Demonstration of selected features

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```
library(dsem)
```

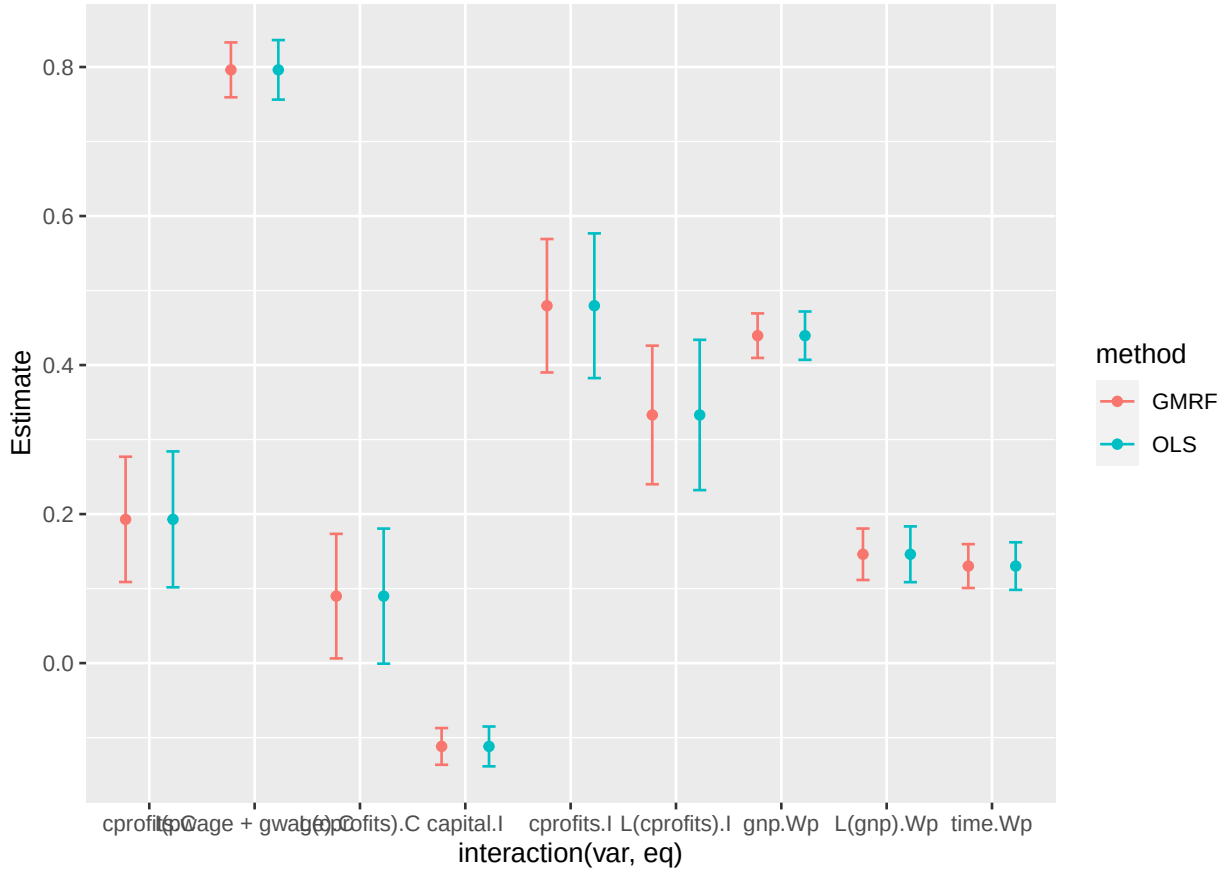
`dsem` is an R package for fitting dynamic structural equation models (PSEMs) with a simple user-interface and generic specification of simultaneous and lagged effects in a non-recursive structure. We here highlight a few features in particular.

Comparison with dynamic linear models

We first demonstrate that `dsem` gives identical results to `dynlm` for a well-known econometric model, the Klein-1 model. We specifically exclude first year for all response variables to match the "casewise-complete" behavior of ordinary least squares:

```
library(dynlm)

data(KleinI, package="AER")
KleinI = ts(data.frame(KleinI, "time"=time(KleinI) - 1931))

# dynlm
fm_cons <- dynlm(consumption ~ cprofits + L(cprofits) + I(pwage + gwage), data = KleinI)
fm_inv <- dynlm(invest ~ cprofits + L(cprofits) + capital, data = KleinI)                  #
fm_pwage <- dynlm(pwage ~ gnp + L(gnp) + time, data = KleinI)

# dsem
sem = "
  cprofits -> consumption, 0, a1
  cprofits -> consumption, -1, a2
  pwage -> consumption, 0, a3
  gwage -> consumption, 0, a3

  cprofits -> invest, 0, b1
  cprofits -> invest, -1, b2
  capital -> invest, 0, b3

  gnp -> pwage, 0, c2
  gnp -> pwage, -1, c3
  time -> pwage, 0, c1
"
tsdata = KleinI[,c("time","gnp","pwage","cprofits",'consumption',"gwage","invest","capital")]
tsdata[1,c('consumption','pwage','invest')] = NA
fit = dsem( sem=sem, tsdata=tsdata, newtonsteps=0, quiet=TRUE )   #
# summary(fit)

# Compile
```

```r
m1 = rbind( summary(fm_cons)$coef[-1,], summary(fm_inv)$coef[-1,], summary(fm_pwage)$coef[-1,] )[,1:2]
m2 = summary(fit$opt$SD)[1:9,]
m = rbind(
  data.frame("var"=rownames(m1),m1,"method"="OLS","eq"=rep(c("C","I","Wp"),each=3)),
  data.frame("var"=rownames(m1),m2,"method"="GMRF","eq"=rep(c("C","I","Wp"),each=3))
)
m = cbind(m, "lower"=m$Estimate-m$Std..Error, "upper"=m$Estimate+m$Std..Error )

# ggplot estimates
library(ggplot2)
ggplot(data=m, aes(x=interaction(var,eq), y=Estimate, color=method)) +
  geom_point( position=position_dodge(0.9) ) +
  geom_errorbar( aes(ymax=as.numeric(upper),ymin=as.numeric(lower)),
                 width=0.25, position=position_dodge(0.9))  #
```



Results show that both packages provide (almost) identical estimates and standard errors.