Your Bayesian analysis in Stata can be as simple or as complicated as your research problem.

Fit regression models

**Linear regression**
- `. bayes: regress y x1 x2 x3`

**Logistic regression**
- `. bayes: logistic z x1 x2 x3`

**Multilevel regression**
- `. bayes: mixed y x1 x2 x3 || id:`

Specify multiple chains
- `. bayes, nchains(4): logistic z x1 x2 x3`

Fit general models

**Multilevel meta-analysis model**
- `. bayesmh lnOR i.trial, noconstant likelihood(normal(var))
  prior({lnOR:i.trial}, normal({theta},{tau2}))
  prior({theta}, normal(0,10000))
  prior({tau2}, igamma(0.0001,0.0001))
  block(LnOR:i.trial, split)
  block({theta}, gibbs) block({tau2}, gibbs)`

**Nonlinear Poisson model: Change-point analysis**
- `. bayesmh count, likelihood(dpoisson({mu1}*sign(year<{cp})+{mu2}*sign(year>={cp})))
  prior({mu1 mu2}, flat)
  prior({cp}, uniform(1851,1962))
  initial({mu1 mu2} 1 {cp} 1906)`

Check convergence
- `. bayesgraph diagnostics {cp} (ratio: {mu1}/({mu2}))`

- Thousands of built-in models
- Add your own models
- Prefix your command with `bayes`:
- Adaptive Metropolis–Hastings
- Gibbs sampling
- Multiple chains
- Convergence diagnostics
- Explore distributions
- Model goodness of fit
- Posterior predictive \( p \)-values
- Posterior summaries
- Hypothesis testing
- Model comparison
- Predictions
- More
Program your own models

Hurdle model

. bayesmh (hours age) (hours0 commute), llevaluator(mychurdle, parameters(lnsig)) prior({hours:} {hours0:} {lnsig}, flat)

```
program mychurdle
    version 16.0
    args lnf xb xg lnsig
    tempname sig
    scalar `sig' = exp(`lnsig')
    tempvar lnfj
    qui gen double `lnfj' = normal(`xg')
    qui replace `lnfj' = log(1 - `lnfj') if $MH _ y1 <= 0
    qui replace `lnfj' = log(`lnfj') - log(normal(`xb'/`sig')) + log(normalden($MH _ y1,`xb',`sig')) if $MH _ y1 > 0
    summarize `lnfj', meanonly
    if r(N) < $MH _ n {
        scalar `lnf' = .
        exit
    }
    scalar `lnf' = r(sum)
end
```

Perform inference

Explore distributions

. bayesgraph histogram {lnOR:i.trial}, ...

Test hypotheses

. bayestest interval {mu1}/{mu2}, lower(3)
Interval tests MCMC sample size = 10,000

<table>
<thead>
<tr>
<th></th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>MCSE</th>
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</thead>
<tbody>
<tr>
<td>probl</td>
<td>.7147</td>
<td>0.45158</td>
<td>.0216545</td>
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</table>

Compare models

. bayestats ic modell model2
Bayesian information criteria

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<tr>
<th></th>
<th>DIC</th>
<th>log(ML)</th>
<th>log(BF)</th>
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</thead>
<tbody>
<tr>
<td>modell</td>
<td>472.0359</td>
<td>-242.5827</td>
<td>.</td>
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<tr>
<td>model2</td>
<td>470.8157</td>
<td>-235.7438</td>
<td>6.838942</td>
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</tbody>
</table>

Note: Marginal likelihood (ML) is computed using Laplace-Metropolis approximation

Find details on Bayesian analysis in Stata at stata.com/features/bayesian-analysis.

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