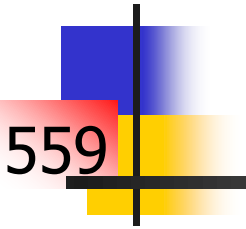

ADMB Variance Estimation

FISH 559; Lecture 14

Variance Estimation

- There are a variety of ways to compute standard errors and confidence intervals for model parameters and model outputs.
  - asymptotic methods; and
  - likelihood profile; and
  - Bayesian methods.

Asymptotic Standard Errors and Correlations-I

- To obtain asymptotic variances for derived parameters include

```
sdreport_number xx;
sdreport_vector yy;
sdreport_matrix zz;
```

in the PARAMETER_SECTION.

- Note: the results from asymptotic theory are approximations and may be bad approximations.

Asymptotic Standard Errors and Correlations-II

- Hints to speed things up:
  - Only calculate the derived variables when they are needed:

```
if (sd_phase())
   { code; }
```

  - Look at the correlation matrix. If you see large (>0.80) correlations among the parameters, it may be time to consider reparameterizing the model!

Likelihood Profile

- To obtain a likelihood profile for any quantity:
  - add the following line to the PARAMETER_SECTION:

    Likeprof_number xx
  - Run the program with the "-lprof" or "-lprof -prsave" options. The latter option produces the list of parameter values for each minimization involving a fixed value for the quantity of interest in the .pvl file. The results in this file provide alternative starting values (e.g. for MCMC runs).
  - The results will appear in the files xx.plt, diags, dgs2, and xx.pvl.

Running MCMC using ADMB

- Run ADMB with the "-mcmc N -mcsave M" option. N is the number of MCMC cycles and M is the frequency with which parameter vectors are saved.
- ADMB will produce a .HST file that contains various diagnostic statistics, along with marginal posteriors for any variables declared as sdreport or likeprof_number. However, this file is not very helpful and should probably be ignored.

559

MCMC Options - I

- -mcscale: dynamically scales the variance-covariance matrix (to turn this off use –mcnoscale).
- -mcmult N: scales the initial variance-covariance matrix if some of the values are "large".
- -mcr: restart the calculations (this doesn't always work for me).
- -mcgrope N: use a "jump" function with a fatter tail. N is amount of fat-tailedness (try N=0.05→0.10).
- -mcdiag: Replace the Hessian-based correlation matrix by an identity matrix.
- -mcrb N: Reduce the extent of correlation (1-9: lower-higher)

MCMC Options - II

- -mcpin fn: Start the chain with the parameter vector stored in the file "fn".

- Hint: One could construct alternative starting values by running a likelihood profile and assembling alternative PIN files from the .PVL files.

MCMC Options - III

- -mceval: Reads in all the saved parameter vectors and calls the function for each parameter vector. To perform calculations for each parameter vector during this process (only), add code along the following lines:

```
if (mceval_phase())
  { code; }
```

- This can be used to output results of interest for each parameter vector. You might wish to save the output to a file!