SCRIPT MOD6S3A: INVERSE GAMMA PLOTS

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In our lecture notes we parameterize the inverse-gamma (ig) distribution as

$$p(x) = \frac{\tau_0^{\nu_0}}{\Gamma(\nu_0)} x^{-(\nu_0+1)} exp\left(-\frac{\tau_0}{\nu_0 - 1}\right)$$

with shape ν_0 and scale τ_0. In `R` we can implement this by loading the `MCMCpack` and using `rinvgamma`, as shown below.

In general, setting ν_0 to low values and τ_0 to high values results in a more diffuse prior density. Note that for the mean to be properly defined we need $\nu > 1$, and for the variance to be properly defined we need $\nu > 2$. However, proper definition of moments is not a requirement for a proper prior (i.e. one that integrates to 1). In fact, the "most diffuse" settings for the inverse gamma are $\nu_0 = \tau_0 = 1/2$.

```
R> #vague prior
R> #############
R> R<-100000
R> v0<-3 #prior for D.o.f. parameter for gamma density
R> tau0<-100 #prior for mean of gamma distribution
R> sig2prior1<-rinvgamma(R,v0,scale=tau0)
R> sig2dens1<-density(sig2prior1,kernel="epanechnikov",n=10000)
R> #
R> #mildly informed prior
R> ######################
R> v0<-15 #prior for D.o.f. parameter for gamma density
R> tau0<-50 #prior for mean of gamma distribution
R> sig2prior2<-rinvgamma(R,v0,scale=tau0)
R> sig2dens2<-density(sig2prior2,kernel="epanechnikov",n=10000)
R> #
R> #informed prior
R> ###############
R> v0<-50 #prior for D.o.f. parameter for gamma density
R> tau0<-10 #prior for mean of gamma distribution
R> sig2prior3<-rinvgamma(R,v0,scale=tau0)
R> sig2dens3<-density(sig2prior3,kernel="epanechnikov",n=10000)
R>

R> proc.time()-tic
   user  system elapsed
   0.69    0.07    0.75
```

```
R> par(mfrow=c(3,1),mar=c(2,4,2,0),oma=c(0,0,0,0) )
R> plot(sig2dens1,type="l",main = "vague (v0=3, tau0=100)",xlab = "",ylab = "density",
 lwd=2,col=1,lty=1,xlim=c(0,100))
R> plot(sig2dens2,type="l",main = "mildly informed (v0=15, tau0=50)",xlab = "",ylab = "density",
 lwd=2,col=1,lty=1,xlim=c(0,10))
R> plot(sig2dens3,type="l",main = "strongly informed (v0=50, tau0=10)",xlab = "",ylab = "density",
 lwd=2,col=1,lty=1,xlim=c(0,1))
R> #note: Drop the "xlim=.." part if you want to let "plot" find the limits for x and y.
```

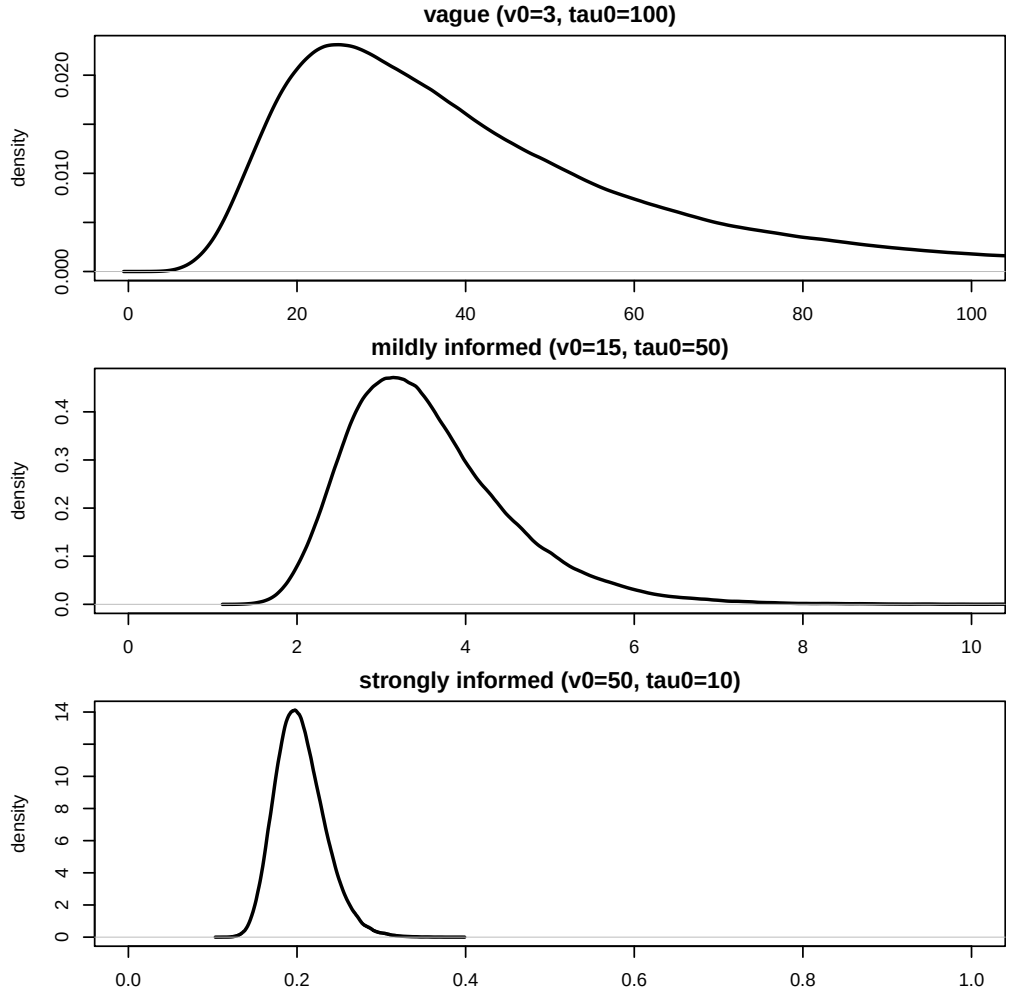

FIGURE 1. ig plots