

## Factor Analysis

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Tue 8/25/2020 4:16 PM

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```
library("corpcor")
```

```
library("GPArotation")
```

```
library("psych")
```

```
library("IDPmisc")
```

```
# Subsetting Data
```

```
FWB1 <- financialWB[, 19:28]
```

```
# Test Assumptions
```

```
## Multicollinearity - looking for things > .9, there are none
```

```
FWBmatrix <- cor(FWB1)
```

```
View(round(FWBmatrix, 2))
```

```
## Some relationship - look for things < .3 with multiple variables
```

```
### FS3 may be suspect - we may want to try to leave it out
```

```
## Bartlett's test
```

```
cortest.bartlett(FWB1)
```

```
### You want the test to be significant and it is! Huzzah!
```

```
## Check the determinants
```

```
det(FWBmatrix)
```

```
### Want it to be < .00001 and it is not - so don't meet assumptions but proceed anyway
```

```
## Trying without that last one since we didn't meet determinant
```

```
FWB2 <- financialWB[, 19:27]
```

```
FWBmatrix2 <- cor(FWB2)
```

```
det(FWBmatrix2)
```

```
### still nothing good there, move on
```

```
## Factor Analysis
```

```
pcModel1 <- principal(FWB1, nfactors=10, rotate="none")
```

```
pcModel1
```

## Based on teh SS Loadings, there are probably 2 factors here

### Examine the scree plot

```
plot(pcModel1$values, type="b")
```

### It confirms 2

```
pcModel2 <- principal(FWB1, nfactors = 2, rotate = "none")
pcModel2
```

## Examine the residuals. It's a good fit if it is less than 50%

```
residuals <- factor.residuals(FWBmatrix, pcModel2$loadings)
residuals <- as.matrix(residuals[upper.tri(residuals)])
largeResid <- abs(residuals) > .05
sum(largeResid)
sum(largeResid/nrow(residuals))
```

### Rotation and interpretation and cut

### But try 3 also because it was > 50%

```
pcModel3 <- principal(FWB1, nfactors = 3, rotate = "none")
pcModel3
```

```
residuals <- factor.residuals(FWBmatrix, pcModel3$loadings)
residuals <- as.matrix(residuals[upper.tri(residuals)])
largeResid <- abs(residuals) > .05
sum(largeResid)
sum(largeResid/nrow(residuals))
```

### That actually looks much better - so you may want to interpret with 2 or with 3

```
print.psych(pcModel3, cut = .3, sort=TRUE)
```

```
print.psych(pcModel2, cut = .3, sort=TRUE)
```

#### Try with some different rotations

```
pcModel4 <- principal(FWB2, nfactors = 3, rotate = "oblimin")
print.psych(pcModel4, cut=.3, sort=FALSE)
```

```
pcModel5 <- principal(FWB2, nfactors = 3, rotate = "varimax")
print.psych(pcModel5, cut=.3, sort=FALSE)
```

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