

BACS HW16

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```
library(seminr)
library(DiagrammeR)
library(semPlot)
sec<-read.csv("C:/Users/eva/Desktop/作業 上課資料(清大)/大四下/BACS/HW16 BACS/security_data_sem.csv", header = T)
dim(sec)
```

```
## [1] 405 85
```

```
sec=as.data.frame(sec)
```

Q1: Composite Path Models using PLS-PM

(a) Create a PLS path model using SEMinR, with all the following characteristics:

(i) Measurement model – all constructs are measured as composites:

```
# Measurement Model
sec_mm<-constructs(
  composite("TRUST", multi_items("TRST", 1:4)),
  composite("SEC", multi_items("PSEC", 1:4)),
  composite("REP", multi_items("PREP", 1:4)),
  composite("INV", multi_items("PINV", 1:3)),
  composite("POL", multi_items("PPSS", 1:3)),
  composite("FAML", single_item("FAML1")),
  interaction_term(iv = "REP", moderator = "POL", method = orthogonal))
```

(ii) Structural Model – paths between constructs as shown in this causal model:

```
sec_sm<-relationships(
  paths(from = c("REP", "INV", "POL", "FAML", "REP*POL"), to = "SEC"),
  paths(from= "SEC",to= "TRUST"))
```

(b) Show us the following results in table or figure formats:

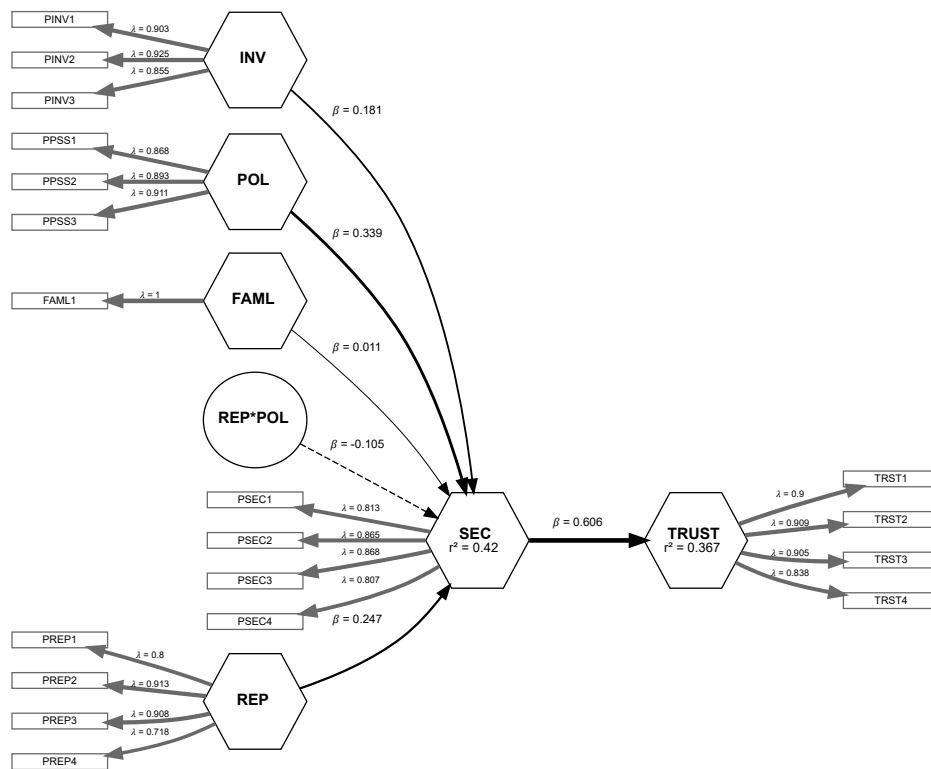
(i) Plot a figure of the estimated model

```
sec_pls<-estimate_pls(
  data=sec,
  measurement_model = sec_mm,
  structural_model = sec_sm)
```

```
## Generating the semnr model
```

```
## All 405 observations are valid.
```

```
plot(sec_pls)
```



(ii)Weights and loadings of composites

```
sec_report<-summary(sec_pls)
sec_report$weights
```

```
##          REP  INV  POL  FAML  REP*POL  SEC  TRUST
## TRST1      0.000 0.000 0.000 0.000    0.000 0.000 0.282
## TRST2      0.000 0.000 0.000 0.000    0.000 0.000 0.280
## TRST3      0.000 0.000 0.000 0.000    0.000 0.000 0.286
## TRST4      0.000 0.000 0.000 0.000    0.000 0.000 0.278
## PSEC1      0.000 0.000 0.000 0.000    0.000 0.277 0.000
## PSEC2      0.000 0.000 0.000 0.000    0.000 0.315 0.000
## PSEC3      0.000 0.000 0.000 0.000    0.000 0.307 0.000
## PSEC4      0.000 0.000 0.000 0.000    0.000 0.292 0.000
## PREP1      0.215 0.000 0.000 0.000    0.000 0.000 0.000
## PREP2      0.334 0.000 0.000 0.000    0.000 0.000 0.000
## PREP3      0.349 0.000 0.000 0.000    0.000 0.000 0.000
## PREP4      0.287 0.000 0.000 0.000    0.000 0.000 0.000
## PINV1      0.000 0.363 0.000 0.000    0.000 0.000 0.000
## PINV2      0.000 0.395 0.000 0.000    0.000 0.000 0.000
## PINV3      0.000 0.358 0.000 0.000    0.000 0.000 0.000
## PPSS1      0.000 0.000 0.360 0.000    0.000 0.000 0.000
## PPSS2      0.000 0.000 0.395 0.000    0.000 0.000 0.000
## PPSS3      0.000 0.000 0.367 0.000    0.000 0.000 0.000
## FAML1      0.000 0.000 0.000 1.000    0.000 0.000 0.000
## PREP1*PPSS1 0.000 0.000 0.000 0.000    0.239 0.000 0.000
## PREP1*PPSS2 0.000 0.000 0.000 0.000    0.031 0.000 0.000
## PREP1*PPSS3 0.000 0.000 0.000 0.000    0.021 0.000 0.000
## PREP2*PPSS1 0.000 0.000 0.000 0.000    0.046 0.000 0.000
## PREP2*PPSS2 0.000 0.000 0.000 0.000   -0.104 0.000 0.000
## PREP2*PPSS3 0.000 0.000 0.000 0.000   -0.228 0.000 0.000
## PREP3*PPSS1 0.000 0.000 0.000 0.000   -0.341 0.000 0.000
## PREP3*PPSS2 0.000 0.000 0.000 0.000    0.095 0.000 0.000
## PREP3*PPSS3 0.000 0.000 0.000 0.000    0.108 0.000 0.000
## PREP4*PPSS1 0.000 0.000 0.000 0.000    0.443 0.000 0.000
## PREP4*PPSS2 0.000 0.000 0.000 0.000    0.382 0.000 0.000
## PREP4*PPSS3 0.000 0.000 0.000 0.000    0.271 0.000 0.000
```

```
sec_report$loadings
```

```
##          REP    INV    POL    FAML REP*POL    SEC    TRUST
## TRST1      0.000  0.000  0.000  0.000 -0.000  0.000  0.900
## TRST2      0.000  0.000  0.000  0.000 -0.000  0.000  0.909
## TRST3      0.000  0.000  0.000  0.000 -0.000  0.000  0.905
## TRST4      0.000  0.000  0.000  0.000 -0.000  0.000  0.838
## PSEC1      0.000  0.000  0.000  0.000 -0.000  0.813  0.000
## PSEC2      0.000  0.000  0.000  0.000 -0.000  0.865  0.000
## PSEC3      0.000  0.000  0.000  0.000 -0.000  0.868  0.000
## PSEC4      0.000  0.000  0.000  0.000 -0.000  0.807  0.000
## PREP1      0.800  0.000  0.000  0.000  0.000  0.000  0.000
## PREP2      0.913  0.000  0.000  0.000  0.000  0.000  0.000
## PREP3      0.908  0.000  0.000  0.000  0.000  0.000  0.000
## PREP4      0.718  0.000  0.000  0.000  0.000  0.000  0.000
## PINV1      0.000  0.903  0.000  0.000 -0.000  0.000  0.000
## PINV2      0.000  0.925  0.000  0.000 -0.000  0.000  0.000
## PINV3      0.000  0.855  0.000  0.000 -0.000  0.000  0.000
## PPSS1      0.000  0.000  0.868  0.000  0.000  0.000  0.000
## PPSS2      0.000  0.000  0.893  0.000  0.000  0.000  0.000
## PPSS3      0.000  0.000  0.911  0.000  0.000  0.000  0.000
## FAML1      0.000  0.000  0.000  1.000 -0.000  0.000  0.000
## PREP1*PPSS1 -0.000 -0.000 -0.000 -0.000  0.581 -0.000 -0.000
## PREP1*PPSS2 -0.000 -0.000  0.000 -0.000  0.510 -0.000 -0.000
## PREP1*PPSS3 -0.000 -0.000 -0.000 -0.000  0.506 -0.000 -0.000
## PREP2*PPSS1 -0.000 -0.000 -0.000 -0.000  0.509 -0.000 -0.000
## PREP2*PPSS2 -0.000 -0.000  0.000 -0.000  0.421  0.000  0.000
## PREP2*PPSS3 -0.000 -0.000 -0.000  0.000  0.336  0.000  0.000
## PREP3*PPSS1 -0.000 -0.000 -0.000  0.000  0.236  0.000  0.000
## PREP3*PPSS2 -0.000 -0.000  0.000 -0.000  0.555 -0.000 -0.000
## PREP3*PPSS3 -0.000 -0.000 -0.000  0.000  0.466 -0.000 -0.000
## PREP4*PPSS1  0.000 -0.000  0.000  0.000  0.900 -0.000 -0.000
## PREP4*PPSS2 -0.000 -0.000 -0.000 -0.000  0.836 -0.000  0.000
## PREP4*PPSS3  0.000 -0.000  0.000  0.000  0.859 -0.000  0.000
```

(iii)Regression coefficients of paths between factors

```
sec_report$paths
```

```
##          SEC TRUST
## R^2      0.420 0.367
## AdjR^2   0.412 0.365
## REP      0.247   .
## INV      0.181   .
## POL      0.339   .
## FAML     0.011   .
## REP*POL -0.105   .
## SEC      . 0.606
```

(iv)Bootstrapped path coefficients: t-values, 95% CI

```
boot_pls<-bootstrap_model(sec_pls,nboot= 1000)
boots_report<-summary(boot_pls)
boots_report$bootstrapped_paths
```

```
##          Original Est. Bootstrap Mean Bootstrap SD T Stat. 2.5% CI
## REP  -> SEC          0.247          0.242          0.058  4.280  0.122
## INV  -> SEC          0.181          0.188          0.056  3.237  0.078
## POL  -> SEC          0.339          0.340          0.053  6.333  0.235
## FAML -> SEC          0.011          0.013          0.058  0.181 -0.102
## REP*POL -> SEC      -0.105         -0.015          0.124 -0.844 -0.197
## SEC  -> TRUST        0.606          0.608          0.036 16.827  0.534
##
##          97.5% CI
## REP  -> SEC          0.347
## INV  -> SEC          0.302
## POL  -> SEC          0.444
## FAML -> SEC          0.129
## REP*POL -> SEC      0.186
## SEC  -> TRUST        0.679
```

Q2:Common-Factor Models using CB-SEM

(a)Create a common factor model using SEMinR, with the following characteristics:

(i)Either respecify all the constructs as being reflective(), or use the as.reflective() function to convert your earlier measurement model to being entirely reflective.

```
sec_cf_mm<-as.reflective(sec_mm)
```

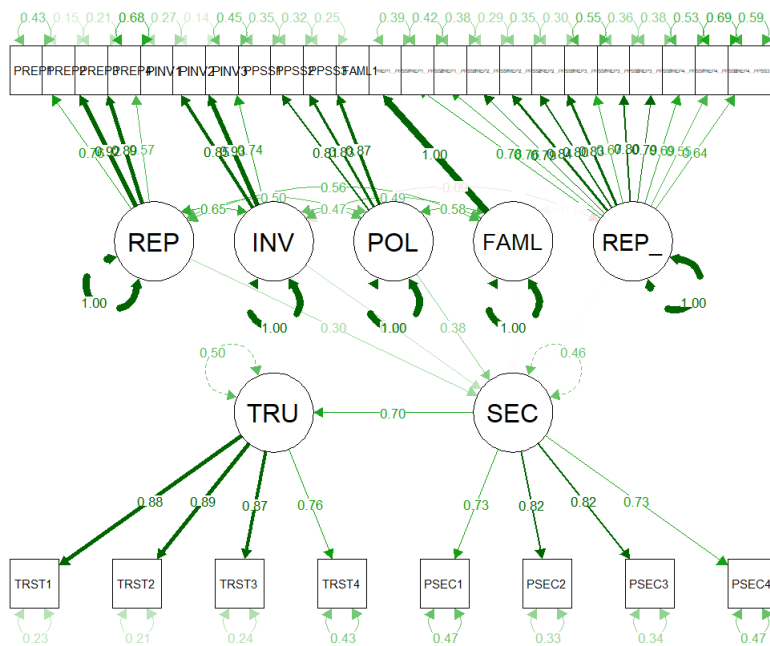
(ii)Use the same structural model as before (you can just reuse it again!)

```
sec_sm<-relationships(
  paths(from = c("REP", "INV", "POL", "FAML", "REP*POL"), to = "SEC"),
  paths(from= "SEC",to= "TRUST"))
sec_cf_pls<-estimate_cbsem(
  data=sec,
  measurement_model = sec_cf_mm,
  structural_model = sec_sm)
```

(b)Show us the following results in table or figure formats

(i)Plot a figure of the estimated model (it will look different from your PLS model!)

```
plot(sec_cf_pls)
```



```
## NULL
```

(ii)Loadings of composites

```
sec_cf_report<-summary(sec_cf_pls)
sec_cf_report$loadings
```

##	TRUST	SEC	REP	INV	POL	FAML
## TRST1	0.8800240	NA	NA	NA	NA	NA
## TRST2	0.8886342	NA	NA	NA	NA	NA
## TRST3	0.8690644	NA	NA	NA	NA	NA
## TRST4	0.7575988	NA	NA	NA	NA	NA
## PSEC1	NA	0.7308766	NA	NA	NA	NA
## PSEC2	NA	0.8173481	NA	NA	NA	NA
## PSEC3	NA	0.8151708	NA	NA	NA	NA
## PSEC4	NA	0.7260444	NA	NA	NA	NA
## PREP1	NA	NA	0.7551328	NA	NA	NA
## PREP2	NA	NA	0.9199208	NA	NA	NA
## PREP3	NA	NA	0.8871362	NA	NA	NA
## PREP4	NA	NA	0.5650059	NA	NA	NA
## PINV1	NA	NA	NA	0.8520004	NA	NA
## PINV2	NA	NA	NA	0.9257476	NA	NA
## PINV3	NA	NA	NA	0.7388750	NA	NA
## PPSS1	NA	NA	NA	NA	0.8051533	NA
## PPSS2	NA	NA	NA	NA	0.8272576	NA
## PPSS3	NA	NA	NA	NA	0.8674335	NA
## FAML1	NA	NA	NA	NA	NA	1

(iii)Regression coefficients of paths between factors, and their p-values

```
sec_cf_report$paths
```

```
## $coefficients
##          SEC      TRUST
## R^2      0.540381651 0.4951084
## REP      0.299536782      NA
## INV      0.214253245      NA
## POL      0.376401499      NA
## FAML     -0.008837653      NA
## REP_x_POL 0.008355287      NA
## SEC      NA      0.7036394
##
## $pvalues
##          SEC      TRUST
## REP      3.817182e-05      NA
## INV      3.534482e-03      NA
## POL      4.380975e-09      NA
## FAML      8.996836e-01      NA
## REP_x_POL 8.516847e-01      NA
## SEC      NA      0
```