Advanced Metrics

Problem Set 3: Indirect inference

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The code and the report can be found in my github repo

MSLE (Probit)

For the first question, I used the `Nelder_Meade` (NM) routine in `simplex.f90`. For the second, I use `BFGS` (BFGS) and smooth the dependent variable as indicated in the assignment. I tried sampling once from U_I ($s = 1$) and 100 times ($s = 100$).

For the last question, I bootstrapped the data 100 times and used the unbiased bootstrap estimator. I used the Cholesky decomposition routine from Intel `LAPACK95` called `POTRI` to invert the matrix. I found that using intrinsic FORTRAN command `MATMUL`, when estimating the weight matrix (WM) Σ^{-1}, increases significantly the processing time when dealing with large matrices. I opted to use a `forall` command doing operations element by element, which significantly reduced time, and leaving `matmul` for only small matrices operations.

Results

The results of the estimations for $s = 1$ are displayed in table 1. Table 2 displays the estimations when $s = 100$ times and table 2 displays the bootstrapped weight matrix.

Table 1: Indirect inference Probit, s=1

	α	λ	γ
NM (Indicator)	6.365253	0.1493535	-3.899324
BFGS (Smooth)	6.815446	1.0479742	-5.240383
NM (Indicator) Σ	4.111111	5.8888889	-8.555556
BFGS (Smooth) Σ	6.933845	1.0184489	-5.079732

Table 2: Indirect inference Probit, s=100

	α	λ	γ
NM (Indicator)	4.000000	4.0000000	-2.000000
BFGS (Smooth)	5.961832	0.1328066	-6.291928
NM (Indicator) Σ	6.390450	0.1197139	-3.905597
BFGS (Smooth) Σ	6.581037	0.3434273	-5.701555

Table 3: Bootstrapped weight matrix Σ^{-1}

353944.34	176915.3	602546.2
3530.64	117860.7	301111.9
12024.83	6009.2	1055124.1

Conclusions

I found that NM performs better than BFGS. It is more consistent and depends a little less on initial guess. BFGS is all over the place. In particular, NM does better when $s = 1$ without weight matrix, but bad when we use the optimal weight matrix. BFGS is consistent giving same initial guess with or without weight matrix. When $s = 100$, NM does worse than BFGS. However, NM is back in the game when using the WM, whereas BFGS is somewhat off.