BACS - HW (Week 16)

Question1
a.Composite Path Models using PLS-PM
i Measurement model – all constructs are measured as composites

```
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",multi_items("FAML",1))
)
```

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:

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

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i Plot a figure of the estimated model

```
plot(sec_pls)
```

ii Weights and loadings of composites

`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

	REP	INV	POL	FAML	REP*POL	SEC	TRUST
TPREP1*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)
summary(boot_pls)
```

```
Bootstrapped Structural Paths:
          Original Est. Bootstrap Mean Bootstrap SD T Stat. 2.5% CI 97.5% CI
REP  -> SEC          0.247         0.244      0.059  4.172  0.125   0.357
INV  -> SEC          0.181         0.185      0.058  3.133  0.070   0.296
POL  -> SEC          0.339         0.344      0.056  6.099  0.236   0.448
FAML -> SEC          0.011         0.010      0.060  0.176 -0.111   0.125
REP*POL -> SEC      -0.105        -0.023      0.124 -0.844 -0.192   0.187
SEC  -> TRUST        0.606         0.610      0.036 16.706  0.539   0.679
```

Question 2) 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<-constructs(
  reflective("TRUST",multi_items("TRST",1:4)),
  reflective("SEC",multi_items("PSEC",1:4)),
  reflective("REP",multi_items("PREP",1:4)),
  reflective("INV",multi_items("PINV",1:3)),
  reflective("POL",multi_items("PPSS",1:3)),
  reflective("FAML",multi_items("FAML",1)),
  interaction_term(iv="REP", moderator="POL",
method=orthogonal)
)
```

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## 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")
)
```

b.Show us the following results in table or figure formats

```
sec_cf_pls<-estimate_cbsem(
  data=sec,
  measurement_model=sec_cf_mm,
  structural_model=sec_sm)
```

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

```
plot(sec_cf_pls)
```
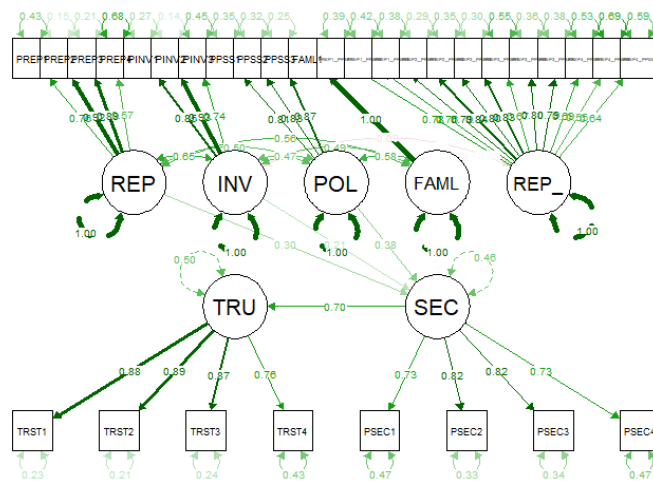
ii. Loadings of composites

`sec_cf_report$composite_scores`

	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

```
             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
```