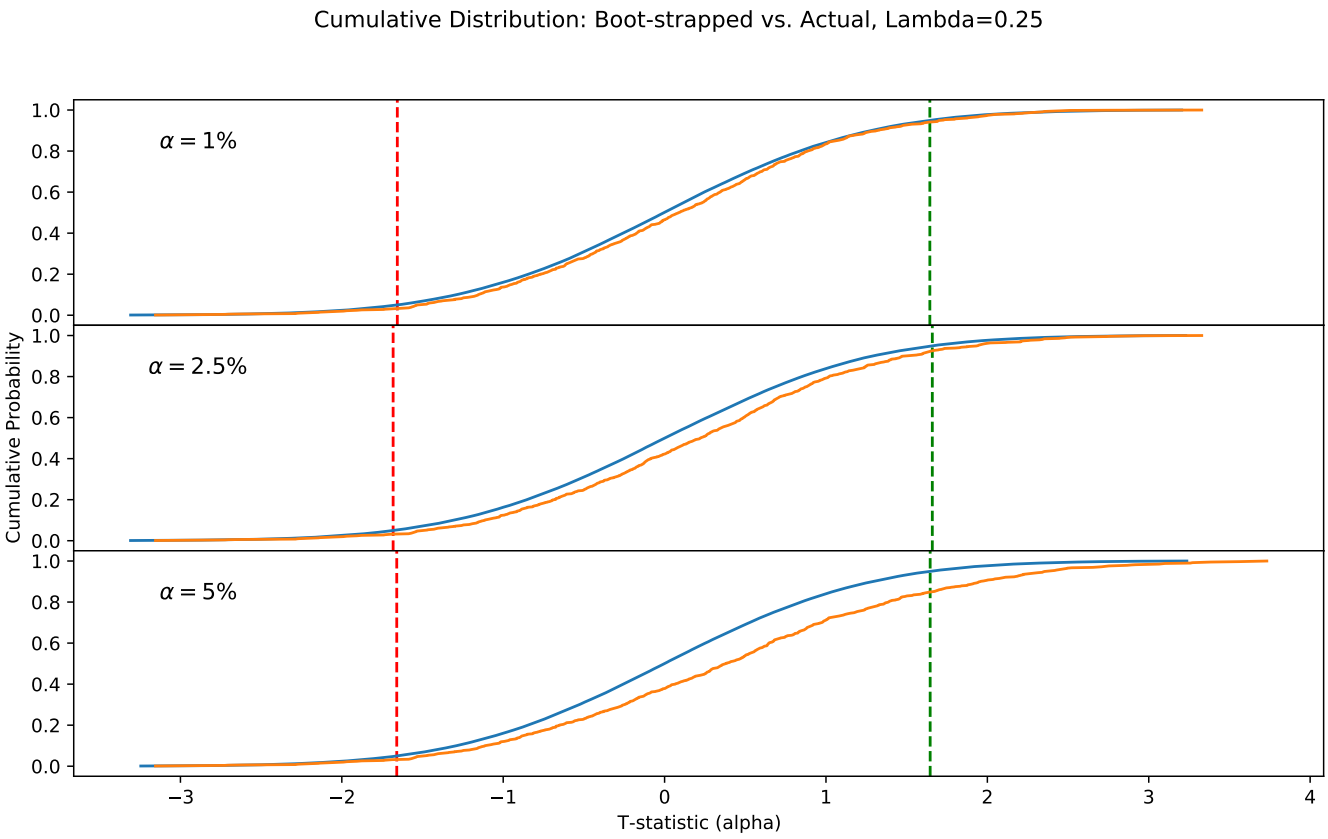


**Figure 5 :** Figures 3-6 show the cumulative distributions of estimated alpha T-statistics at each of four levels of lambda (.1, .25, .5, .75), the fraction of truly skilled funds. In each figure, lambda is given in the title. For each lambda, the first panel conducts the procedure so that the true alpha of the underlying distribution is 1%. The second and third use alpha =2.5% and 5%, respectively. 95th and 5th bootsrap percentiles are given by the green and red dashed lines, respectively. The CDF of alpha T-statistics is estimated using bootstrapped (orange) and actual (blue) data. In the below, $\lambda = .5$.

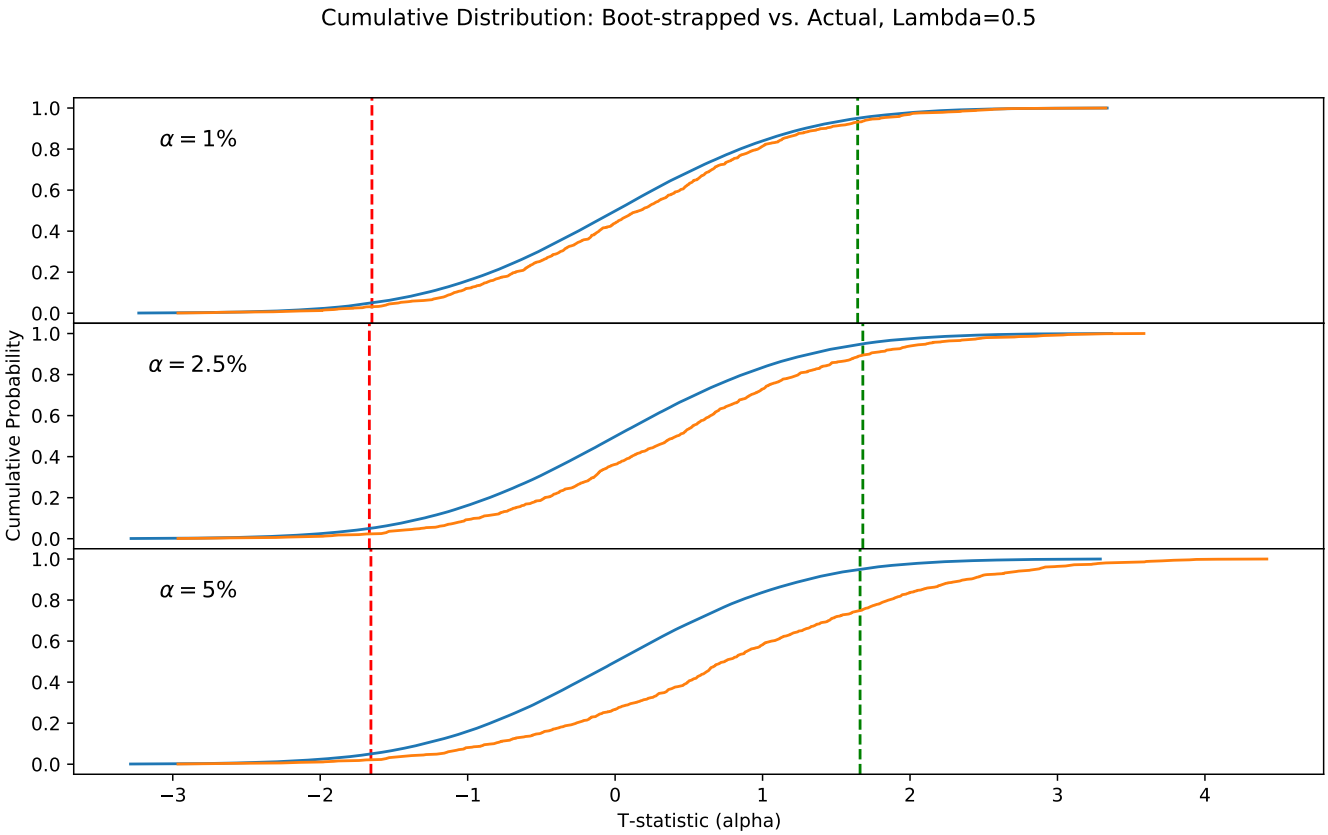


**Figure 6 :** Figures 3-6 show the cumulative distributions of estimated alpha T-statistics at each of four levels of lambda (.1, .25, .5, .75), the fraction of truly skilled funds. In each figure, lambda is given in the title. For each lambda, the first panel conducts the procedure so that the true alpha of the underlying distribution is 1%. The second and third use alpha =2.5% and 5%, respectively. 95th and 5th bootsrap percentiles are given by the green and red dashed lines, respectively. The CDF of alpha T-statistics is estimated using bootstrapped (orange) and actual (blue) data. In the below, $\lambda = .75$.

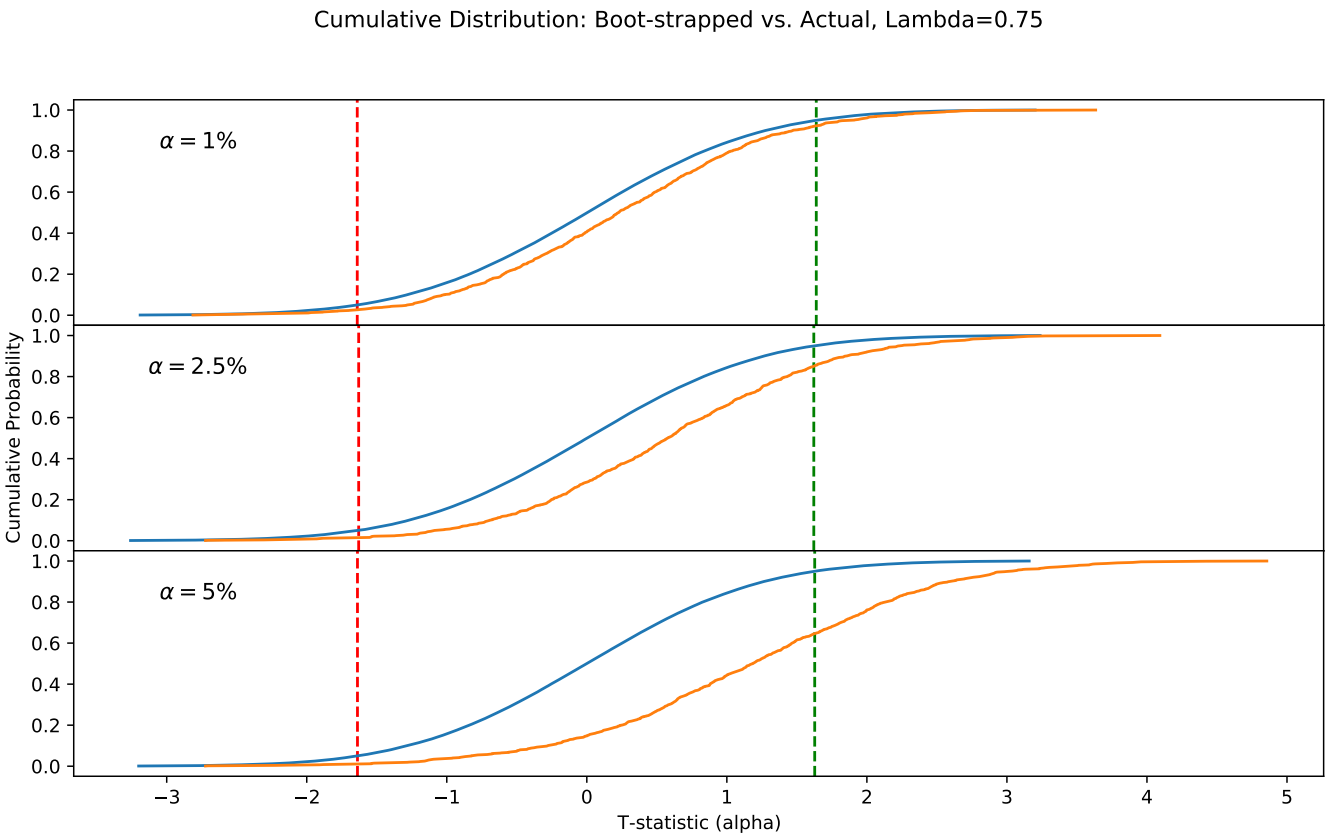


**Figure 7 :** Figures 7-10 show the distributions of estimated 95th (orange) and 5th (blue) percentile alpha T-statistics across bootstrap runs at each of four levels of lambda (.1, .25, .5, .75), the fraction of truly skilled funds. In each figure, lambda is given in the title. For each lambda, the first panel conducts the procedure so that the true alpha of the underlying distribution is 1%. The second and third use alpha =2.5% and 5%, respectively. In the below, $\lambda = .1$.

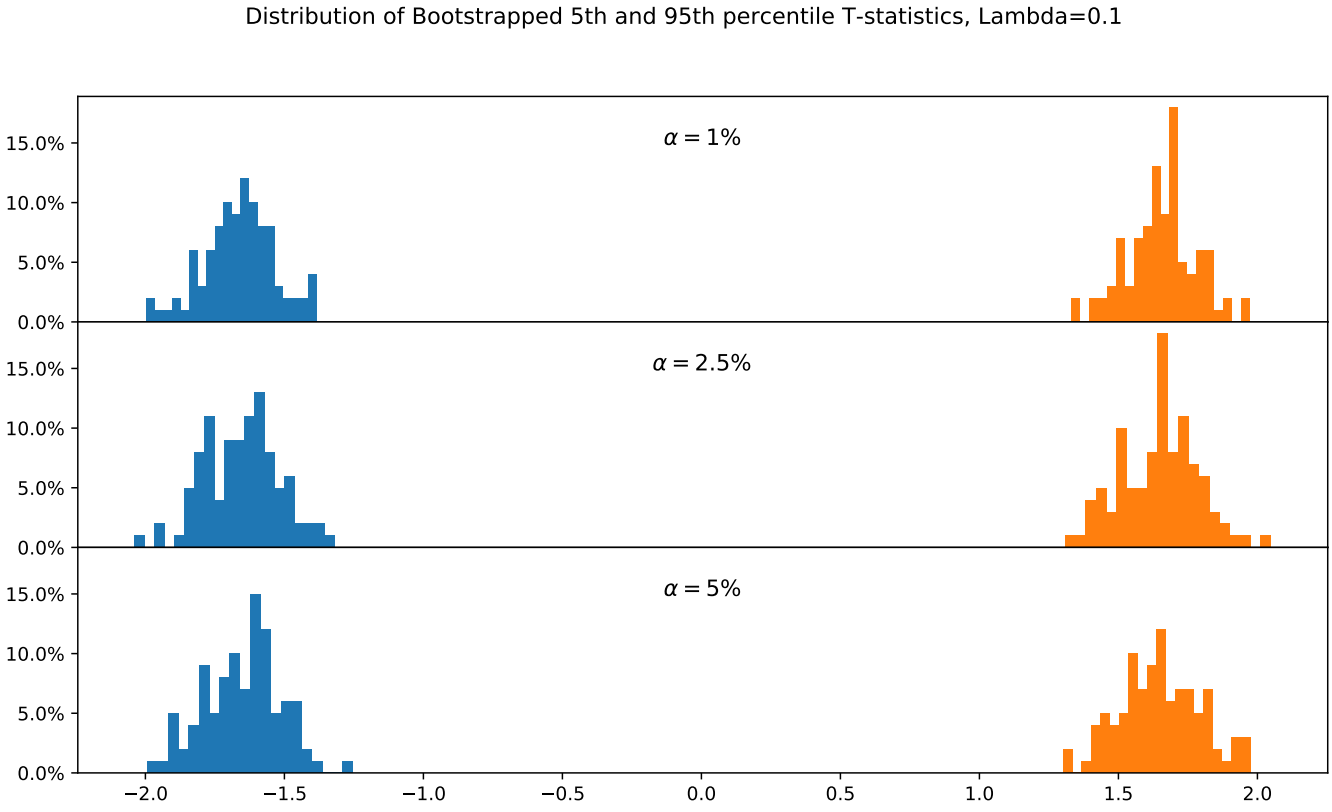


**Figure 8 :** Figures 7-10 show the distributions of estimated 95th (orange) and 5th (blue) percentile alpha T-statistics across bootstrap runs at each of four levels of lambda (.1, .25, .5, .75), the fraction of truly skilled funds. In each figure, lambda is given in the title. For each lambda, the first panel conducts the procedure so that the true alpha of the underlying distribution is 1%. The second and third use alpha =2.5% and 5%, respectively. In the below, $\lambda = .25$.

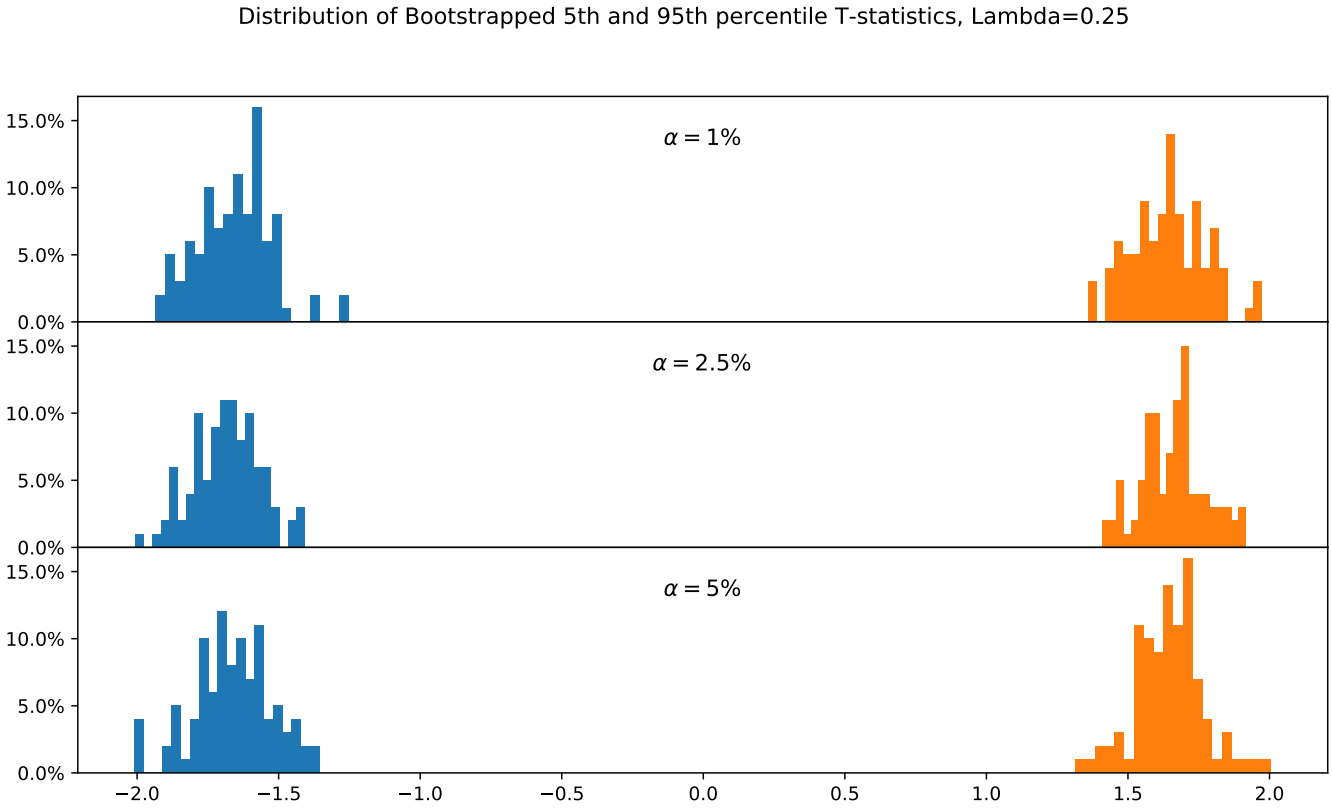


**Figure 9 :** Figures 7-10 show the distributions of estimated 95th (orange) and 5th (blue) percentile alpha T-statistics across bootstrap runs at each of four levels of lambda (.1, .25, .5, .75), the fraction of truly skilled funds. In each figure, lambda is given in the title. For each lambda, the first panel conducts the procedure so that the true alpha of the underlying distribution is 1%. The second and third use alpha =2.5% and 5%, respectively. In the below, $\lambda = .5$.

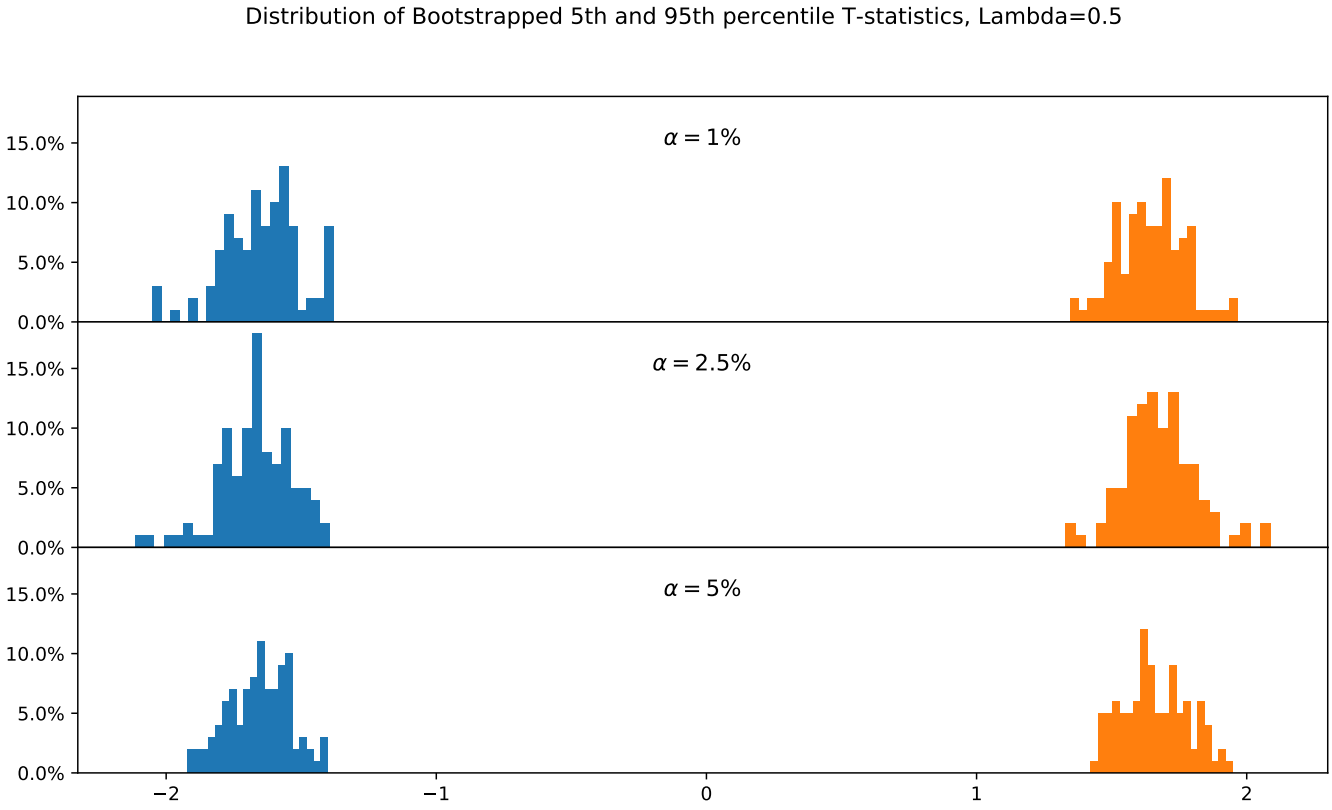


**Figure 10 :** Figures 7-10 show the distributions of estimated 95th (orange) and 5th (blue) percentile alpha T-statistics across bootstrap runs at each of four levels of lambda (.1, .25, .5, .75), the fraction of truly skilled funds. In each figure, lambda is given in the title. For each lambda, the first panel conducts the procedure so that the true alpha of the underlying distribution is 1%. The second and third use alpha =2.5% and 5%, respectively. In the below, $\lambda = .75$.