R demo: crime and punishment

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crime and punishment

- response y: # of reported crimes per 100,000
- 15 predictors:

M	So	Ed	Po1	Po2
LF	M.F	Pop	NW	U1
U2	GDP	Ineq	Prob	Time

- take log transformations of all variables except for So (indicator of the state being in the southern United States)

Image source: https://pixabay.com/en/jail-cells-jail-penitentiary-police-429638/

Study source: Ehrlich, I.(1973)Participation in illegitimate activities: a theoretical and empirical investigation. Journal of Political Economy 81, 521565.

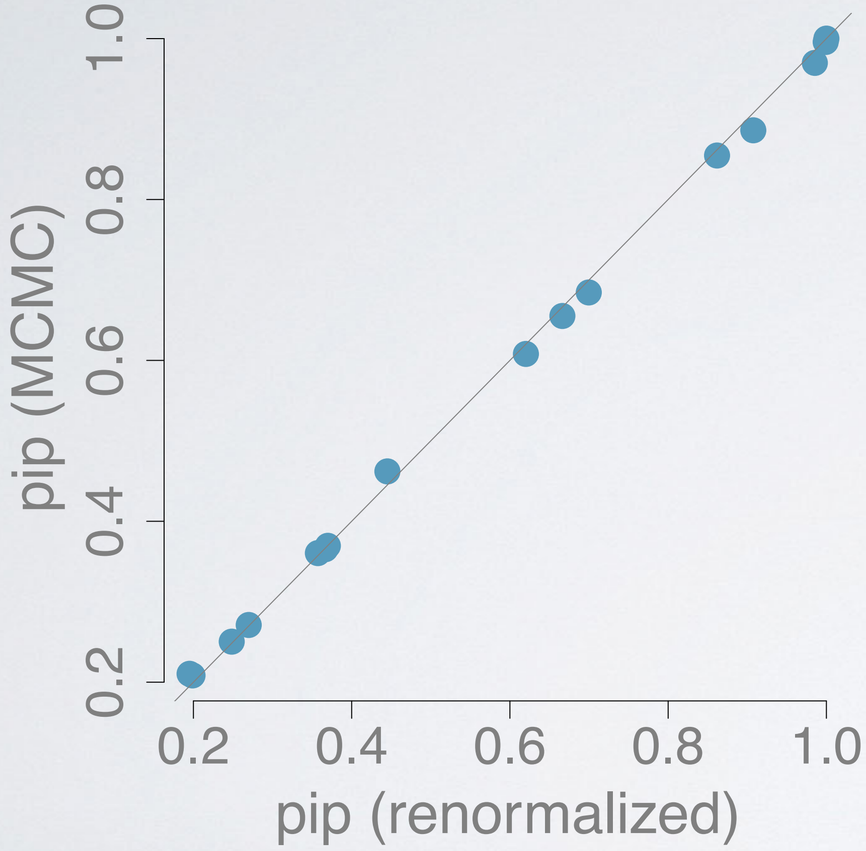
R

```
> library(MASS)
> data(UScrime)
> UScrime[,-2] = log(UScrime[,-2])
> library(BAS)
> crime.ZS =  bas.lm(y ~ .,
+                    data = UScrime,
+                    prior = “ZS-null",
+                    modelprior = uniform(),
+                    method = "MCMC")
```

R

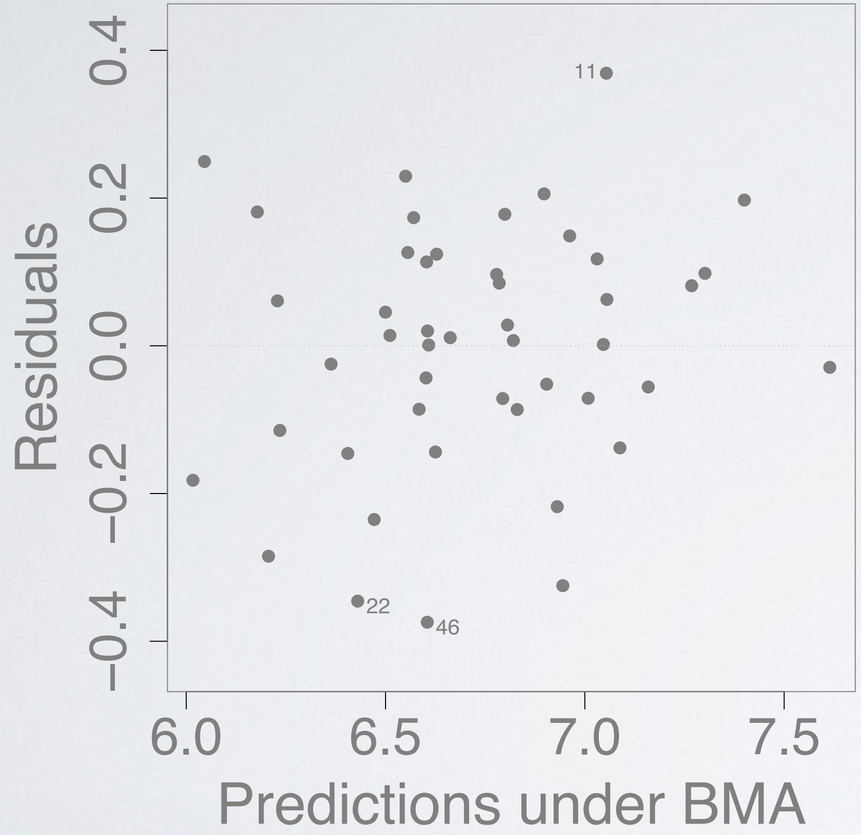
```
> diagnostics(crime.ZS)
```

$$p_{BMA}(\beta_j \neq 0 \mid \text{data}) = \frac{1}{I}\sum_{i=1}^{I} I[X_j \in \mathcal{M}_m^{(i)}] \frac{BF[\mathcal{M}_m:\mathcal{M}_0]O[\mathcal{M}_m:\mathcal{M}_0]}{\sum_{m\in S} BF[\mathcal{M}_m:\mathcal{M}_0]O[\mathcal{M}_m:\mathcal{M}_0]}$$



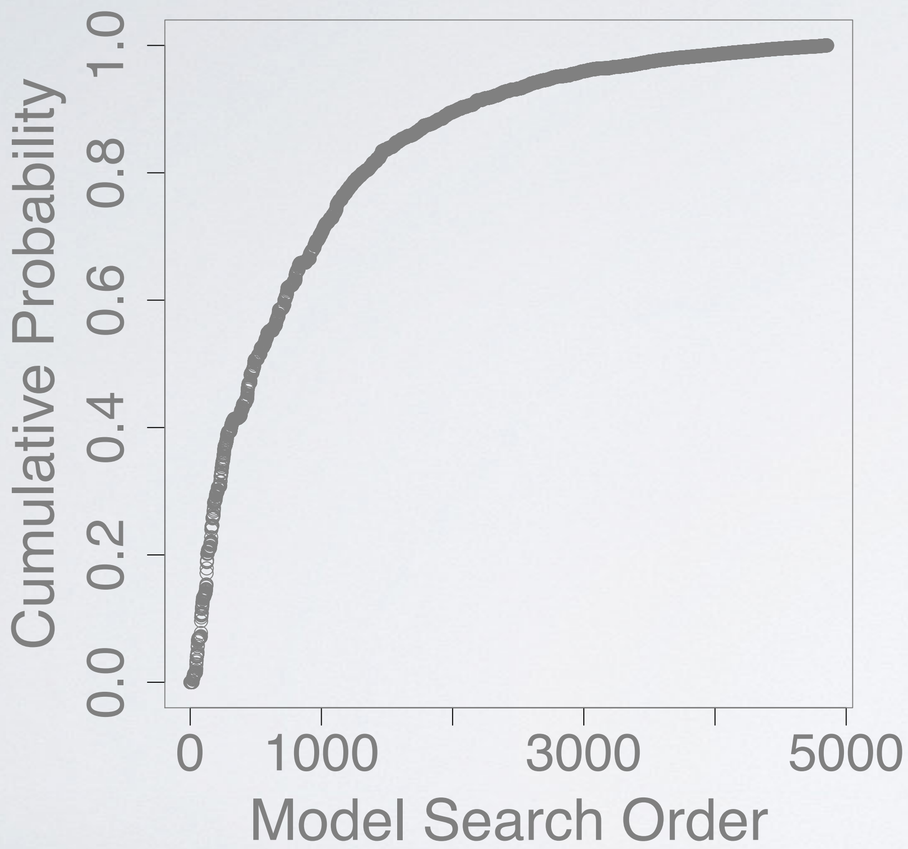
R

```
> plot(crime.ZS, which = 1)
```



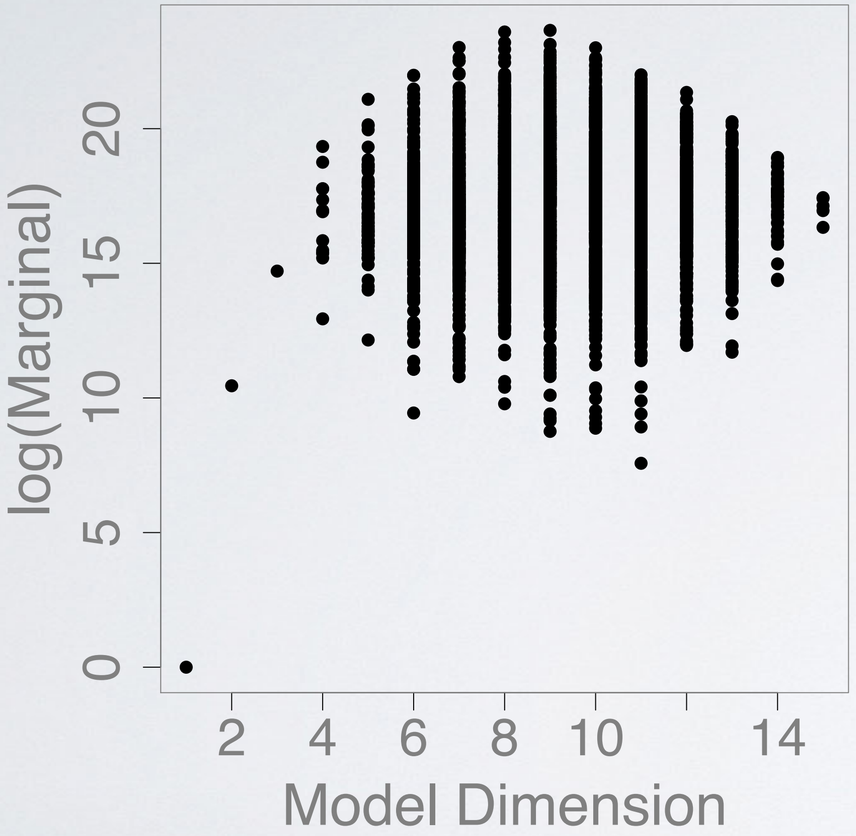
R

```
> plot(crime.ZS, which = 2)
```



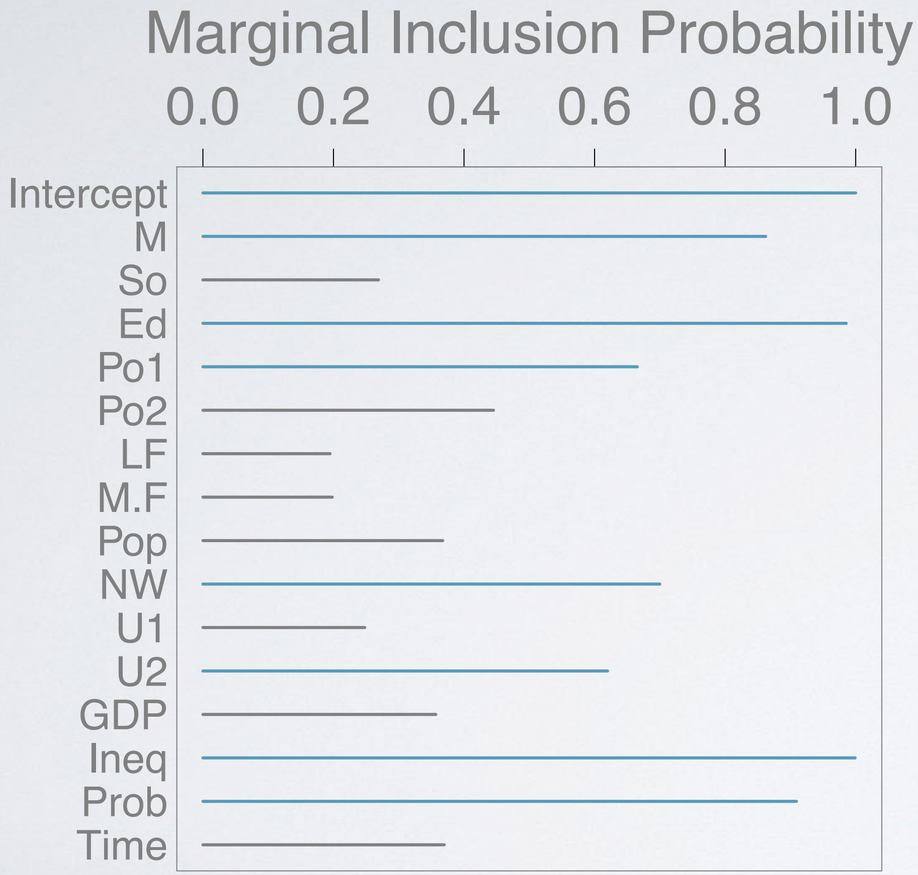
R

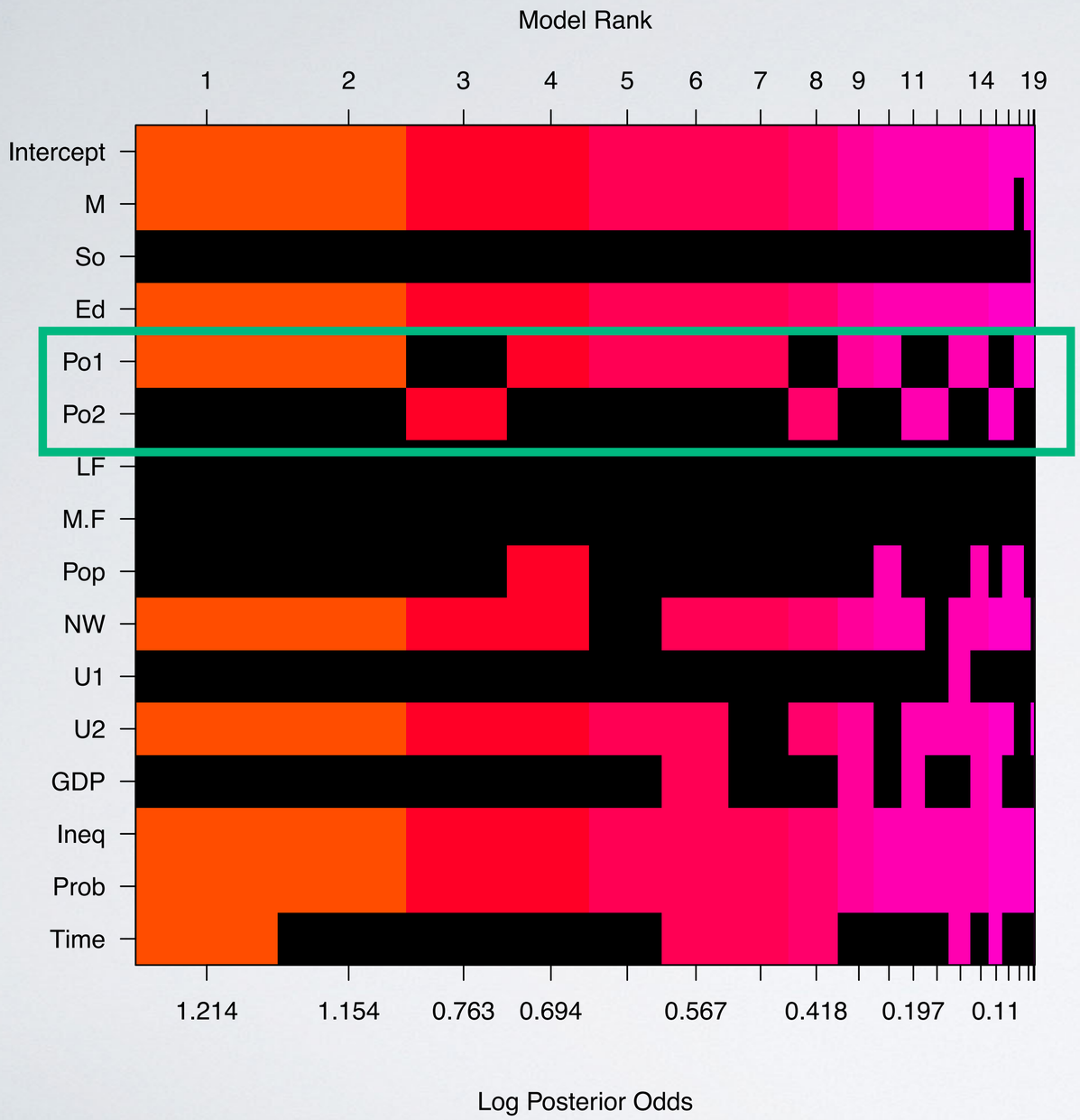
```
> plot(crime.ZS, which = 3)
```



R

```
> plot(crime.ZS, which = 4)
```



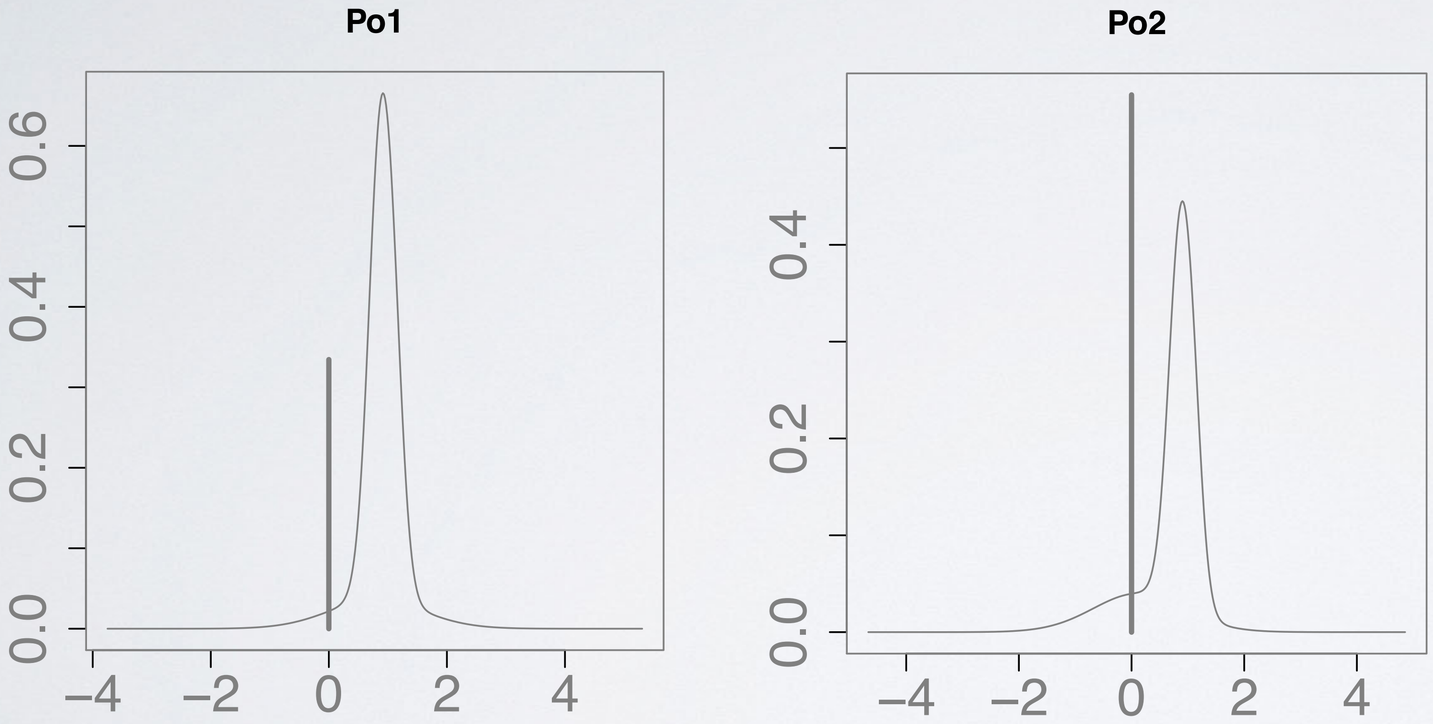


R

```
> image(crime.ZS, rotate=F)
```

R

```
> coef.ZS=coef(crime.ZS)
> plot(coef.ZS)
```



summary

- demo of BAS
- use of MCMC
- diagnostics
- effect of correlation

next:

- decision making and prediction